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Technical Report Overview

Report: Line Creek Local Aquatic Effects Monitoring Program (LAEMP) Report, 2020

Overview: This report presents the 2020 results of the local aquatic effects monitoring program 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 on biological productivity and tissue selenium accumulation downstream of the facility.

This report was prepared for Teck by Minnow Environmental Inc.

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

Line Creek Local Aquatic Effects Monitoring Program (LAEMP) Report, 2020

Prepared for:
Teck Coal Limited
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Prepared by:
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April 2021

Line Creek Local Aquatic Effects Monitoring Program (LAEMP) Report, 2020

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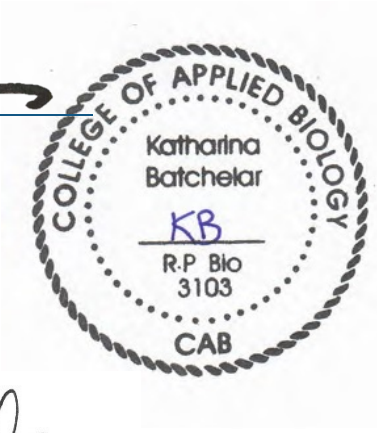

EXECUTIVE SUMMARY

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). There are three main foci to the monitoring in relation to the operation of the AWTF. Firstly, the fluidized bed reactor technology used at the WLC AWTF for selenium and nitrate removal 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 phosphorus concentrations to increase in Line Creek downstream from the WLC AWTF discharge and potentially cause increased algal growth and changes to the trophic status and biotic community structure. Secondly, selenium removal from water involves microbial uptake, which deceases 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., selenite and organoselenium). The third focus of the LAEMP is to monitor other conditions related to active water treatment that could potentially adversely influence the receiving environment, other than those addressed by the first two foci.

Based on the above, the objectives for the Line Creek LAEMP were expressed as the following study questions: (1) Is active water treatment affecting biological productivity downstream in Line Creek? (2) Are tissue selenium concentrations reduced downstream from the WLC AWTF? and (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 report evaluates monitoring data up to the end of the 2020 calendar year.

The WLC AWTF was recommissioned in 2018 with an Advanced Oxidation Process (AOP[1]), which is designed to reverse the shift in selenium species in AWTF effluent from chemically-reduced species back to a selenate-dominated condition. This change in treatment process was implemented in response to monitoring in 2016 and 2017 that confirmed elevated aqueous concentrations of chemically-reduced selenium in AWTF effluent (which have greater potential for bioaccumulation than selenate) and correspondingly elevated selenium concentrations in benthic invertebrates. Discharge to the receiving environment from the AWTF with AOP began on October 28, 2018 with variable flow and continued to do so until December 30, 2018, at which time consistent treatment flow near the maximum capacity of the

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

facility began and has continued to do so into 2020. The scope of the present report covers until the end of December 2020.

Biological productivity downstream in Line Creek did not appear to be influenced by operational activities of the AWTF with AOP in 2020. Periphyton coverage at both mine-exposed (except for RG_LILC3 and RG_LIDCOM) and reference areas was moderate in 2020 (based on visual assessment) and showed temporal consistency with previous sampling during operations with previous years except at two areas. Increased periphyton coverage was noted at RG_LILC3 and RG_LIDCOM but these results were not associated with increased nutrient concentrations (nitrate, phosphorus, or orthophosphate) or increased periphyton coverage at monitoring areas located between the two sites (RG_LISP24 and RG_LIDSL) suggesting the increased was unlikely to be related to AWTF discharge. Benthic invertebrate biomass and density at mine-exposed areas of Line Creek also showed no significant increases in 2020 related to previous years that could be related to operation of the AWTF with AOP. Benthic invertebrate community endpoints, as determined from kick and sweep sample collection, indicated no consistent adverse change in community characteristics related to operation of the AWTF with AOP in 2020. Similar to 2019, an increase in the percentage of sensitive taxa (Ephemeroptera) in 2020 at areas of Line Creek furthest downstream from the AWTF discharge was suggestive of an improvement in benthic invertebrate community structure in lower Line Creek areas. Overall, biological productivity downstream from the WLC AWTF in 2020 did not change relative to previous years.

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 in 2020 compared to AWTF operation (without AOP). As a result, mean benthic invertebrate selenium concentrations in 2020 were below the Level 1 Elk Valley Water Quality Plan (EVWQP; 13 mg/kg) benchmark (for growth, reproduction, and survival of invertebrates) at all areas downstream of the AWTF discharge (excluding one sampling event in April at RG_LILC3 which had a mean selenium concentration of 14 mg/kg). Similar to past results, concentrations of aqueous non-selenate species in 2020 were generally low and reflective of the low bioaccumulation in benthic invertebrates. Comparison of benthic invertebrate selenium concentrations to the selenium bioaccumulation model indicated that selenium bioaccumulation in 2020 was within expectations of the model except three samples at RG_LILC3 (in April) were associated with a seasonal (i.e., winter) increase in concentrations of aqueous non-selenate species. Similar increases in aqueous non-selenate species were also observed in the winter of previous years, both when the AWTF was operational with and without the AWTF (e.g., Minnow 2018b, Minnow 2020a) and to some extent when flow through the AWTF without AOP was reduced in early 2018 (Minnow 2019a). Despite exceeding selenium bioaccumulation model predictions, selenium in the three samples from RG_LILC3 in April remained lower in concentration and closer

to selenium bioaccumulation model upper prediction interval than those during ATWF operation without AOP. Combined, the results from the 2020 LCO LAEMP indicated that the recommissioned AWTF with AOP functioned as intended to decrease the non-selenate species in AWTF effluent, resulting in selenium accumulation in benthic invertebrates from Line Creek that, with the exception of three samples, would be expected based on the selenium bioaccumulation model.

Operation of the AWTF with AOP in 2020 did not result in an obvious change in 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 during AWTF with AOP operation in 2020. No acute toxicity effects were noted in 2019 for either downstream area evaluated (LC_LC3 and less than previous year and/or were not influenced by AWTF discharge.

Overall, operation of the WLC AWTF with AOP in 2020 functioned as designed to remove aqueous total selenium and nitrate from effluent. Recommissioning of the AWTF with AOP resulted in reduced selenium bioaccumulation downstream in Line Creek relative to AWTF operation without AOP by decreasing the concentrations of non-selenate species in AWTF effluent. In addition, operation of the AWTF with AOP in 2020 did not influence the receiving environment through effects to biological productivity, or through potential effects related to factors other than nutrients or selenium. Results of the 2020 LCO LAEMP provide information that supports Teck's Adaptive Management Program and inform adjustments to monitoring.

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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

CABIN – Canadian Aquatic Biomonitoring Network

CMO – Coal Mountain Operation

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

HR-ICP-MS – High Resolution Inductively Coupled Plasma Mass Spectrometry

ICP-MS – Inductively Coupled Plasma Mass Spectrometry

K-M – Kaplan-Meier Method

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

QA/QC – Quality Assurance / Quality Control

RAEMP – Regional Aquatic Effects Monitoring Program

SPO – Site Performance Objective

SRC – Saskatchewan Research Council

WLC – West Line Creek

1 INTRODUCTION

1.1 Background

Teck Coal Limited (Teck) operates five steelmaking coal mines in the Elk River watershed, including the Fording River Operation (FRO), Greenhills Operation (GHO), Line Creek Operation (LCO), Elkview Operation (EVO), and Coal Mountain Operation (CMO; Figure 1.1). 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 five Elk Valley mine operations.

Section 8.3.1 of Permit 107517 (version March 11, 2021) outlines the requirements for the Line Creek Local Aquatic Effects Monitoring Program (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[2] and submitted to the Director for approval by May 1 each year."*

Also, Section 9.5 of Permit 107517 states:

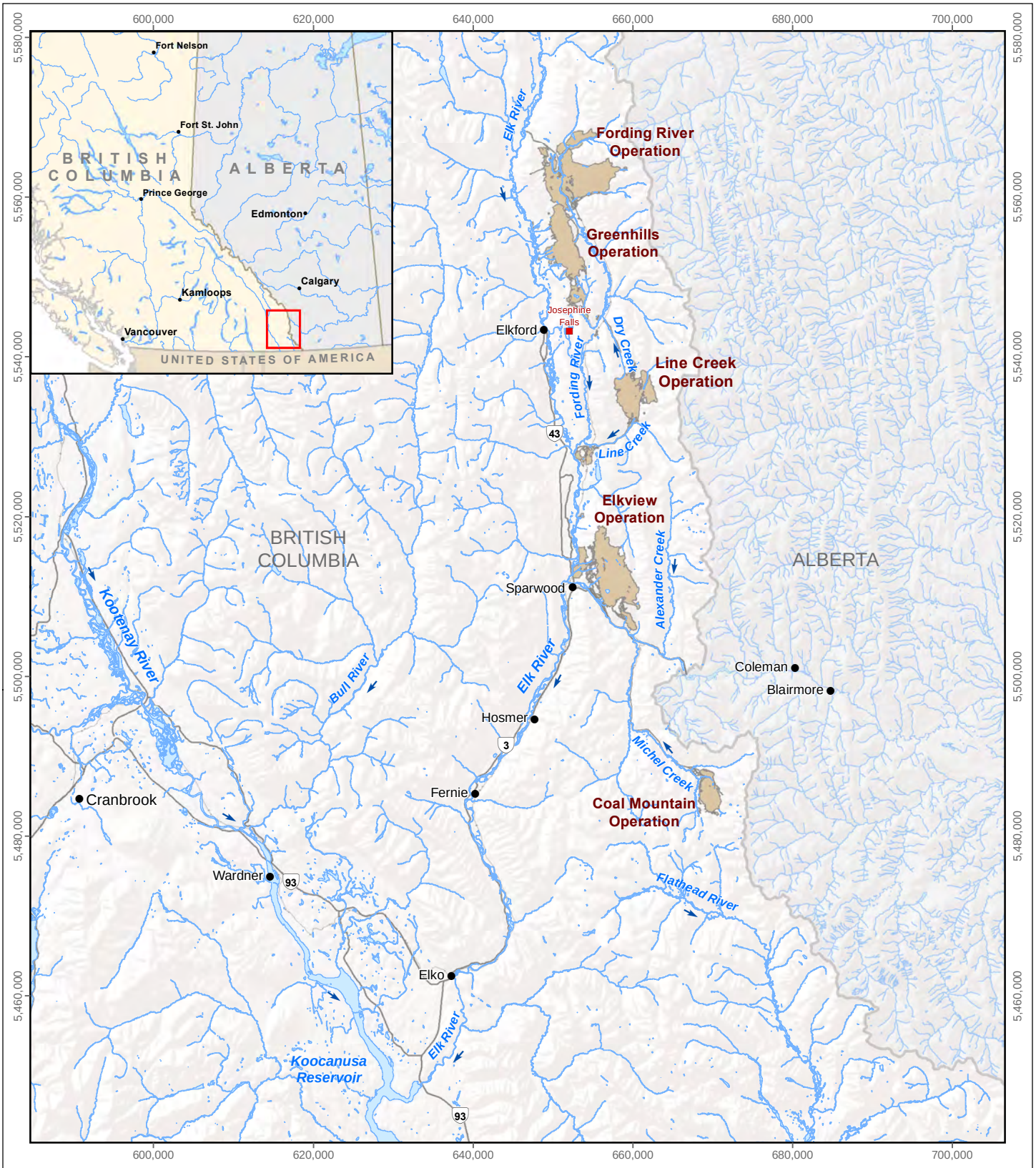
> *The LAEMP Annual Reports must be reported on in accordance with generally accepted standards of good scientific practice in a written report and submitted to the Director by April 30 of each year following the data collection calendar year.*

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 (i.e., annual sampling and more comprehensive monitoring every three years, with the next cycle of annual sampling to be completed in September 2021).

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;

[2] EMC refers to the Environmental Monitoring Committee, which Teck was required to form under Permit 107517. The EMC consists of representatives from Teck, ENV, 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 Operation

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

Date: April 2021
Project 207202.0015

minnow environmental inc.

Figure 1.1

Document Path: C:\Users\MLaPalme\Trinity Consultants, Inc\Teck - 207202.0015 - LCO LAEMP\4 - GIS\LCO LAEMP\20-15 Figure 1.1 Teck Coal Limited Operation.mxd

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

The goal of the Line Creek LAEMP is to assess site-specific conditions (e.g., commissioning of active water treatment) on a more frequent and localized basis than the RAEMP, as required until sufficient data have been collected, concerns no longer exist, or relevant monitoring can be incorporated into the RAEMP.

1.2 Study Questions

Although the broader objective of the Line Creek LAEMP is to assess site-specific conditions at LCO, the LAEMP was designed with the primary focus of monitoring aquatic health and evaluating potential effects related to the commissioning of the West Line Creek (WLC) Active Water Treatment Facility (AWTF) at LCO. Monitoring related to the operation of the WLC AWTF includes three main foci for the assessment of potential adverse effects to the receiving environment. These three foci are as follows:

1. The potential for changes in productivity, trophic status, and biological community structure downstream of the WLC AWTF. The fluidized bed reactor technology used at the WLC AWTF for selenium and nitrate removal 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 phosphorus concentrations to increase in Line Creek downstream from the WLC AWTF discharge. Increased phosphorus concentrations in Line Creek could potentially cause increased algal growth and changes to trophic status and biological community structure.

2. 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 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). The WLC AWTF

was recommissioned in 2018 with an Advanced Oxidation Process (AOP) to mitigate observed increases in aqueous non-selenate selenium concentrations and in selenium accumulation in aquatic biota in the receiving environment (see Section 1.3 for details).

3. 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).

Based on the above, the objectives for the Line Creek LAEMP were expressed as the following study questions:

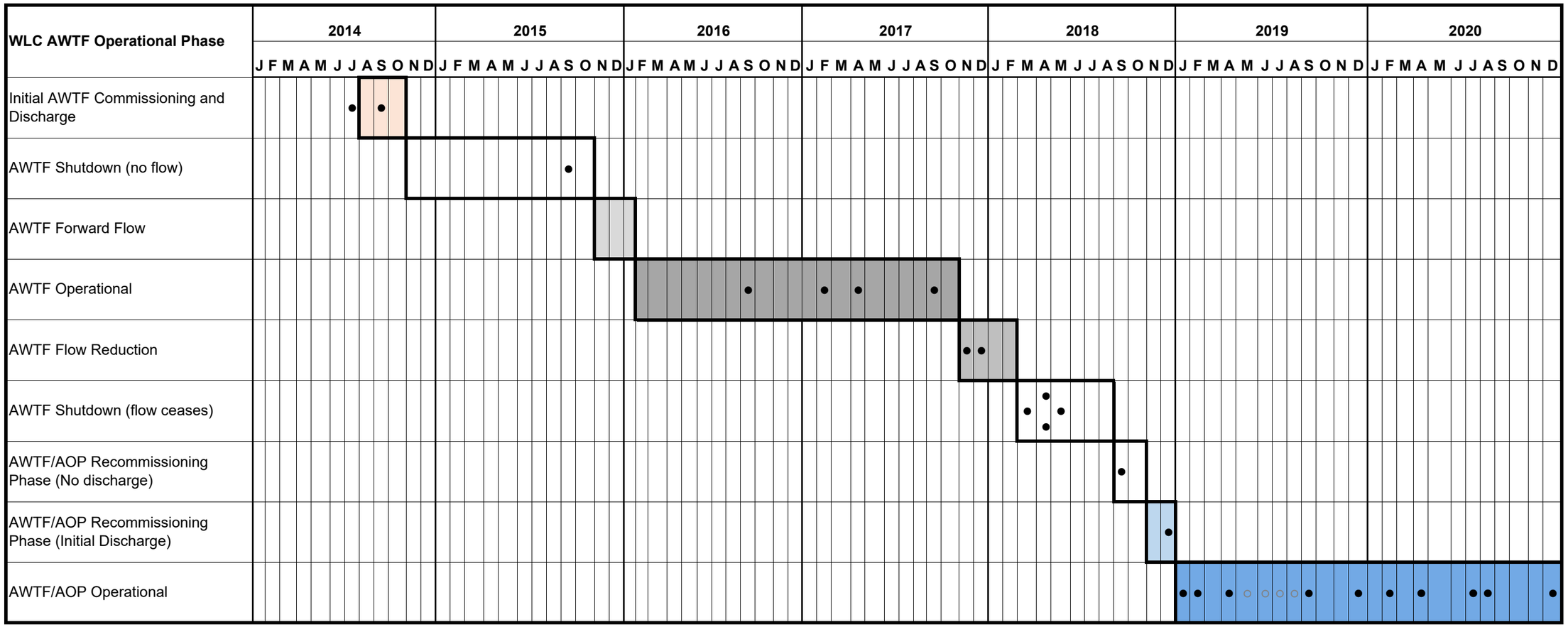
1. Is active water treatment affecting biological productivity downstream in Line Creek?
2. Are tissue selenium concentrations reduced downstream from the WLC AWTF?
3. Is WLC AWTF operation affecting aquatic biota through thermal effects, effects on dissolved oxygen concentrations, or concentrations of treatment-related constituents other than nutrients or selenium?

1.3 WLC AWTF Operational Timeline

Sampling for the Line Creek LAEMP began in September 2012 prior to initial commissioning of the WLC AWTF in 2014 (Figure 1.2). Interpretive reports for the Line Creek LAEMP have been submitted annually for monitoring that was initiated in 2014 (Minnow 2015, 2016, 2017a, 2018b, 2019b, 2020a).

The AWTF operated briefly in 2014 (July 24 to October 17) 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 (Figure 1.2). An increase in selenium concentrations in benthic invertebrates downstream of the AWTF was then noted in September 2016 (Minnow 2017a). Following this, Teck identified challenges in the performance of the WLC AWTF with respect to selenium treatment. Although treatment successfully resulted in lower aqueous total selenium concentrations in Line Creek, aqueous concentrations of chemically-reduced selenium species were elevated in AWTF effluent. These selenium species have greater potential for bioavailability to aquatic biota than selenate, which is the dominant form in the influent and other areas of the watershed (Minnow 2017a).

Continued monitoring in 2016 and 2017 confirmed that selenium concentrations in benthic invertebrates were significantly elevated downstream of the AWTF discharge relative to



● = 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 2020

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

historical levels (Minnow 2017a, 2018b), and indicated that aqueous concentrations of chemically-reduced selenium species were elevated in Line Creek downstream of the AWTF. Teck then temporarily suspended AWTF operations in response to these results. Specifically, effluent flow through the AWTF was decreased by approximately half[3] starting in October 2017 before ceasing temporarily in March 2018 (Table 1.1, Figure 1.2), following the receipt of necessary authorizations from regulators. The AWTF flow reduction and shutdown process was supported by an approved monitoring plan (ENV 2018) that augmented the monitoring outlined in the 2017 Line Creek LAEMP study design (Minnow 2017c). During the shutdown period, concentrations of chemically-reduced aqueous selenium species decreased substantially, as did selenium concentrations in benthic invertebrate tissues (Minnow 2019a).

The AWTF remained shut down until recommissioning with an advanced oxidation process (AOP[4]) which was initiated on August 30, 2018 (no discharge to the environment occurred during this initial recommissioning; 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 reducing 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 (Table 1.1, Figure 1.2) and this continued until December 29, 2018 (120 days after the start of recommissioning with AOP)[5], after which the AWTF with AOP operational phase began. The AWTF with AOP operational phase which started on December 20, 2018 has continued throughout 2019 and 2020 and is ongoing.[6] The AWTF was operational throughout 2020.[7]

[3] AWTF effluent flow was approximately 5,300 - 5,500 m^3/day during operational phase, then was reduced to approximately 2,500 m^3/day during the flow reduction period.

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

[5] AWTF effluent flow was 0 to approximately 7,500 m^3/day during operation stabilization of AWTF with AOP.

[6] 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) has been 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.

[7] The AWTF was shut down for brief periods of over 24 hours on four occasions in 2020. On July 14 and September 30, 2020, the AWTF was shut down for annual maintenance, while on September 20 and December 9th, 2020 the AWTF was shut down due to a power failure (lasting for ~50 h) and boiler issues (lasting for ~80 h), respectively (Teck 2021a).

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		01-Feb-16	14-Oct-17	~5,300 to 5,500
AWTF Flow Reduction		15-Oct-17	08-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.

[a] 120 days after recommissioning date.

1.4 Linkages to Teck's Adaptive Management Plan

As required in Permit 107517 Section 10, Teck has developed an Adaptive Management Plan (AMP). The purpose of the AMP is to support implementation of the Elk Valley Water Quality Plan (EVWQP) to achieve water quality and calcite targets, to be protective of human health and the environment, and where necessary, restorative, and to facilitate continuous improvement of water quality in the Elk Valley (Teck 2018). Following an adaptive management framework, the AMP identifies six Management Questions that will be re-evaluated at regular intervals as part of AMP updates throughout EVWQP implementation. Data from the RAEMP (Minnow 2018d, Minnow 2020b) and the various LAEMPs (including the present monitoring program) will feed into the adaptive management process to address these Management Questions that collectively address the environmental management objectives of the AMP (Teck 2018) and the EVWQP (Teck 2014). The AMP also identifies key uncertainties that need to be reduced to fill gaps in current understanding and support achievement of the EVWQP objectives.

Monitoring data from the LAEMP will contribute to the broader data set assessed every three years within the RAEMP, in addition to addressing questions specific to the Line Creek LAEMP on an annual basis. The RAEMP is designed to evaluate multiple management related questions, such as Management Question #2, (i.e., "Will aquatic ecosystem health be protected by meeting the long-term site performance objectives?) and Management Question #5 (i.e., "Does monitoring indicate that mine-related changes in aquatic ecosystem conditions are consistent with expectations?"). Additionally, for each Management Question a "Key Uncertainty" framework has also been developed to identify data gaps and direct future work (as described in annual AMP Reports). Information acquired from the Line Creek LAEMP will be used in conjunction with studies in the Elk Valley area (including other LAEMPs) to reduce these uncertainties and provide additional context to the ecological conditions of the Elk Valley area as a whole.

The evaluation of biological triggers for potential adaptive monitoring and management actions is incorporated as part of Management Question #5 of the AMP (Teck 2018). Generally, triggers are intended as a simple way to flag potential unexpected monitoring results that may require additional evaluation and action under the adaptive management response framework. In the 2020 LCO LAEMP, percent EPT (Ephemeroptera [mayflies], Plecoptera [stoneflies], and Trichoptera [caddisflies]) and composite-taxa benthic invertebrate tissue selenium concentration were assessed against their respective biological triggers (additional information and methods pertaining to this analysis can be found in Appendix E).

The second annual AMP report was submitted on July 31, 2020 and included data from 2019 (Teck 2020). This report indicated that aqueous nitrate concentrations at the Line Creek Compliance Point exceeded the Site Performance Objective (SPO; monthly average and daily maximum) in 2019 (Teck 2020). This is consistent with the nitrate SPO exceedances observed in 2018 at this site, which triggered an AMP response framework (Teck 2019b); however, the magnitude of SPO exceedances in 2019 was lower than in 2018 (Teck 2020). Actions associated with the AMP response to elevated aqueous nitrate concentrations in 2019 focused on further investigations and adjustments and are outlined in detail in the 2019 Annual AMP report (Teck 2020). The investigation of cause identified blasting residue on waste rock as the source of nitrate in Line Creek. Several adjustments have been implemented as part of the AMP response framework and operations continue to implement and refine blasting practices, continue evaluation of blasting products and the utilization of drill hole liners for blasting (Teck 2019b). Additional mitigation is planned through long-term adjustments outlined in the 2019 Implementation Plan Adjustment (Teck 2019a).

Concentrations of aqueous total selenium also exceeded the SPO (daily maximum) at the Line Creek Compliance Point in 2019 (two events; Teck 2020) also occurred in 2019 (Teck 2019b). These exceedances were identified in the AMP response framework for 2019, which was triggered in 2018 (Teck 2019b, 2020). Selenium monitoring related to the LCO LAEMP is focused on concentrations in biota with the primary monitoring objective to evaluate conditions associated with the WLC AWTF operation. Specifically, the Line Creek LAEMP Question #2 is: “Are tissue selenium concentrations reduced downstream from the WLC AWTF?”. Adaptive management actions related to this LCO LAEMP monitoring have been implemented based on changes to the AWTF operational status as well as in response to biological tissue selenium results. For example, previous monitoring actions have included the addition of supplemental monthly monitoring of benthic invertebrate selenium concentrations between May and August 2019. This was completed following forward flow (and discharge to the receiving environment which began in October 2018) from the newly recommissioned AWTF with AOP support better understanding of the AWTF with AOP performance. In addition, adjustments were made to the timing of benthic invertebrate selenium monitoring in 2020 (per request of the EMC) to better reflect spawning events of westslope cutthroat trout (see Minnow 2020c for details). The implementation of actions under the adaptive management framework is not constrained to the AMP or LAEMP annual reporting cycles, but may be (and have been) triggered at any time during the course of each annual LAEMP cycle (results are reported on April 30th of each year for the preceding calendar year) depending on the answers to site-specific LAEMP questions and on available data. Monitoring plans and schedules will continue to adapt to findings in the field and operational needs.

For more information on the adaptive management framework, the Management Questions, the Key Uncertainties, the Response Framework, Continuous Improvement, linkages between the AMP and other EVWQP programs, and AMP reporting, refer to the AMP (Teck 2018) and the 2019 Annual AMP report (Teck 2020).

2 METHODS

2.1 Overview

The general approach for the Line Creek LAEMP (see Table 2.1) includes 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 2020 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 (Table 2.2, Figure 2.1). These monitoring areas represent the same locations that have been sampled for the LCO LAEMP since 2017[8] (Minnow 2018b) and include 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 West Line Creek 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 West Line Creek. The monitoring areas RG_LILC3, RG_LISP24, RG_LIDSL, RG_LIDCOM, and RG_LI8 are monitoring areas downstream from the WLC AWTF that provide spatial resolution of the potential influence of the AWTF treatment in Line Creek. Monitoring areas RG_FRUL and RG_FO23 are situated in the Fording River upstream and downstream of the Line Creek confluence, respectively (Table 2.2, Figure 2.1). Continuous water temperature is also monitored at several locations (Figure 2.2, Table 2.3).

To address the study questions described in Section 1.2, the 2020 Line Creek LAEMP included evaluation of the following components:

- Periphyton visual coverage scores;
- Benthic invertebrate density, biomass, community, and tissue selenium concentrations (composite-taxa samples);
- Concentrations of nutrients, total selenium, selenium species, and other analytes (i.e., those listed in Section 2.2.1) in water, based on routine water quality monitoring;

[8] The LCO LAEMP locations monitored in 2020 were the same as those initially sampled for the LCO LAEMP in 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).

Table 2.1: General Approach for the 2020 Line Creek LAEMP, as Presented in the LAEMP Study Design (Minnow 2020a)

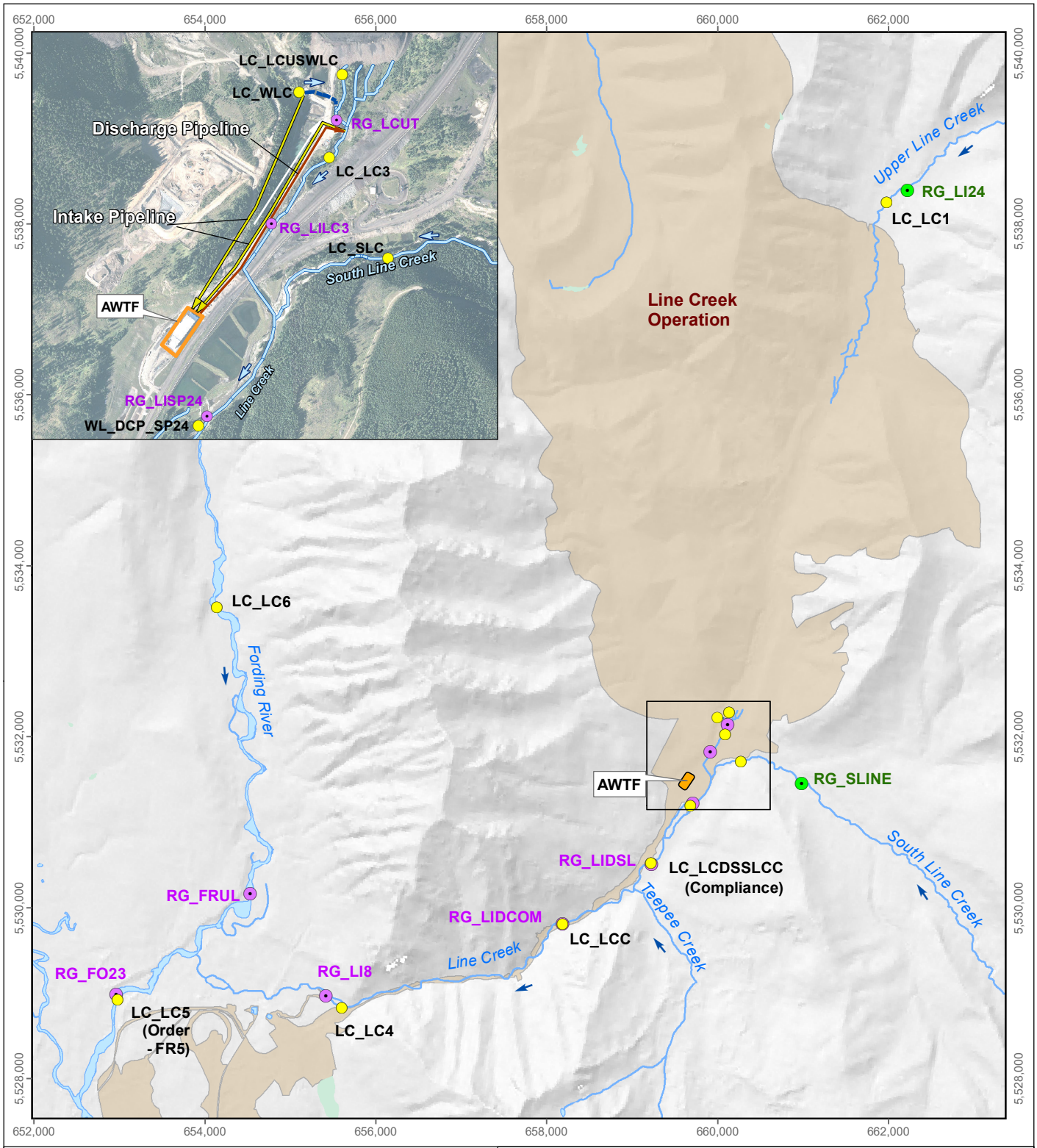
Key Questions	Assessment Endpoints	Measurement Endpoints				How Data will be Evaluated to Address Key Question[a]
		Water	Sampling Areas	Biological	Sampling Areas	
Is active water treatment affecting biological productivity downstream in Line Creek?	Biological productivity downstream from the AWTF discharge 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.

Table 2.2: Monitoring Areas Associated with Line Creek LAEMP, 2020

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



LEGEND

- Teck Water Quality Station
- Mine-exposed Biological Sampling Area
- Reference Biological Sampling Area
- Active Water Treatment Facility (AWTF) Operational-Dependent Flow
- Active Water Treatment Facility (AWTF)
- Teck Coal Mine Operation

Line Creek LAEMP Biological Monitoring Areas and Teck Water Quality Stations, 2020

0 1 2 4 km

Map Projection: UTM Zone 11 U NAD 1983

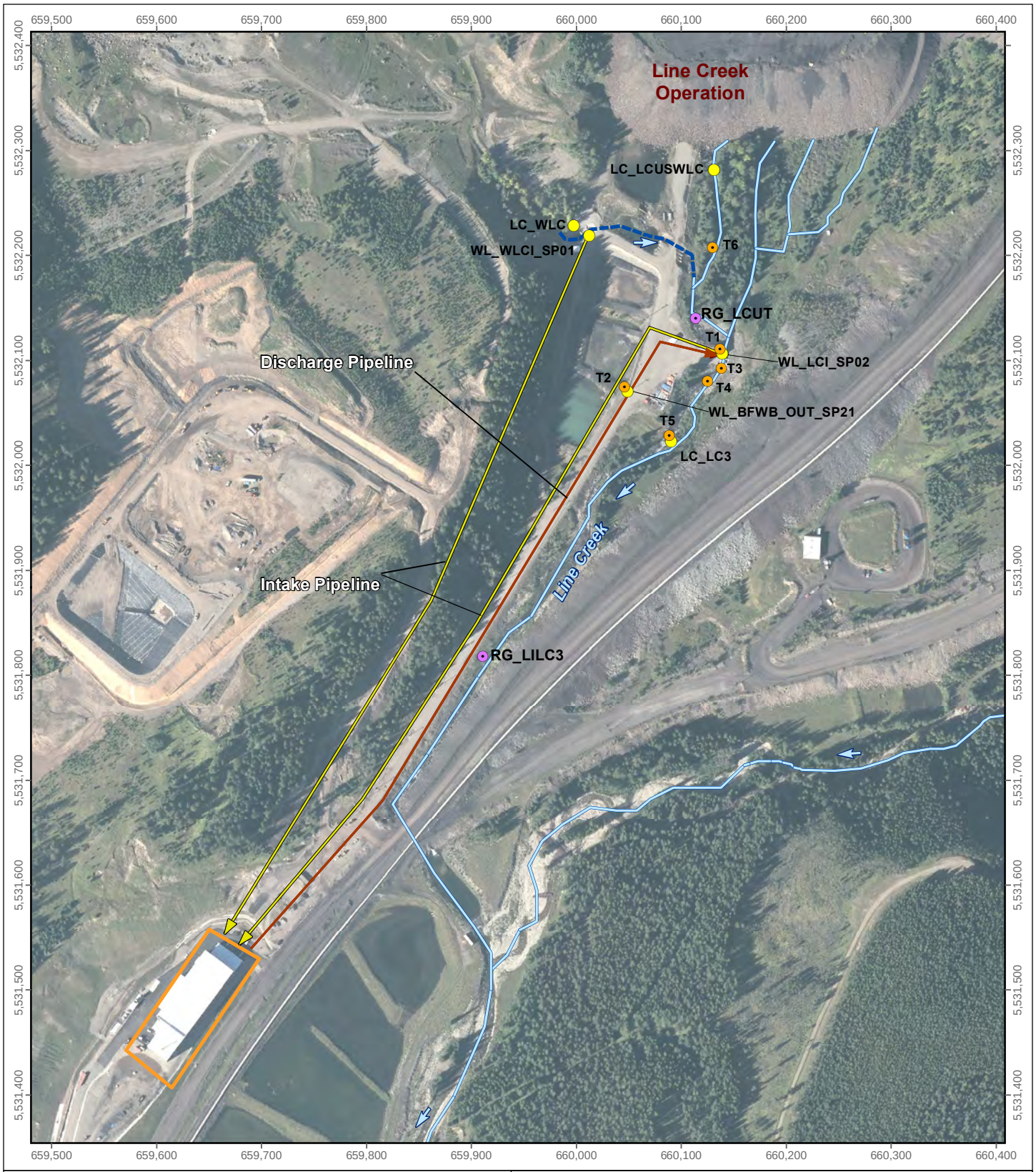
N W E S

Date: April 2021
Project 207202.0015

minnow environmental inc.

Figure 2.1

Document Path: C:\Users\MLaPalme\Trinity Consultants, Inc\Teck - 207202.0015 - LCO LAEMP\4 - GIS\LCO LAEMP\20-15 Figure 2.1 LC LAEMP Bio Monitoring Areas and Teck WQ Stations.mxd



LEGEND

- Temperature Data Logger
- Biological Monitoring Area
- Teck Water Quality Station
- Active Water Treatment Facility (AWTF) Operational-Dependent Flow
- Active Water Treatment Facility (AWTF)

Line Creek LAEMP Monitoring Areas and Teck Water Quality Stations in Upper Line Creek, 2020

0 85 170 340 Meters

N W E S

Projection: North American Datum 1983 UTM Zone 11 U

Date: April 2021
Project 207202.0015

minnow environmental inc.

Figure 2.2

Document Path: C:\Users\MLaPalme\Trinity Consultants, Inc\Teck - 207202.0015 - LCO LAEMP\4 - GIS\LCO LAEMP\20-15 Figure 2.2 Line Creek LAEMP Monitoring Areas and Teck WQ in Upper Line CK.mxd

Table 2.3: Temperature Data Logger Locations, 2020

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 5m Downstream of Discharge	660130	5532076
T5	Temperature at LC3 (100m DS of outfall)	660092	5532030
T6	Temperature at LCUT (upstream of LC Intake and T1 data logger)	660130	5532208

- *In situ* water quality (including temperature and dissolved oxygen) at routine water quality monitoring locations;
- Water temperature upstream and downstream of the WLC AWTF recorded continuously with data loggers; and
- Toxicity of WLC AWTF effluent and surface water samples collected downstream of the AWTF outfall, in the Fording River (downstream of Line Creek), and at reference.

Water quality monitoring and acute and chronic water toxicity testing results presented in this report include requirements specified under Permit 107517 (ENV 2021). Biological sampling in 2020 was completed in accordance with the 2019 and 2020 LCO LAEMP study designs (Minnow 2019b, 2020c). Benthic invertebrate tissue selenium monitoring was completed five times in 2020; in late February and late April 2020 as specified in the 2019 LCO LAEMP study design (Minnow 2019b), and in July, early September, and early December 2020 as specified in the 2020 LCO LAEMP study design (Minnow 2020c). It should be noted that the benthic invertebrate tissue selenium sampling events outlined in the previous LCO LAEMP study designs (2018 and 2019) occurred in February, April, September, and December (Minnow 2018c, 2019b), while sampling events encompassed by the 2020 LCO study design occurred in late April, July, September, and December (i.e., compared to prior years the February sampling event was removed and a July sampling event was added). This modification in the

timing of sample collection was requested by the EMC to provide more information on the dietary exposure of westslope cutthroat trout to selenium (measured in benthic invertebrate composite-taxa samples) close to their spawning window which occurs in the spring (see Minnow 2020c for details).

Fish tissue monitoring (which was completed in previous years; Minnow 2018b, 2019a, 2020a) was excluded from the 2020 LCO LAEMP monitoring program in an effort to help reduce the potential for sampling stress on bull trout and westslope cutthroat populations in Line Creek related to LAEMP monitoring activities. The exclusion of fish tissue monitoring in 2020 was based on feedback from the EMC and the Elk Valley Fish and Fish Habitat Committee (EVFFHC) and as a proactive measure in response to a decline in the Upper Fording River westslope cutthroat trout population in 2019 (Cope 2020).

2.2 Water Quality

2.2.1 Routine Water Quality

Water quality data assessed as part of the Line Creek LAEMP included data for routine monitoring managed by Teck (Tables 2.4 and 2.5), and water samples collected at the biological monitoring stations concurrently with biological sampling (Table 2.2, Figure 2.1)[9]. Water quality data were downloaded from Teck's EQuIS™ database, including:

- Nutrient concentrations (i.e., nitrate, nitrite, ammonia, total phosphorus, and orthophosphate); 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[10], 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 (previously noted above), uranium, and zinc, and dissolved concentrations of cadmium and cobalt];

[9] The routine water quality monitoring locations and the biological monitoring locations for some areas differ slightly (e.g., LC_LCUSWLC; Figure 2.1).

[10] The selenium species methaneselenonic acid was identified as an "unknown" selenium species (Se_Unknown; see Appendix G) eluting between methylseleninic acid and selenomethionine in laboratory reports associated with the LCO LAEMP prior to December 2020. For the present report, these "unknown' species results have been identified as methaneselenonic acid throughout 2020 results to maintain consistency in data interpretation of selenium speciation results.

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]	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	E293371	660138	5532109	Mine-exposed	D	M	-	-
West Line Creek AWTF Influent	WL_WLCI_SP01	E293370	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; 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 LT_{50}; 48-hr Daphnia spp. LT_{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).

Table 2.5: 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.

- Concentrations of analytes with British Columbia Water Quality Guidelines (BCWQG; BCMOECCS 2019, 2021) and/or water quality benchmarks
- (Teck 2014, Golder 2017b; see Appendix Table D.1 for a list of analytes and associated screening values); and
- *In situ* water quality data (i.e., temperature, pH, specific conductivity, and dissolved oxygen).

Quality assurance and quality control (QA/QC) associated with routine water quality monitoring were discussed in the annual water quality report for Permit 107517 (Teck 2021b). Quality control results associated with water samples collected concurrently with biological samples are discussed in greater detail in the Data Quality Review (DQR) in Appendix A (see Appendix G for applicable laboratory reports).

2.2.2 Toxicity Testing

Effluent samples from the WLC AWTF (WL_BFWB_OUT_SP21) were collected for acute toxicity testing, as stipulated in Permit 107517 (Table 2.4). The following acute toxicity tests were performed:

- Single concentration acute toxicity test (96-hour LT_{50}) using rainbow trout (*Oncorhynchus mykiss*); universal method: EPS 1/RM/9 (Environment Canada 2007a); and
- Single concentration acute toxicity test (48-hour LT_{50}) using *Daphnia* spp.; universal method: EPS 1/RM/11 (Environment Canada 1996).

Chronic toxicity tests were also completed on water samples collected quarterly and semiannually in 2020 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 (LC_LC5; Table 2.4, Figure 2.1), as per the Permit 107517 (March 11, 2021). Chronic toxicity tests were also completed on water samples from one reference area (LC_SLC) in 2020 to develop a within-watershed reference location for Line Creek. The quarterly and semi-annual tests were completed as follows:

Quarterly tests:

- 72-hour growth/inhibition test using a freshwater alga (*Pseudokirchneriella subcapitata*), conducted using method: EPS1/RM/25 (Environment Canada 2007b); and

- 7-day test of reproduction and survival using a cladoceran (*Ceriodaphnia dubia*), conducted using method: EPS1/RM/21 (Environment Canada 2007c)[11].

Semi-annual tests - Q2 and Q4:

- 28-day water-only test of growth and survival using a freshwater amphipod (*Hyalella azteca*), conducted using methods adapted from USEPA (2000); and
- 30-day early life stage toxicity test using rainbow trout, conducted using method: EPS 1/RM/28- 1E (Environment Canada 1998).

Semi-annual tests - Q1 and Q3:

- 30-day early life stage toxicity test using fathead minnow (*Pimephales promelas*), conducted using methods adapted from: EPA-712-C-96-121; USEPA 1996; and E1241-05; ASTM 2013.

Chronic toxicity results for each individual endpoint for each species were then categorized into one of the three categories: 'no adverse response', 'possible adverse response', and 'likely adverse response'.[12] Toxicity tests and associated QA/QC measures were completed by a qualified third-party laboratory. Water quality samples were collected during toxicity testing to support evaluation of toxicity results. The results were summarized in annual reports completed in accordance with Permit 107517 (Teck 2021, Golder 2021). Applicable results (i.e., for monitoring stations in Line Creek associated with the LAEMP) are summarized in this report. [13]

[11] A single bioassay was used for each test area, with the test allowed to continue to 8 days (per request of the EMC). The lab collected and compiled data for both 7- and 8-d test length, and the results of the two test durations for *C. dubia* are compared in the interpretive report (Golder 2021).

[12] No adverse response: response not significantly lower than one or more references or response is below the regional normal range with an effect size of <20% relative to the mean of batch-specific references. Possible adverse response: response significantly lower than one or more references in the batch and not below the local normal range with an effect size of 20-50% relative to the mean of batch specific references or response is significantly lower than references and the local normal range, but not below the regional normal range. Likely adverse response: response significantly lower than one or more references in the batch and below the local and regional normal range or response is significantly lower than references but not below the local normal range with an effect size >50% relative to the mean of batch-specific references.

[13] Interpretation of chronic toxicity results in the present report was specifically focused on applicable results for monitoring stations located in Line Creek that were compared to the Line Creek reference (LC_SLC). LC_LC5 is located in the Fording River below the confluence with Line Creek (Figure 2.1), and results from this area were not compared to the Line Creek reference (LC_SLC), but rather compared to the Fording River reference (FR_UFR1; Golder 2021). Therefore, although chronic toxicity monitoring was competed at LC_LC5 in 2020, results of this monitoring were not integrated into this report. See Golder 2021 for detailed chronic toxicity results for this monitoring area.

2.3 Primary Productivity

Periphyton coverage was visually scored during the September 2020 sampling event at each of the ten sampling areas where benthic invertebrates were collected by kick sampling (Table 2.6), consistent with the 2020 study design (Minnow 2020c). Scores were recorded for five stations located a minimum of 5 m apart in each area, and were based on the categories defined in the Canadian Aquatic Biomonitoring Network (CABIN) sampling method (Environment Canada 2012a):

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

2.4 Secondary Productivity and Invertebrate Community Structure (Hess Sampling)

Samples for analysis of benthic invertebrate density, biomass, and community structure were collected in September 2020 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). Five samples were collected at each reference area and 10 at each mine-exposed area (Table 2.6, Figure 2.1). 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.

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

Table 2.6: Primary and Secondary Productivity and Benthic Invertebrate Community Sampling Completed in Line Creek and Fording River in September 2020 Compared to the 2020 LAEMP Study Design (Minnow 2020a)

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 (√)	-
	RG_LILC3	n=5 (√)	n=3 (√)	n=10 (√)
	RG_LISP24	n=5 (√)	n=1 (√)	-
	RG_LIDSL	n=5 (√)	n=3 (√)	n=10 (√)
	RG_LIDCOM	n=5 (√)	n=1 (√)	-
	RG_LI8	n=5 (√)	n=3 (√)	-
Mine-exposed Fording River	RG_FRUL	n=5 (√)	n=1 (√)	-
	RG_FO23	n=5 (√)	n=1 (√)	-

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

moisture before being weighed to the nearest 0.1 mg. Sorting efficiency and sub-sampling accuracy and precision were quantified using methods outlined by Environment Canada (2012b, 2014). Total and family-level density and biomass were reported for each sample (preserved wet weight; see Appendix G for laboratory reports).

2.5 Benthic Invertebrate Community Structure (Kick Sampling)

Three replicate samples were collected during the September 2020 sampling event from areas downstream from the AWTF outfall that have been monitored consistently over time (RG_LILC3, RG_LIDSL, and RG_LI8) and at each reference area (RG_SLINE, RG_LI24; Table 2.6, Figure 2.1). Replicates were collected from stations spaced a minimum of 50 m apart, where habitat allowed (i.e., riffle habitat was present) and sampling could be completed safely. Single kick and sweep samples were also collected from riffle habitat at RG_LCUT (located upstream from the AWTF discharge), RG_LISP24, and RG_LIDCOM to provide additional spatial resolution of community characteristics (Table 2.6).

Benthic invertebrate community sampling followed the CABIN protocol, which involved a 3-minute travelling kick to dislodge organisms into a net having a triangular aperture measuring 36 cm per side and mesh having 400 µm openings (Environment Canada 2012a). 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 all 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 nominal concentration of 10% buffered formalin in ambient water.

Benthic invertebrate community samples were sent to Cordillera Consulting (lead taxonomist Scott Finlayson), in Summerland BC, for sorting and taxonomic identification to the lowest practical level (LPL; typically genus or species). At the beginning of the sorting process, the total number of preserved organisms in each sample was estimated. If the total number was estimated to be greater than 300, then the sample was sub-sampled for sorting and enumeration. A minimum of 5% of each sample was sorted, consistent with requirements specified by Environment Canada (2012b, 2014). Sorting efficiency and sub-sampling accuracy and precision were quantified using methods outlined by Environment Canada (2012b, 2014). Total organism abundance was reported for each sample (see Appendix G for laboratory reports).

Consistent with the requirements of the CABIN sampling protocol, supporting habitat information (i.e., water velocity and depth, in situ water quality [temperature, dissolved oxygen, specific

conductivity, pH], canopy cover, substrate characteristics [100 pebble count], etc.) was documented concurrent with benthic invertebrate community samples (Environment Canada 2012a). In addition to the CABIN requirements, measurements of calcite presence and concretion were made on a total of 100 particles (concurrent, and on the same particles used in the 100-pebble count) using methods described by Teck (2016). Consistent with the Teck methodology for monitoring calcite, an adaptation of the Wolman pebble count was used to characterize calcite deposition by also recording the presence (score = 1) or absence (score = 0) of calcite on each particle. The degree of concretion 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.

The results for the 100 particles were then be expressed as a Calcite Index (CI) based on the following equation (Teck 2016):

$$CI = CI_p + CI_c$$

Where:

$$CI = Calcite\ Index$$

$$CI_p = Calcite\ Presence\ Score = \frac{Number\ of\ particles\ with\ calcite}{100}$$

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

2.6 Benthic Invertebrate Tissue Selenium Concentrations

As outlined in Section 2.1, benthic invertebrate tissue selenium sampling was completed in accordance with the 2019 and 2020 LCO LAEMP study designs (Minnow 2019b, 2020c). Five sampling events were completed in 2020: February and late April (Minnow 2019b), and July, late August/early September, and late November/early December (Minnow 2020c). Ten replicate benthic invertebrate tissue samples were collected from each sampling area in February, April, and July while five replicates were collected from each area in August/September and November/December (Table 2.7). The level of replication completed for each of the sampling events is consistent with the 2019 and 2020 LCO LAEMP study designs (Minnow 2019b, 2020c) with the exception of July when the number of replicates collected at each area (n=10) was higher than outlined in the 2020 LCO LAEMP Study Design (n=5; Minnow 2020c). As outlined in the

Table 2.7: Benthic Invertebrate Composite-Taxa Tissue Selenium Sampling for Line Creek LAEMP, 2020

Area Type	Biological Area Code	AWTF with AOP Operation Stabilization				
		Feb 24 to 26	Apr 27 to 30	Jul 13 to 16[a]	Aug 25 to Sep 1	Nov 30 to Dec 2
Reference	RG_SLINE	n=10 (√)	n=10 (√)	n=10 (√)	n=5 (√)	n=5 (√)
	RG_LI24	n=10 (√)	n=10 (√)	n=10 (√)	n=5 (√)	n=5 (√)
Mine-exposed	RG_LCUT	n=10 (√)	n=10 (√)	n=10 (√)	n=5 (√)	n=5 (√)
	RG_LILC3	n=10 (√)	n=10 (√)	n=10 (√)	n=5 (√)	n=5 (√)
	RG_LISP24	n=10 (√)	n=10 (√)	n=10 (√)	n=5 (√)	n=5 (√)
	RG_LIDSL	n=10 (√)	n=10 (√)	n=10 (√)	n=5 (√)	n=5 (√)
	RG_LIDCOM	n=10 (√)	n=10 (√)	n=10 (√)	n=5 (√)	n=5 (√)
	RG_LI8	n=10 (√)	n=10 (√)	n=10 (√)	n=5 (√)	n=5 (√)
	RG_FRUL	n=10 (√)	n=10 (√)	n=10 (√)	n=5 (√)	n=5 (√)
	RG_FO23	n=10 (√)	n=10 (√)	n=10 (√)	n=5 (√)	n=5 (√)

Notes: AWTF = Active Water Treatment Facility. AOP = Advanced Oxidation Process. " √" = target sample size was met.

[a] Exceeds sampling specified in the 2020 Line Creek LAEMP study design (target sample size was 5).

2020 LCO LAEMP study design (Minnow 2020c), the level of replication for benthic invertebrate tissue monitoring was decreased from ten replicates per area (implemented in past LCO LAEMP studies; Minnow 2018c, 2019b) to five replicates per area (Minnow 2020c). This change in replication was informed by analyses of sample size requirements which indicated that five replicates per area would be sufficient to detect a potential temporal change in benthic invertebrate tissue selenium concentrations, if variability among replicates remained similar to 2019 (Minnow 2020c).

Benthic invertebrate tissue samples were collected for selenium analysis using the CABIN kick and sweep sampling method described in Section 2.5, except that sampling was not timed. 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).

Upon collection of the sample using the kick and sweep sampling method, as many organisms as possible were carefully removed from sample debris using tweezers until about 0.5 g of wet tissue was obtained. Invertebrate tissue samples were then photographed to document taxa composition, placed into labelled vials, and stored in a cooler with ice packs until transfer to a freezer later in the day. Tissue samples were kept in a freezer until they were transported by courier in coolers with ice packs to Saskatchewan Research Council (SRC) laboratory in Saskatoon, SK or TrichAnalytics Inc. in Saanichton, BC.[14] Samples were either freeze-dried (SRC) or dehydrated (<60°C; TrichAnalytics) upon receipt by the respective laboratories. Analysis of samples submitted to SRC were analyzed using High Resolution Inductively Coupled Plasma Mass Spectrometry (HR-ICP-MS) while those submitted to TrichAnalytics Inc. were analyzed using Laser Ablation Inductively Coupled Plasma Mass Spectrometry (ICP-MS). Results for selenium and other parameters were reported on a dry weight basis along with moisture content to allow conversion to wet weight values, as required (see Appendix G for laboratory reports).

[14] In previous LCO LAEMP studies (Minnow 2018b, 2019a, 2020a), benthic invertebrate tissue quality samples were analyzed by SRC. Beginning in April 2020, benthic invertebrate tissue quality samples were submitted to TrichAnalytics Inc. instead of SRC for analyses (i.e., only samples collected in February 2020 were submitted to SRC for analyses). This change in the selected laboratory was based on the results of an Interlaboratory Tissue Analysis Validation Study completed in December 2020 (Golder 2020b).

2.7 Data Analysis

2.7.1 Water Quality

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. Routine water quality results were paired with the closest biological monitoring station (Table 2.2). 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 (Table 2.2). 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; see Section 2.1). Accordingly, water quality data for RG_LCUT in 2020 (similar to 2019) 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)[15]. Water quality data collected concurrently with biological sampling at other areas were associated with the corresponding routine water quality monitoring station (Table 2.2) for data analysis.

Annual means of water quality data were computed by first taking a mean of results within months and then averaging monthly means. If replicate sample results were available, the Kaplan-Meier (K-M) mean of the replicates was used. Monthly means were also calculated using the KM method. 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 2020) and involved calculating the area under the K-M *survival* curve. The K-M method is non-parametric and can accommodate multiple Laboratory Reporting Limits (LRLs).

The method described in Minnow (2017b) 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.

[15] In 2020, the AWTF was shut down for periods of over 24 hours on four occasions. On July 14 and September 30, 2020, two extended shutdowns occurred for annual maintenance, while on September 20 and December 9th, 2020 the AWTF was shut down due to a power failure (lasting for ~50 h) and boiler issues (lasting for ~80 h), respectively (Teck 2021a). 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.

Second, the monthly concentrations were plotted as a ratio of the monthly 97.5th percentile of the concentrations (i.e., monthly mean concentration: monthly 97.5th 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 (SPO; ≤ 0.02 mg/L) outlined in Permit 107517.

A temporal analysis for total selenium at LC_LC1 was conducted on monthly mean concentrations among years using an Analysis of Variance (ANOVA) model with factors *Year* and *Month*. The factor *Month* was included in the model to control for seasonal effects within a year. A log-normal distribution was assumed for all data (i.e., data were $\log_{10}$-transformed prior to analysis). If the *Year* term of the model was identified as statistically significant ($\alpha < 0.05$), the variability within years (controlling for month) was used to test for significant differences among all pairwise comparisons of years. Significance of the pairwise comparisons was assessed using a Tukey's honestly significant difference test with an α of 0.05. Using this method, potential differences in total selenium concentrations between 2020 relative to multiple previous years (2012 to 2019) and relative to 2019 only were assessed. The analysis was completed twice, once including all data, and once excluding one outlying result from 2012. The magnitude of difference in selenium concentrations for a given year relative to the first year of available data (i.e., 2012) was calculated as:

Magnitude of Difference = $(\bar{x}_i - \bar{x}_{2012})/\bar{x}_{2012} \times 100\%$

where $\bar{x}_i$ is the observed mean for a given year and $\bar{x}_{2012}$ is the observed mean in 2012 (i.e., the base year; the first year with available data).

Routine water quality monitoring results were screened against BCWQG (BCMOECCS 2019, 2021) as part of Teck's Annual Water Quality Monitoring Report under Permit 107517 (Teck 2020). In addition, further screening against BCWQG and water quality benchmarks (Teck 2014, Golder 2017b; see Appendix Table D.1 for screening values) was completed for select analytes during the 2020 calendar year. These analytes included nutrients (i.e., nitrate, nitrite, total phosphorus, and orthophosphate); total and dissolved selenium, analytes with early warning triggers under the AMP (total dissolved solids, sulphate, total concentrations of antimony, barium, boron, lithium, manganese, molybdenum, nickel, uranium and zinc, and dissolved concentrations of cadmium and cobalt; Section 2.2.1), and analytes with BCWQG and/or water quality benchmarks. Plots of the analytes with early warning triggers under the AMP were prepared using available data from 2012 to 2020 for each monitoring station individually relative to BCWQG and water quality benchmarks (where applicable), and as combined plots to allow for visual comparison among stations.

Aqueous selenium speciation results were plotted as monthly mean concentrations for each monitoring area.

Temperature and dissolved oxygen concentrations in Line Creek were also graphically evaluated relative to BCWQG. British Columbia water temperature guidelines for bull trout and westslope cutthroat trout 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 and Baxter 1996; McPhail 2007; COSEWIC 2016). Temperature data recorded continuously at locations immediately upstream and downstream of the AWTF discharge (using data loggers) were plotted relative to temperature measurements recorded further upstream at LC_LCUSWLC[16] (Figure 2.2, Table 2.3).

In the 2018 LCO LAEMP, a mass balance analysis (using data from April 2016 to December 2018) was completed and showed that the AWTF treatment was not the primary contributor of total phosphorus or orthophosphate loadings to the downstream environment during the operational phase of the AWTF (prior to AOP; Minnow 2019a). A mass-balance approach could not be completed in 2020 as continuous flow data was not available at LC_LC3 and LC_LCDSSLCC until late spring of 2020. For future LCO LAEMP reporting, if mass-balance analyses are completed, they should align with Teck's water quality modelling team to ensure consistency.

2.7.2 Secondary Productivity Endpoints

Potential effects of AWTF operation on benthic invertebrate biomass and density were analyzed among areas and years using an 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 2020 and included all available results from 2014 to 2020. 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.

[16] A continuous temperature data logger was installed upstream of the AWTF discharge (near LC_LCUSWLC) in September 2019 (Data logger T6; Figure 2.2, Table 2.3), and temperatures were recorded until September 2, 2020 when the data logger was retrieved, downloaded, and redeployed.

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 2020);
- $Area(CI)$ = 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 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 2020) using an ANOVA for each area and endpoint. Prior to analysis, data were log10 transformed to better meet the assumptions of the analysis. When the overall ANOVA was significant ($\alpha < 0.1$), a Tukey's *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 2020) using customized scripts, and data were presented on log_{10}-transformed y-axes for consistency with the statistical approach. Letters were used on the to indicate which years differed significantly from one another at each mine-exposed area based on the results of the ANOVA model.

2.7.3 Selenium Tissue Chemistry – Benthic Invertebrates

Selenium concentrations measured in tissues of benthic invertebrates were plotted over time relative to corresponding site-specific effect benchmarks (Table 2.8) and relative to the regional normal range[17]. 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.

The ANOVA model that was fit to the data for each mine-exposed area (and both reference areas[18]) was:

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

where:

- Y = response variable;

[17] The reference normal range as presented in the RAEMP represents the 2.5th and 75th percentiles of reference area data from 1996 to 2019 (Minnow 2020b).

[18] 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 2019a).

Table 2.8: Selenium Benchmarks for Benthic Invertebrate Tissue 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)

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]).

- 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 2018][19], Restart of AWTF with AOP [October 2018 to December 2018], and AWTF with AOP Operational Phase [December 2018 to December 2020]) depending on data availability, where each period included between one to fourteen 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 it depended 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 (2020) 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".

[19] 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.

Differences among sampling events within a given period were not statistically contrasted, with the exception of 2020 data from within the "AWTF with AOP Operational" period which were completed to evaluate of AWTF with AOP performance in 2020 (the focus of the 2020 LCO LAEMP). [20]

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

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.

[20] The "AWTF with AOP Operational" period was initiated in December 2018 (Table 1.1). Within-period statistical contrasts were focused on 2020 data from the "AWTF with AOP Operational" period for two reasons; 1) data from 2020 are the focus on the present report, and 2) analysis of data from December 2018 to December 2019 during the "AWTF with AOP Operational" period was incorporated in the 2019 LCO LAEMP report (Minnow 2020a). It should be noted that the terminology used to describe the AWTF with AOP 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 1.3 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.

Similar to the ANOVA model used to assess secondary productivity, testing the significance of the interaction terms is the key hypothesis of interest in these ANOVA models, as it tests for changes in the relative differences between the mine-exposed and reference areas over time. If all interaction terms are not significant, then it can be concluded that there are no period effects that can be attributed to AWTF operation schedule. If the interaction terms are significant, then the contrasts among sampling events within the "AWTF with AOP Operational Phase" period also present a key tool for the purpose of evaluating AWTF performance during operation with AOP. 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 2020), 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 2020 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 *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 2020) 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 2020 were plotted relative to total selenium concentrations measured in water samples collected at or near the same time (within approximately three days) as the tissue samples. A line representing the regional one-step water-to-invertebrate selenium bioaccumulation model was also presented on the plot (Golder 2020c). Confidence limits (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).

2.7.4 Benthic Invertebrate Community Data

Community endpoints that were evaluated included density (Hess samples) or sample abundance (kick samples), family richness (Hess and kick samples), richness at the Lowest Practical Level of taxonomy (LPL richness; kick samples), and the 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; absolute and relative abundances for kick samples, and density for Hess samples). Community data for kick samples were plotted to show changes over time relative to regional normal ranges[21] as well as site-specific normal ranges.[22]

[21] The reference normal range as presented in the RAEMP represents the 2.5th and 75th percentiles of the 2012 to 2019 (Minnow 2020b).

[22] Site-specific normal ranges represent the 2.5th and 97.5 percentile for a given area as determined by habitat predictors for a given site 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).

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 concentrations of aqueous nutrients were evaluated in relation to the AWTF operational status. The AWTF with AOP was operational throughout 2020 with discharge to the receiving environment occurring throughout the year (see Section 1.3 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, and there is the potential for increased phosphorus concentrations downstream in Line Creek during AWTF operation. Aqueous total phosphorus concentrations at the Compliance Point were consistently below the SPO of 0.02 mg/L throughout 2020, including the growing season (June 15 to September 30) to which the SPO applies (Figure 3.1).

In 2020, aqueous total phosphorus concentrations downstream of the AWTF discharge were within the range of concentrations reported prior to AWTF operation (i.e., 2013 to 2015, excluding initial operations in 2014; Figure 3.2; Appendix Figure B.1). Aqueous orthophosphate concentrations in 2020 also were also within the range of results reported prior to AWTF operation (i.e., 2012 to 2015, excluding initial operations in 2014; Figure 3.3; Appendix Figure B.2).

Total phosphorus and orthophosphate concentrations were further evaluated using an approach recommended in the Proposal to Update the Site Performance Objective for Phosphorus in Line Creek (see Section 2.7.1; Minnow 2017b[23]). The purpose of this approach 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 3.4 and 3.5). Monthly mean concentrations were then expressed as a ratio of the baseline 97.5th percentile for each month (bottom panels in Figures 3.4 and 3.5).

Throughout 2020, total phosphorus and orthophosphate concentrations at LC_LC3 were below the baseline 97.5th percentiles, with one exception (Figures 3.4 and 3.5). Specifically, the mean total phosphorus concentration at LC_LC3 was slightly higher than the baseline 97.5th percentile

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

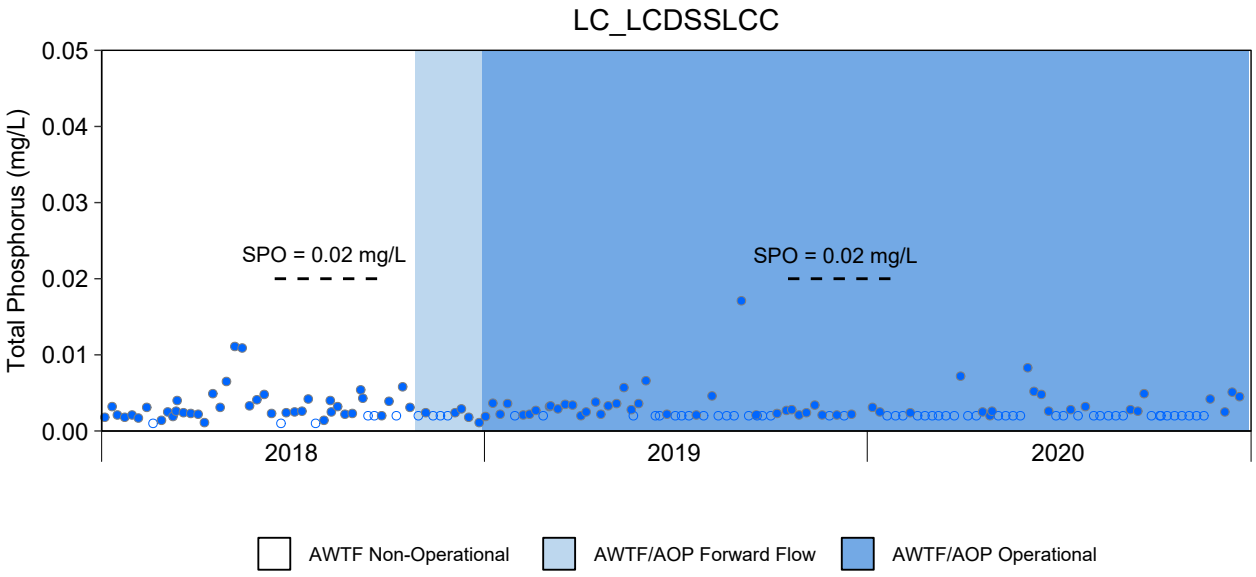


Figure 3.1: Total Phosphorus Concentrations in Water Collected from the Line Creek Compliance Point (LC_LCDSSLCC), 2018 to 2020

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. Hollow symbols represent results below the laboratory reporting limit (LRL).

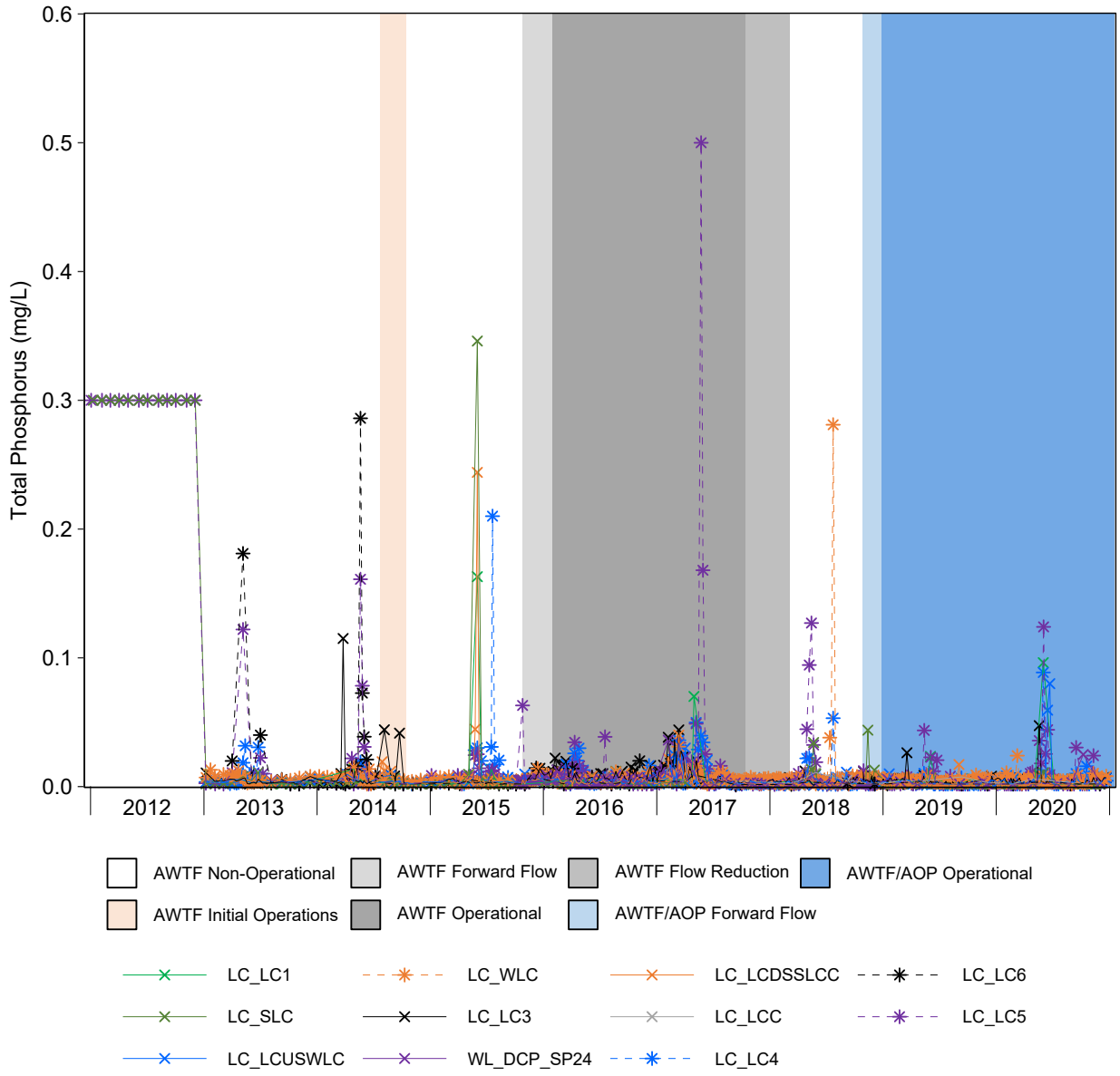


Figure 3.2: Time Series Plots for Aqueous Total Phosphorus Concentrations from the Line Creek LAEMP Sampling Stations, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted at the LRL (LRLs between 0.0010 and 0.30 mg/L). West Line Creek (WLC) Active Water Treatment Facility (AWTF) operational timelines pertain only to mine-exposed monitoring areas located downstream of the AWTF discharge.

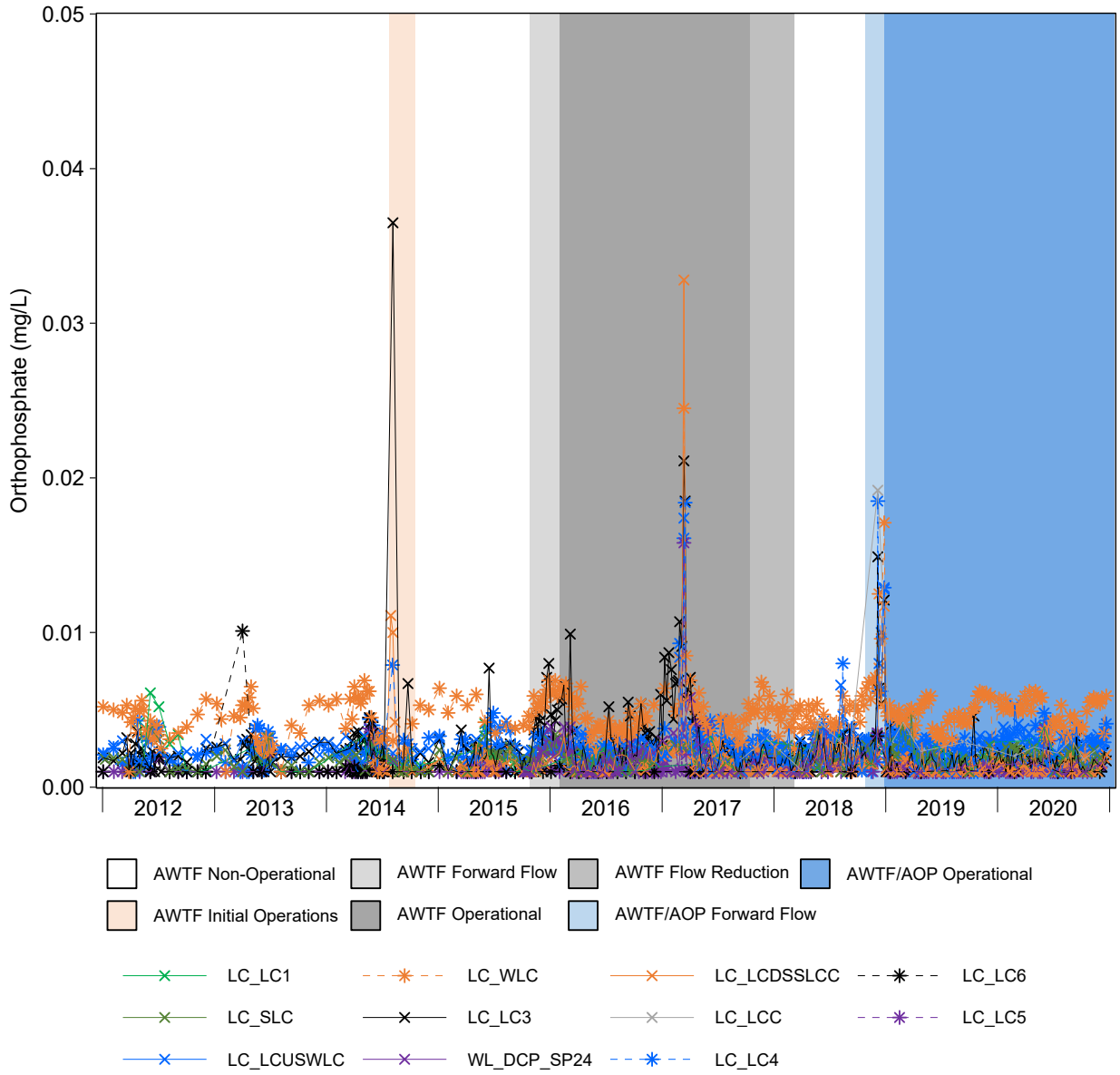


Figure 3.3: Time Series Plots for Aqueous Orthophosphate Concentrations from the Line Creek LAEMP Sampling Stations, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted at the LRL (LRLs were 0.0010 mg/L). West Line Creek (WLC) Active Water Treatment Facility (AWTF) operational timelines pertain only to mine-exposed monitoring areas located downstream of the AWTF discharge.

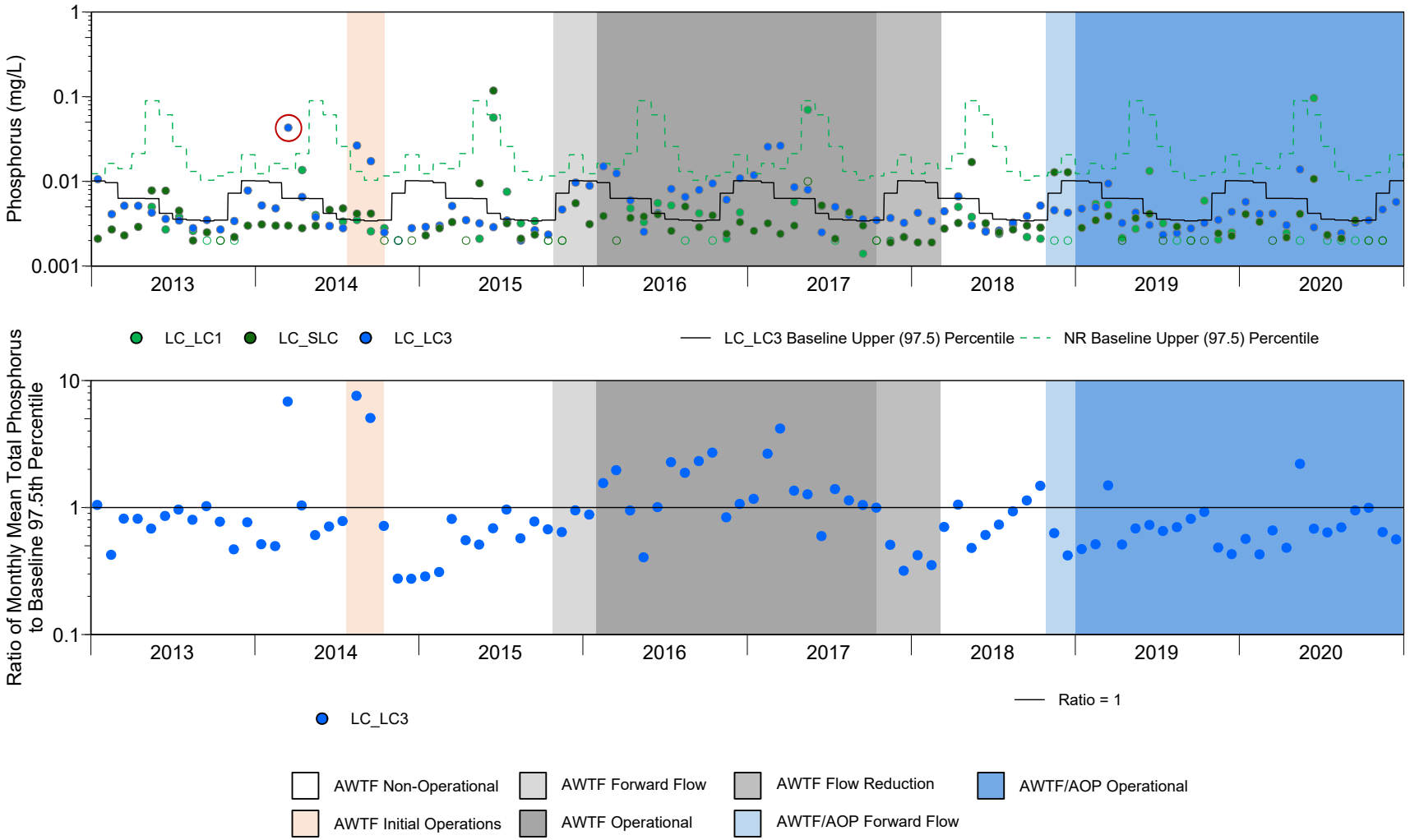


Figure 3.4: Total Phosphorus at LC_LC3 During AWTF Operation Relative to Pre-Operational Baseline Concentrations

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 hollow 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.

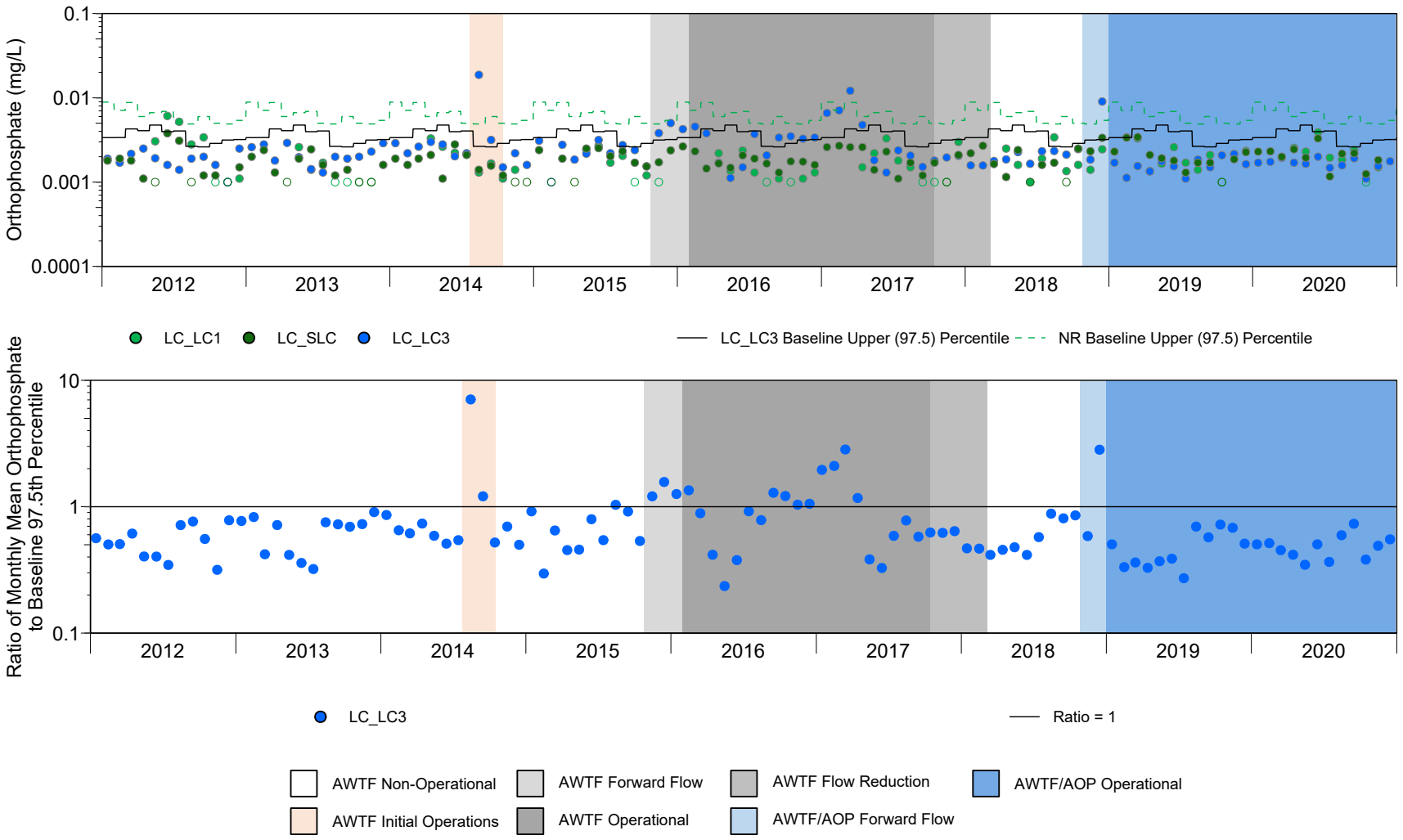


Figure 3.5: Orthophosphate at LC_LC3 During AWTF Operation Relative to Pre-Operational Baseline Concentrations

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 hollow 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 May 2020 (Figure 3.4). These results were consistent with the 2019 LCO LAEMP (which also documented the AWTF with AOP Operational phase), which demonstrated that total phosphorus and orthophosphate concentrations were below the baseline 97.5th percentile with one exception for total phosphorus in March 2019 (Figure 3.4; Minnow 2020a). 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 (more frequently for total phosphorus than orthophosphate; Figures 3.4 and 3.5). Operation of the AWTF with AOP (in both 2019 and 2020) appears to have been more successful at minimizing phosphorus and orthophosphate contributions to the receiving environment than operations of the AWTF without AOP (in 2016 and 2017).

One function of the AWTF is to decrease nitrate loads to the receiving environment, and the AWTF with AOP removed 36,766 kg of nitrate during operations in 2020 (Teck 2021a). Aqueous nitrate concentrations at the Compliance Point were below the SPO Daily Maximum Limit of 9 mg/L during the majority of 2020 (67%) 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 2021b for details). Exceedances of the daily SPOs and monthly average compliance limits, however, were always low (1.3 and 1.7-folds higher, respectively; Teck 2021b) and aqueous nitrate concentrations downstream of the AWTF discharge in 2020 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 3.6; Appendix Figure B.3). In 2020, 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 BCWQG (Appendix Figure B.3; Appendix Tables D.1 and D.2). Although nitrate concentrations exceeded the EVWQP Level 1 benchmark in both areas upstream of the AWTF discharge (59% [30 of 51 weekly sampling events] and 65% [34 of 52 weekly sampling events] of LC_LCUSWLC and LC_WLC samples in 2020, respectively), this was not the case at most mine-exposed areas in Line Creek downstream of the discharge (WL_DCP_SP24, LC_LCSSLCC, LC_LCC, and LC_LC4), with the exception of LC_LC3 (Appendix Tables D.1 and D.2; Appendix Figure B.3). Nitrate concentrations at LC_LC3 were higher than the EVWQP Level 1 benchmark in 4% of samples (2 of 53 weekly sampling events) from 2020, which was a lower rate of benchmark exceedance than observed at this area in 2019, with observed nitrate concentrations higher than the EVWQP Level 1 and Level 2 benchmarks (33 and 27% of samples, respectively; Minnow 2020a).

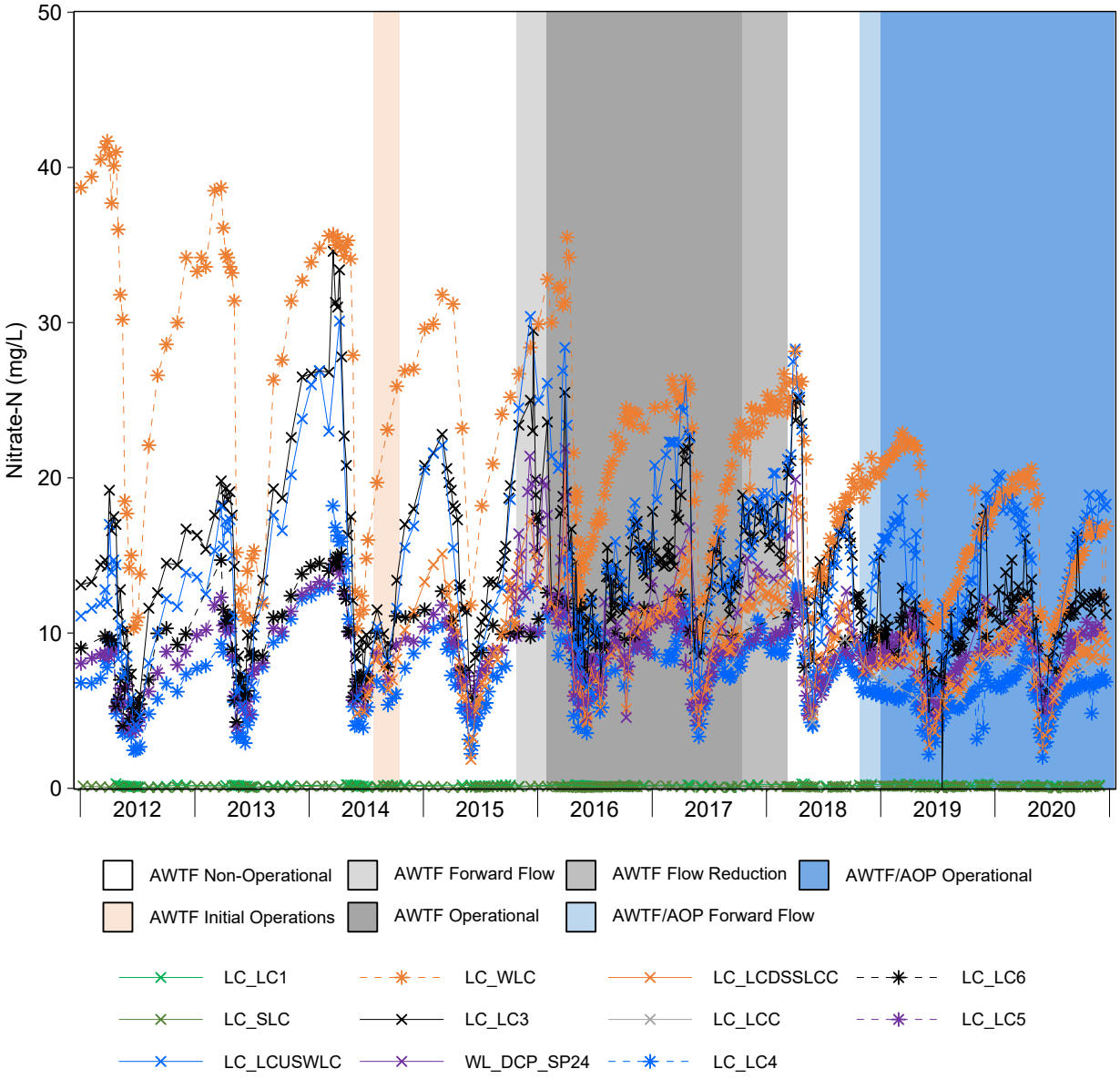


Figure 3.6: Time Series Plots for Aqueous Nitrate-N Concentrations from the Line Creek LAEMP Sampling Stations, 2012 to 2020

Notes: All concentrations reported by the laboratory were detectable. West Line Creek (WLC) Active Water Treatment Facility (AWTF) operational timelines pertain only to mine-exposed monitoring areas located downstream of the AWTF discharge.

3.3 Primary Productivity Indicators

In 2020, mean periphyton coverage was moderate at seven of the ten study areas (Appendix Figure B.4, Appendix Table B.1), with visual scores at these areas 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 remaining three sampling areas had mean periphyton coverage scores that were either lower (RG_SLINE [reference]; mean score = 1) or higher (RG_LILC3 and RG_LIDCOM [mine-exposed]; mean score = 4) than moderate (Appendix Figure B.4, Appendix Table B.1). The mean visual periphyton score of 4 at these two mine-exposed areas (RG_LILC3 and RG_LIDCOM) in 2020 represents an increase in coverage by one category compared to previous results (mean score = 3 at both areas in 2017 to 2019; Minnow 2018b, 2019a, 2020a). The increase in periphyton coverage between 2019 and 2020 at these areas were not associated with increased in nutrient concentrations (nitrate, phosphorus, or orthophosphate) between 2019 and 2020 (see Section 3.2) or by a similar increase at other monitoring areas located between RG_LILC3 and RG_LIDSL (i.e., RG_LISP24 and RG_LIDSL; Appendix Figure B.4, Appendix Table B.1). As such, it is likely that the increased periphyton coverage observed at these two areas was related to environmental factors that may influence periphyton growth (e.g., water depth, flow, and temperature, and canopy coverage [which is quite limited at these two areas]). Continued monitoring will help to determine whether the change is an isolated event or part of a longer-term change.

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; sampling areas 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 outlying values for the reference area RG_SLINE -- one in 2017 and one in 2018 (Figures 3.7 and 3.8; see Section 2.7.2 for data ANOVA methods, including outlier removal).

Although benthic invertebrate biomass at RG_LILC3 (based on Hess sampling) was significantly lower in 2020 when compared to previous years (2014 to 2019), biomass in 2020 was more comparable to reference (RG_LI24 and RG_SLINE). When considering changes in biomass at RG_LILC3 in relation to changes in reference areas (i.e., the difference between biomass at RG_LILC3 and reference between years), RG_LILC3 was more similar to the reference areas in 2020 (i.e., the difference was smaller) than in 2014 and 2018 (Appendix Tables B.2 and B.3). Biomass at RG_LIDSL in 2020 was not significantly different to previous years (regardless of whether changes in reference areas were considered or not; Figure 3.7; Appendix Tables B.2 and B.3). Combined, the biomass results at RG_LILC3 and RG_LIDSL did

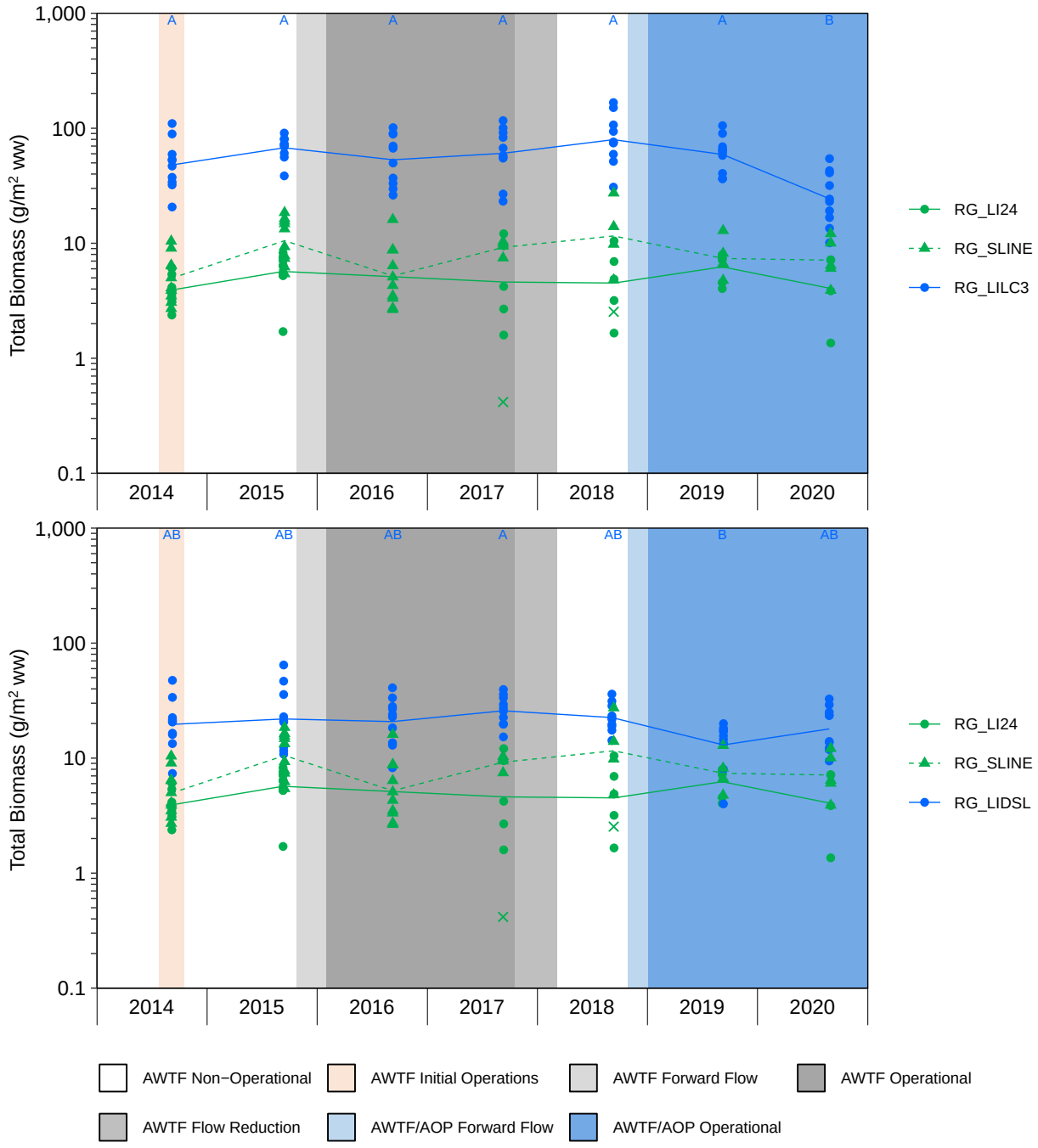


Figure 3.7: Total Benthic Invertebrate Biomass (Hess Sampling) for RG_LILC3 and RG_LIDSL and Over Time, 2014 to 2020

Notes: 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'.

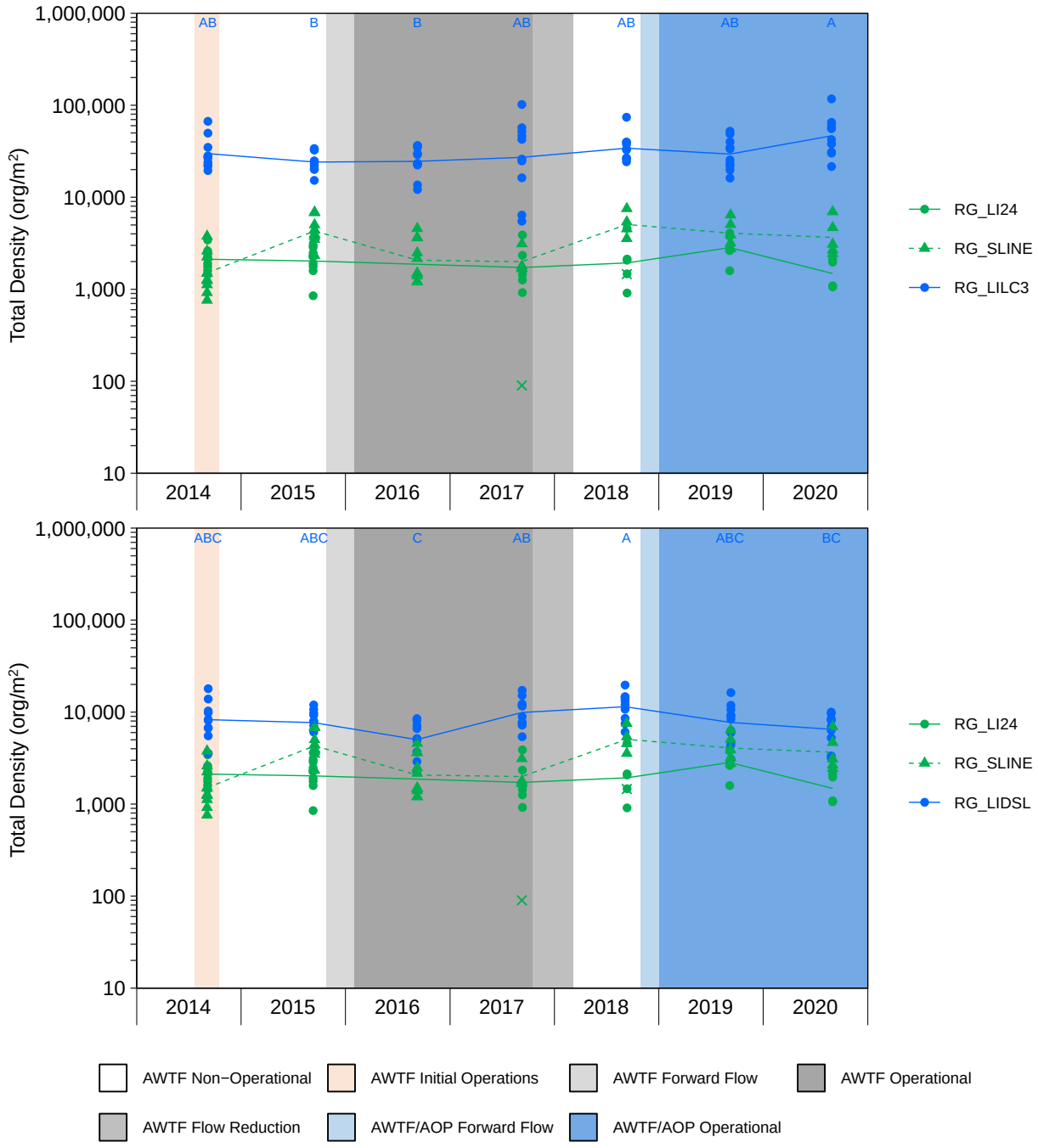


Figure 3.8: Total Benthic Invertebrate Density (Hess Sampling) for RG_LILC3 and RG_LIDSL and Over Time, 2014 to 2020

Notes: 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'.

not indicate an increase in benthic invertebrate biomass associated with AWTF operation with AOP in 2020.

Density at RG_LIDSL in 2020, when compared to previous years (2014 to 2019), was significantly lower than results from 2018 (Figure 3.8, Table 3.1, Appendix Table B.4). However, significant changes in density at RG_LIDSL between 2018 and 2020 were not observed, when evaluated in relation to changes at the reference areas (both RG_SLINE and RG_LI24) over the same time frame. This suggests that the decrease in density at RG_LIDSL between 2018 and 2020 was likely related to natural variability. Specifically, the difference between biomass at RG_LILC3 and reference (RG_SLINE or RG_LI24) did not change significantly among years (Figure 3.8, Appendix Table B.4). Density at RG_LILC3 in 2020 was significantly higher than reported results from 2015 and 2016. The difference between density at RG_LILC3 and one of the two references (RG_LI24) was also significantly greater in 2020 than 2015 (owing to an increase in density at RG_LILC3; Figure 3.8, Table 3.1; Appendix Table B.4).[24] This was not the case, however, when changes in density at RG_LILC3 were evaluated in relation to the reference area RG_SLINE, as no differences were noted between 2020 and any of the previous years. 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 2020.

Benthic invertebrate abundance in kick and sweep samples from 2020 were within or above the regional and site-specific normal ranges at mine-exposed areas in Line Creek (both upstream and downstream of the AWTF discharge) and in the Fording River (upstream and downstream of the Line Creek; Appendix Figure B.5; Appendix Table B.5). Total sample abundance at mine-exposed areas downstream[25] of the AWTF discharge in 2020 was within the range of previous AWTF operational years (without AOP [2016, 2017] or with AOP [2019]; Appendix Figure B.5). Three of these downstream areas (RG_LIDSL, RG_LI8, and RG_FO23; those with longer-term datasets) have on occasion shown higher abundance during AWTF with AOP operation (2019 and 2020) compared to pre-AWTF (2012 to 2015; Appendix Figure B.5). However, benthic invertebrate abundance results for RG_LILC3 (the area located closest to the AWTF discharge) in 2019 and 2020 were within the range of pre-AWTF results, suggesting that temporal increases in abundance observed at areas further downstream were likely not AWTF-related. Furthermore, abundance values that were higher in 2019 and 2020 than previous years (2016 to 2018) were also observed at RG_LCUT, which is upstream of

[24] Benthic density data were not available for RG_LI24 in 2016 for comparison.

[25] Areas downstream of AWTF discharge include RG_LILC3, RG_LISP 24, RG_LIDSL, RG_LIDCOM, RG_LI8, and RG_FO23. Pre-AWTF operational abundance values were not available for RG_LISP24 or RG_LIDCOM.

Table 3.1: Geometric Means of Benthic Invertebrate Density for Hess Sampling in Areas of Line Creek, 2014 to 2020

Area	Benthic Invertebrate Density (# organisms/m^2)						
	2014	2015	2016	2017	2018	2019	2020
RG_LI24	2,120	2,028	-	1,723	1,933	3,182	1,482
RG_SLINE	1,508	4,300	2,072	1,072	5,062	4,067	3,659
RG_SLINE[a]	1,508	4,300	2,072	1,993	3,947	4,067	3,659
RG_LILC3	29,805	24,136	24,564	27,162	34,153	29,481	46,510
RG_LIDSL	8,276	7,690	5,024	9,910	11,452	7,718	6,506

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

[a] One outlier removed in 2017 and 2018.

the AWTF discharge. This further suggests that higher abundance in 2020 at areas downstream of the AWTF discharge is likely not AWTF-related. This was 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 2020. This is consistent with the similarity in aqueous nutrient concentrations (Section 3.2) and primary productivity results (Section 3.3) in 2020 relative to previous years, including 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 taxon richness (i.e., number of different taxa identified to lowest practical level of identification) was within or above the regional normal range and site-specific normal range at mine-exposed and reference sampling areas in 2020 (Appendix Figure B.6; Appendix Table B.5). Taxon richness at RG_LILC3, the sampling area located closest downstream of the AWTF discharge, was higher in 2020 than the previous two years (2018 and 2019) but was within the range of earlier monitoring years (2014 to 2017; Appendix Figure B.6). An increase in taxon richness in 2020 relative to prior years was also observed at RG_LCUT (2016 to 2019; Appendix Figure B.6), which is upstream of the AWTF discharge, suggesting that these increases are likely due to natural variability or conditions further upstream.

Percent EPT (Ephemeroptera ([mayflies], Plecoptera [stoneflies], and Trichoptera [caddisflies] in 2020 fell below the regional and site-specific ranges at mine-exposed areas upstream (RG_LCUT) of the AWTF and closest downstream of the AWTF discharge (RG_LILC3, RG_LISP24, RG_LIDSL [2 of 5 replicates]; Appendix Figure B.7, Appendix Table B.5). At areas located further downstream in Line Creek (RG_LIDCOM, RG_LI8) and in the Fording River (RG_FRUL, RG_FO23), EPT percentages were within the regional and site-specific ranges except at RG_LIDCOM which was within the regional but below the site-specific normal range, and one replicate at the Fording River downstream of Line Creek (RG_FO23; Appendix Figure B.7). Percent EPT at the mine-exposed areas was within the range of past years except at RG_LISP24 and RG_LIDCOM, where percent EPT in 2020 was slightly higher and lower, respectively, than the previous three monitoring years (Appendix Figure B.7, Appendix Table B.5).

Percent Ephemeroptera (mayflies) results in 2020 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 B.8, Appendix Table B.5).

Percent Ephemeroptera at areas located further downstream in Line Creek and in the Fording River was within the regional normal range but below the site-specific normal range at RG_LISP24, RG_LIDSL (2 of 5 replicates), RG_LIDCOM, and RG_FO23 (2 of 5 replicates; Appendix Figure B.8, Appendix Table B.5). Despite this, results were within the range or higher than in previous years. Specifically, percent Ephemeroptera was higher in 2020 at RG_LISP24 than prior years (2017 to 2019), and at RG_LIDCOM and RG_LI8 was higher in 2019 and 2020 than prior years (Appendix Figure B.7). This increase is suggestive of an improvement in benthic invertebrate community structure at these areas located further downstream from the ATWF discharge, or in the case of RG_LIDCOM, an indication that the decrease in %EPT was not due to a decreased percentage of Ephemeroptera.

Percent Chironomidae in 2020 was above the reference normal range at areas immediately upstream (RG_LCUT) and downstream from the AWTF (particularly RG_LILC3, RG_LISP24, RG_LIDSL [two of five replicates], and RG_LIDCOM; Appendix Figure B.9; Appendix Table B.5). The results for RG_LCUT, RG_LILC3 were within the range of previous years, which have been above the reference normal range (> 40%) since the initiation of sampling at these areas (Appendix Figure B.9). Percent Chironomidae at RG_LISP24 and RG_LIDCOM (which fell outside the normal range in 2020) were slightly lower and higher, respectively, than the previous three monitoring years which compliments the opposite change in percent EPT observed at these areas in 2020 (Appendix Figures B.7 and B.9). Remaining sampling areas located furthest downstream in Line Creek (RG_LI8) or in the Fording River (RG_FRUL, and RG_FO23) showed Chironomidae percentages that were within reference normal range and the range of prior years (Appendix Figure B.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 E). 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]; see Appendix E for details). Each of the mine-exposed areas (as well as one of the reference areas [RG_LI24]) had at least one replicate sample which corresponded to a biological trigger (i.e., %EPT was below the biological trigger). Percent EPT at these areas has previously been flagged for further investigation in the RAEMP based on benthic invertebrate community results (Minnow 2020b), except for the reference area RG_LI24. Based on the magnitude of trigger exceedance (0.4%) in only one of five replicates, this area is not believed to warrant further investigation. Further information regarding the %EPT biological trigger as it pertains to the LCO LAEMP can be found in Appendix E.

3.6 Summary

Total phosphorus concentrations at the Compliance Point (LC_LCDSSLCC) were below the SPO of 0.02 mg/L during the 2020 growing season (June 15 to September 30), consistent with previous years. Aqueous nutrient concentrations (total phosphorus, orthophosphate, and nitrate) in 2020 were generally within the range observed prior to AWTF operation. In addition, results suggested that operation of the AWTF with AOP in 2020, similar to results from 2019, 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 most mine-exposed areas (as well as reference) was moderate in 2020 (based on the CABIN visual assessment, see Section 2.3) and was temporally consistent with results from previous years except at two areas. For the areas which showed increased periphyton coverage (RG_LILC3 and RG_LIDCOM), supporting evidence (i.e., nutrient concentrations and lack of temporal increases in periphyton coverage at other areas downstream of the AWTF) did not suggest that this increase was due an influence of AWTF discharge. Benthic invertebrate biomass and density at mine-exposed areas of Line Creek showed no significant increases in 2020 when compared to previous years that could be related to operation of the AWTF with AOP. Benthic invertebrate total abundance (measured by kick and sweep) in all areas in 2020 was similar to results from 2019, and although higher in some cases than previous years (pre-2017), was still within the regional normal range at most mine-exposed areas. Additionally, the absence of a change closest to the AWTF discharge indicated that this was likely unrelated to AWTF with operation (consistent with the biomass and density results). Benthic invertebrate community endpoints, as determined from kick and sweep sample collection, indicated no adverse change in community characteristics related to AWTF with AOP operations in 2020. Rather, an increase in the percentage of sensitive taxa (as measured through evaluations of percent EPT and percent Ephemeroptera) in 2020 at areas of Line Creek furthest downstream from the AWTF discharge was suggestive of an improvement in benthic invertebrate community structure. Overall, biological productivity downstream from the WLC AWTF did not appear to be affected by AWTF with AOP operations throughout 2020, relative to previous years.

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 2020 with discharge to the receiving environment occurring throughout the year (see Section 1.3 for details).

4.2 Composite-Taxa Benthic Invertebrate Samples

Benthic invertebrate selenium concentrations at mine-exposed areas downstream of the AWTF on Line Creek (RG_LILC3, RG_LISP24, RG_LIDSL, RG_LIDCOM, RG_LI8 were significantly lower during the AWTF with AOP operational phase in 2020 than during AWTF operational (without AOP; 2016 and 2017), compared to changes at the reference areas over the same time frame (Figure 4.1; Appendix Figures C.1 to C.2; Appendix Tables C.1 to C.9). Specifically, benthic invertebrate selenium concentrations measured during each of the AWTF with AOP sampling events in 2020 were significantly lower than each of the sampling events during the AWTF without AOP phase (up to 15 individual comparisons), except at RG_LI8. At RG_LI8, benthic invertebrate selenium concentrations were significantly lower during AWTF with AOP operation in 2020 compared to the AWTF without AOP (2016 and 2017) in nearly all (13 of 15) comparisons (Appendix Table C.6; Appendix Figure C.2). RG_LI8 is the sampling area furthest downstream from the AWTF in Line Creek, thus the lack of significant decreases in two of the comparisons is likely due to lower influence of the AWTF without AOP at this area (Appendix Figure C.2; Appendix Table C.6). Benthic invertebrate selenium concentrations in 2020 were similar to before AWTF operation (2012), where data exist for this comparison (RG_LILC3, RG_LIDSL, RG_LI8; Figure 4.1, Appendix Figure C.2; Appendix Tables C.2, C.4, C.6).

Within the 2020 AWTF with AOP operational phase, changes in benthic invertebrate selenium concentrations at each downstream area were compared to changes at the reference areas over the same time frame. The purpose of this comparison was to evaluate AWTF with AOP performance during 2020. Results of this analysis indicated that selenium concentrations in benthic invertebrates (as a function of changes in reference areas) changed differently at each of the mine-exposed areas in Line Creek during this period, except at RG_LIDCOM, where no significant changes in 2020 occurred (Appendix Tables C.10 to C.17). Relatively few, if any, patterns in the significant changes within 2020 were consistently observed among the four mine-exposed areas (RG_LILC3, RG_LISP24, RG_LIDSL, and RG_LI8) relative to reference.

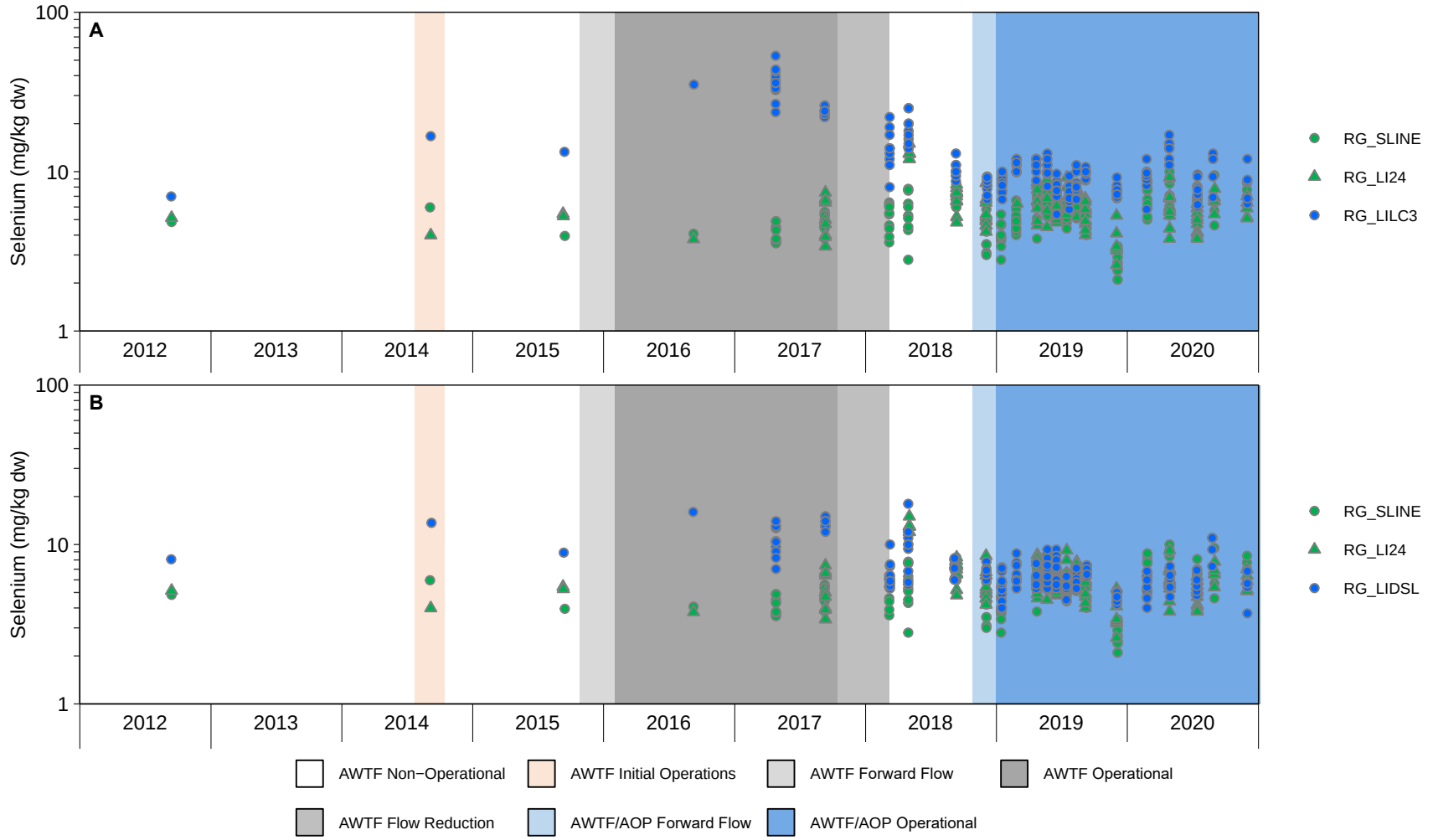


Figure 4.1: Benthic Invertebrate Selenium Concentrations, for A) RG_LILC3 and B) RG_LIDSL (Mine−exposed Areas) Relative to RG_SLINE and RG_LI24 (Reference Areas), 2012 to 2020

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 operations, 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.

The possible exceptions were significantly lower selenium tissue concentrations in February and higher concentrations in September compared to other sampling events (events in 2020: February, April, July, September, and December). Benthic invertebrate tissue selenium concentrations were significantly higher in September for two or more other sampling events at RG_LISP24, RG_LIDSL, and RG_LI8 (Appendix Figures C.1 and C.2; Appendix Tables C.11, C.12, C.14). A similar pattern was not observed at RG_LILC3 (immediately downstream of the AWTF discharge; Table 4.1; Appendix Table C.10), suggesting that the significantly higher benthic invertebrate selenium concentrations in September observed at areas further downstream from the AWTF discharge were likely not AWTF-related. Taxon composition of benthic invertebrate samples was also largely consistent throughout the year among monitoring areas (Appendix Table C.1), suggesting that the increased tissue selenium concentrations in September at RG_LISP24, RG_LIDSL, and RG_LI8 were not related to sample composition Benthic invertebrate selenium concentrations reported in April at RG_LILC3 (14 mg/kg dw) were significantly higher than 3 of the 4 remaining sampling events in 2020 (February, July, and December, which had concentrations of 9.2, 7.4, and 8.5 mg/kg dw, respectively; Figure 4.1; Appendix Table C.10). This was not observed at areas further downstream or during other sampling events, indicating that the spatial and temporal extent of the increase was limited to RG_LILC3 in April 2020 (Appendix Tables C.10 to C.14).

Selenium concentrations of benthic invertebrates collected from the six areas downstream of the AWTF discharge in Line Creek were similar to or lower than reference and/or upstream of the discharge (RG_LCUT) throughout the 2020 sampling period Figure 4.2, Table 4.1), with the exception of the April sampling event at RG_LILC3. In addition, mean benthic invertebrate selenium concentrations at areas downstream of the AWTF were within the regional normal range in 2020 except at RG_LILC3 in April and at three areas (RG_LILC3, RG_LIDSL, and RG_LI8) in August/September (Figure 4.2 Table 4.1; Minnow 2020b). Mean selenium concentrations in benthic invertebrates were also below the Level 1 EVWQP Benchmark for effects to invertebrates (13 mg/kg dw) at areas downstream of the AWTF throughout 2020, with the one sampling event at RG_LILC3 in April again the only exception. The mean tissue selenium concentration at RG_LILC3 in April was 1 mg/kg dw (i.e. 8%) higher than the Level 1 EVWQP benchmark (13 mg/kg dw) Figure 4.2, Table 4.1).

The elevated selenium concentrations in benthic invertebrate tissues from RG_LILC3 in April are likely related to a seasonal (winter) increase in concentrations of aqueous non-selenate selenium species. Further discussion of the association between seasonality in aqueous selenium speciation results and benthic invertebrate tissue selenium concentrations is provided in Section 4.3. No substantial changes to the AWTF operational status or process occurred in 2020 prior to the April sampling event, further suggesting that the increased benthic invertebrate

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 2020

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 (Jan 31, 2016 to Oct 15, 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 (Mar 8 - 11)	2018 (Apr 3 - 5)	2018 (Apr 30 - May 4)	2018 (May 28 - 29)	2018 (September 6 -13)
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 2020

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 3-6)	2019 (January 14-17)	2019 (Feb 25 - Mar 7)	2019 (April 22 - 26)	2019 (May 22 - 24)	2019 (June 17 - 19)	2019 (July 15 - 23)	2019 (August 12 - 13)	2019 (September 5 - 12)	2019 (December 2-6)	2020 (Feb 24- Feb 26)	2020 (Apr 27- Apr 30)	2020 (Jul 13 - 16)	2020 (Aug 25 - Sep 1)	2020 (Nov 30 - Dec 2)
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	8.5
		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	7.5
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.

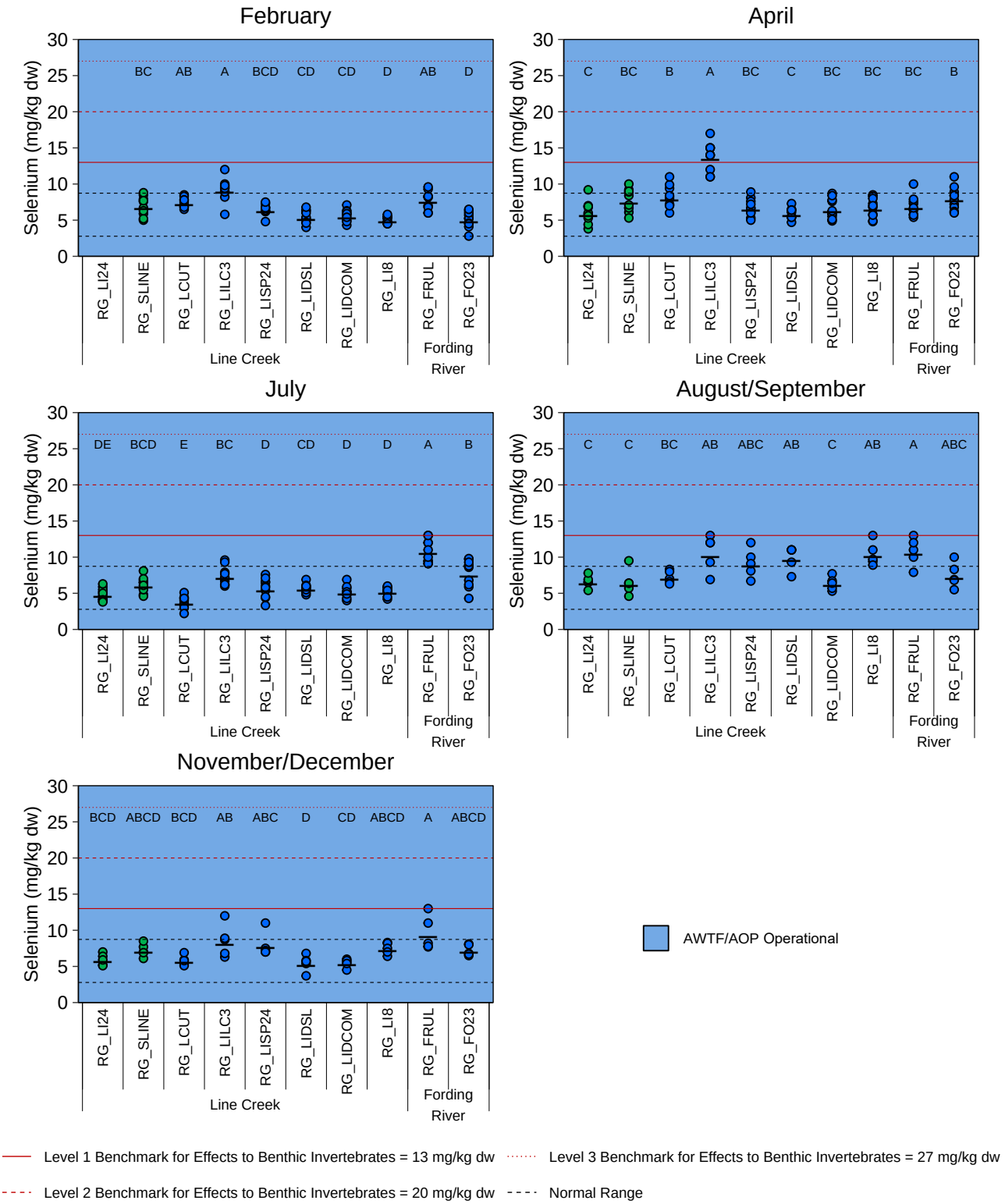


Figure 4.2: Selenium Concentrations in Composite−Taxa Benthic Invertebrate Samples Collected at Reference (Green) and Mine−Exposed (Blue) Areas of Line Creek and Fording River, 2020

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 2012 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 $\log_{10}$ transformed.

selenium concentrations were related to a seasonal increase in aqueous non-selenate species rather than documented changes to the AWTF processes. Despite this, the benthic invertebrate selenium concentrations at RG_LILC3 in 2020 (including the April results) represent a substantial improvement relative to 2016 and 2017 (during the AWTF operational phase without AOP) when tissue selenium concentrations exceeded the EVWQP Level 2 and Level 3 benchmarks for effects to benthic invertebrates at this area (Table 4.1; Minnow 2017a, 2018b). Similar to the results in 2019 (Minnow 2020a), results from 2020 continued to indicate that the spatial and temporal extent of elevated benthic invertebrate selenium concentrations was substantially decreased compared to AWTF operation without AOP (e.g., Minnow 2018b) and limited to immediately downstream of the AWTF (specifically RG_LILC3) in April 2020.

Selenium concentrations in benthic invertebrates from the Fording River downstream of Line Creek (RG_FO23) were similar (April, August/September, and November/December) or significantly lower (February and July) when compared to the Fording River upstream of Line Creek (RG_FRUL; Figure 4.2, Table 4.1, Appendix Figure C.3). Changes in benthic invertebrate selenium concentrations at RG_FO23 (downstream of Line Creek) during the AWTF with AOP operational phase compared to AWTF without AOP differed from those at RG_FRUL (upstream of Line Creek). However, these differences were primarily related to higher benthic invertebrate tissue selenium concentrations observed at RG_FRUL (upstream of Line Creek). Specifically, mean benthic invertebrate selenium concentrations at RG_FRUL in July to December 2020 were higher than previously observed, with the exception of December 2018 (Figure 4.3, Table 4.1). This resulted in a significantly greater difference between the benthic invertebrate selenium concentrations at RG_FO23 relative to RG_FRUL (i.e., comparatively lower concentrations at RG_FRUL) in July and September 2020 compared to April and September 2017 (during AWTF operation without AOP; Table 4.1, Figure 4.3; Appendix Table C.18). A significant difference also occurred between February 2020 compared to April and September 2017, but this was owing to mean benthic invertebrate selenium concentrations at RG_FO23 being the lowest observed since initiation of sampling in 2006 (Table 4.1, Figure 4.3; Appendix Table C.18). Within the AWTF with AOP period in 2020, the difference in benthic invertebrate selenium concentrations between RG_FO23 and RG_FRUL was significantly smaller in April than any other sampling event (Figure 4.3; Appendix Table C.19). This aligns with the significant increase in benthic invertebrate selenium concentrations observed at RG_LILC3 in April 2020 (compared to reference; Figures 4.1 and 4.2; Appendix Table C.10), but the increase at RG_LILC3 was not observed further downstream (i.e., it was only observed at RG_LILC3). As such, the significant change in the Fording River in April 2020 is likely unrelated to the change at RG_LILC3. Overall, these results indicated that benthic invertebrate selenium concentrations in the Fording River were not influenced by Line Creek in 2020, which is consistent with the decreased tissue

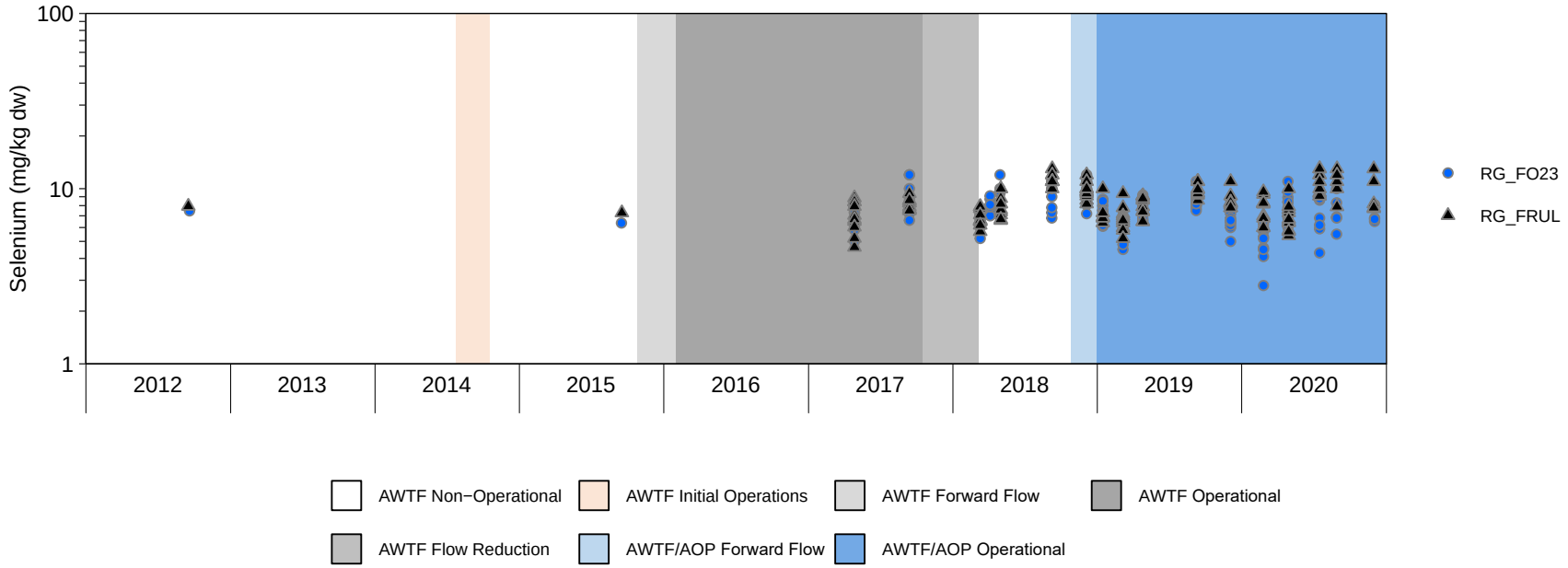


Figure 4.3: Benthic Invertebrate Selenium Concentrations, for RG_FO23 (Fording River Downstream of Line Creek) Relative to RG_FRUL (Fording River Upstream of Line Creek), 2012 to 2020

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 operations, 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.

selenium results in Line Creek during AWTF with AOP relative to AWTF operation (without AOP), and with previous findings (Minnow 2018b, 2019a).

Selenium concentrations in benthic invertebrate tissue 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 E). Similar to the biological trigger evaluation for %EPT, 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 the two reference areas [RG_SLINE and RG_LI24]; see Appendix E for details). RG_LILC3 was the only area for which replicates exceeded the respective biological trigger (4 of 40 replicates), with each of those being collected in the April sampling event discussed above. The remaining mine-exposed and reference areas had selenium concentrations that were below the biological trigger. As discussed above, the biological trigger exceedance for these four replicates at RG_LILC3 is likely related to slight seasonal increase in concentrations of aqueous non-selenate selenium species observed in the winter of 2020 (particularly March), and therefore do not warrant further investigation. Further information regarding the selenium concentrations in benthic invertebrate tissue biological trigger as it pertains to the LCO LAEMP can be found in Appendix E.

4.3 Aqueous Selenium and Bioaccumulation

The AWTF with AOP was effective throughout 2020 in decreasing the aqueous total selenium concentrations downstream in Line Creek, removing more selenium from WLC influent in 2020 (540 kg) than in 2019 (475 kg; Teck 2021a). The decrease in aqueous total selenium concentrations in 2020 was particularly evident at LC_LC3, LC_LCDSSLCC, and LC_LC4 compared to when the AWTF was not operational (Figure 4.4; Appendix Figures C.4 and C.5[26]). Total aqueous selenium was detected with high frequency (i.e., 100% of sampling events) above the long-term BCWQG at mine-exposed stations (Appendix Table D.2; Appendix Figures C.4 and C.5). This was true for stations both upstream and downstream of the AWTF discharge in Line Creek and in the Fording River upstream and downstream of the Line Creek confluence. Total aqueous selenium concentrations were also consistently (i.e., 100% of sampling events) above the Level 1 EVWQP Benchmark throughout 2020 for mine-exposed areas upstream and downstream of the AWTF in Line Creek (excluding LC_LCUSWLC, LC_LCDSSLCC and LC_LC4, which exceeded the benchmark in > 85% of sampling events), while concentrations directly above the outfall (LC_WLC) also exceeded the Level 2 EVWQP in 100% of sampling events.

[26] Appendix Figure B.4 presents total aqueous selenium results with LC_WLC excluded for greater resolution of results.

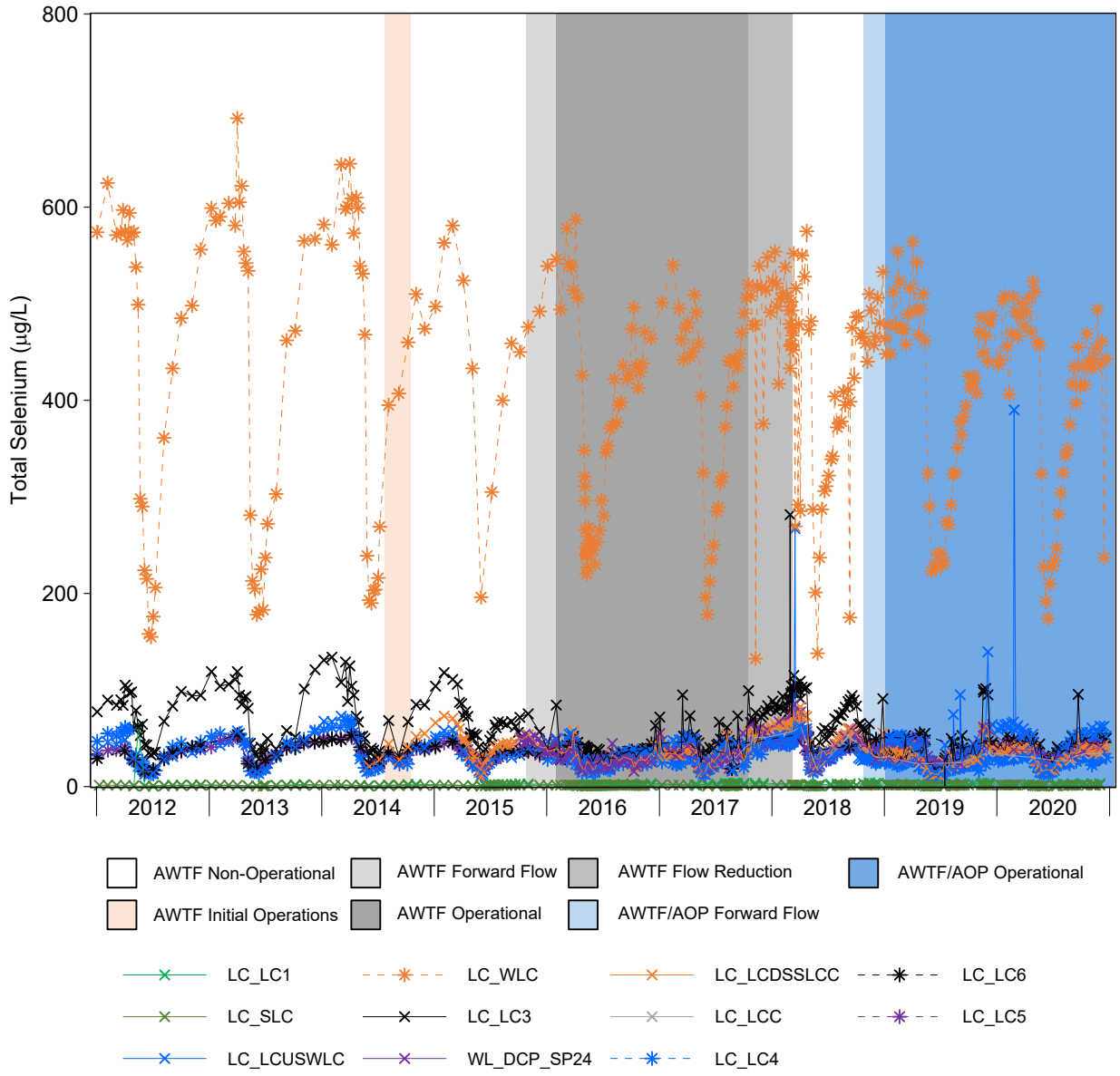


Figure 4.4: Time Series Plots for Aqueous Total Selenium Concentrations from the Line Creek LAEMP Sampling Stations, 2012 to 2020

Notes: All concentrations reported by the laboratory were detectable. West Line Creek (WLC) Active Water Treatment Facility (AWTF) operational timelines pertain only to mine-exposed monitoring areas located downstream of the AWTF discharge. µg/L = micrograms per litre. dw = dry weight.

The difference between LC_WLC and those areas downstream of the AWTF suggest that treatment is working as expected in reducing selenium in effluent.

Aqueous concentrations of selenium were above the Level 2 EVWQP Benchmark (74 µg/L) at LC_LC3 for one sampling event (of 57), with a concentration of 95 µg/L. This Level 2 EVWQP Benchmark exceedance occurred during a shutdown event (i.e., power outage at the facility and thus the AWTF was non-operational) between September 20 and 21, 2021 (Teck 2021b, see Section 1.4). This shutdown event also resulted in a selenium exceedance (62 µg/L) of the selenium daily maximum concentration (58 µg/L; per 107517 Permit Limit) at the Compliance point (LC_LCDSSLCC; (Teck 2021b). The AWTF was also not operational on February 26, 2020 (Ogden 2021, pers. comm.) and although this was a short event (12 h), it resulted in aqueous concentrations at RG_LCUT that were considerably higher (423 µg/L) than concentrations reported for the remainder of the year for this area (mean: 54 µg/L; Figure 4.4; Appendix Figures C.4 and C.5). Higher aqueous analyte concentrations are anticipated at RG_LCUT when West Line Creek flows are not being diverted to the AWTF for treatment (i.e., when the AWTF is not operational) compared to when the AWTF is in operation as water quality at RG_LCUT would be undiluted and would be more reflective of water quality influences farther upstream on the main stem of Line Creek [LC_LCUSWLC]). Both shutdown events further highlight the removal of selenium via treatment by AWTF.

Previous evaluation of aqueous total selenium concentrations at the LC_LC1 (RG_LI24) reference area identified significant increases in aqueous total selenium since 2014 (Minnow 2018b). Further analysis of temporal changes indicated that concentrations in 2020 were similar to the last five years of reporting (2015 to 2019) but remained higher than concentrations measured in 2012 to 2014[27] (Appendix Table C.20). Routine monitoring at this reference location will continue in 2021, and analysis of potential temporal changes in total selenium will be repeated in 2021 (Minnow 2021).

Aqueous selenium in all study areas was primarily in the oxidized form selenate (Figure 4.5; Appendix Table C.21). Aqueous selenium in chemically-reduced forms such as selenite or organoselenium species are present at much lower concentrations than selenate. The combined total of non-selenate selenium species typically represents <1% of the total aqueous selenium in waters from upstream of the AWTF discharge in Line Creek (i.e., LC_LCUSWLC in 2020 mean Σnon-selenate species: 0.11%, range: 0.07 to 1.00%; Appendix Table C.21). Some of these

[27] Results discussed herein are excluding one outlier from the analysis. No significant differences among years were found with inclusion of the outlier (Appendix Table B.20).

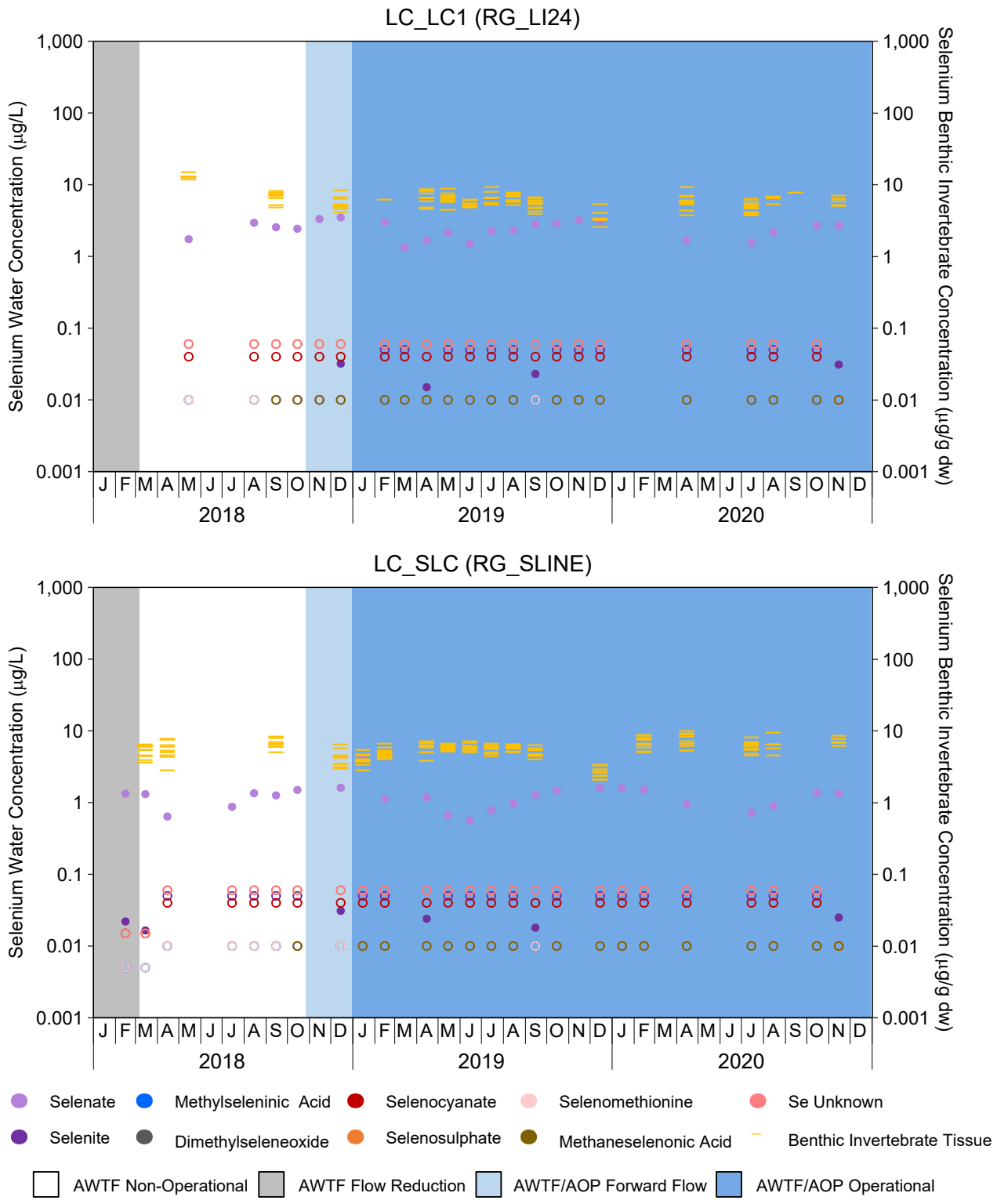


Figure 4.5: Monthly Mean Selenium Species and Benthic Invertebrate Tissue Selenium at Mine-exposed and Reference Stations in Line Creek, LCO LAEMP, January 2018 to December 2020

Note: Samples at the laboratory reporting limit (LRL) are plotted with an open symbol. µg/L = micrograms per litre. dw = dry weight.

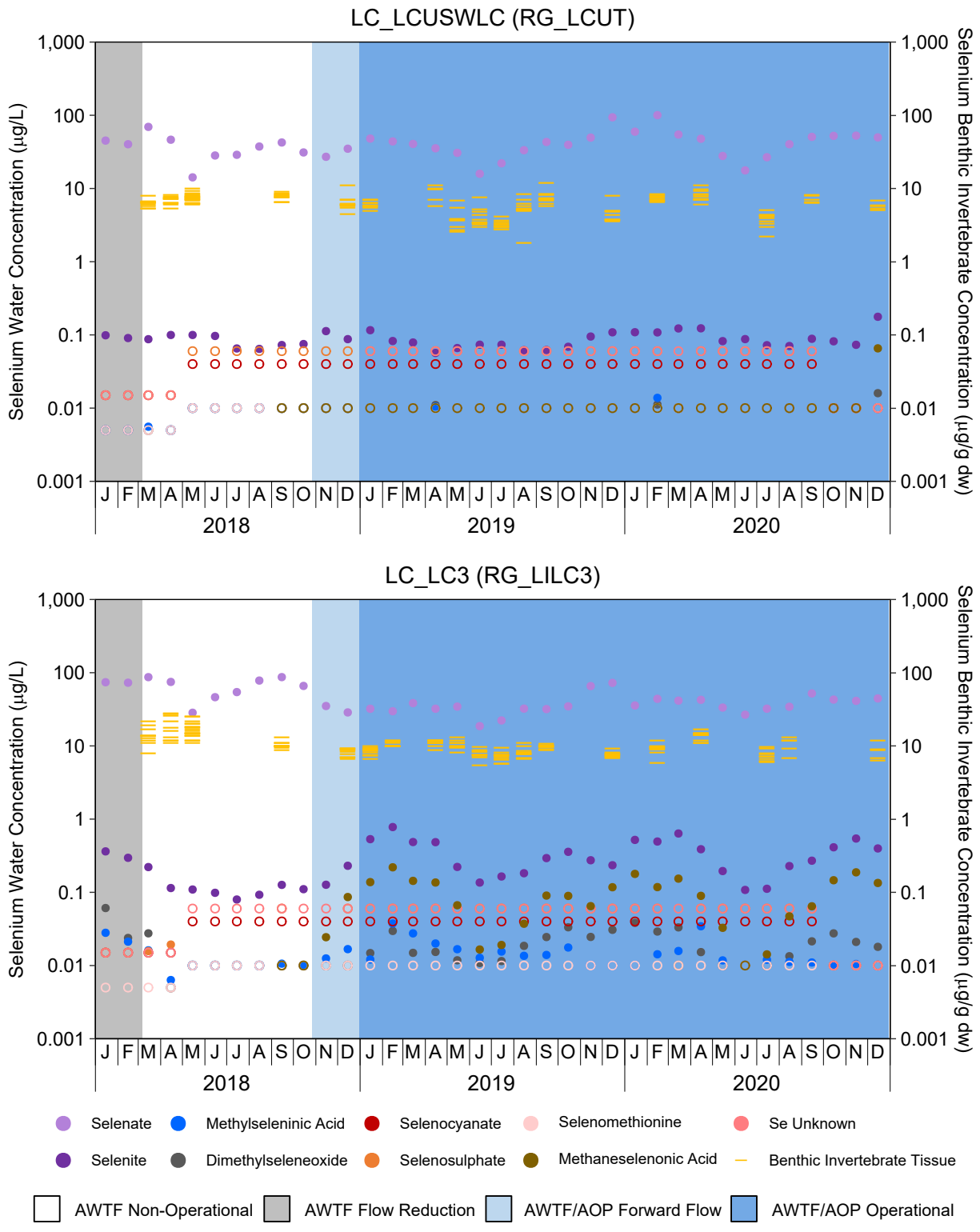


Figure 4.5: Monthly Mean Selenium Species and Benthic Invertebrate Tissue Selenium at Mine-exposed and Reference Stations in Line Creek, LCO LAEMP, January 2018 to December 2020

Note: Samples at the laboratory reporting limit (LRL) are plotted with an open symbol. µg/L = micrograms per litre. dw = dry weight.

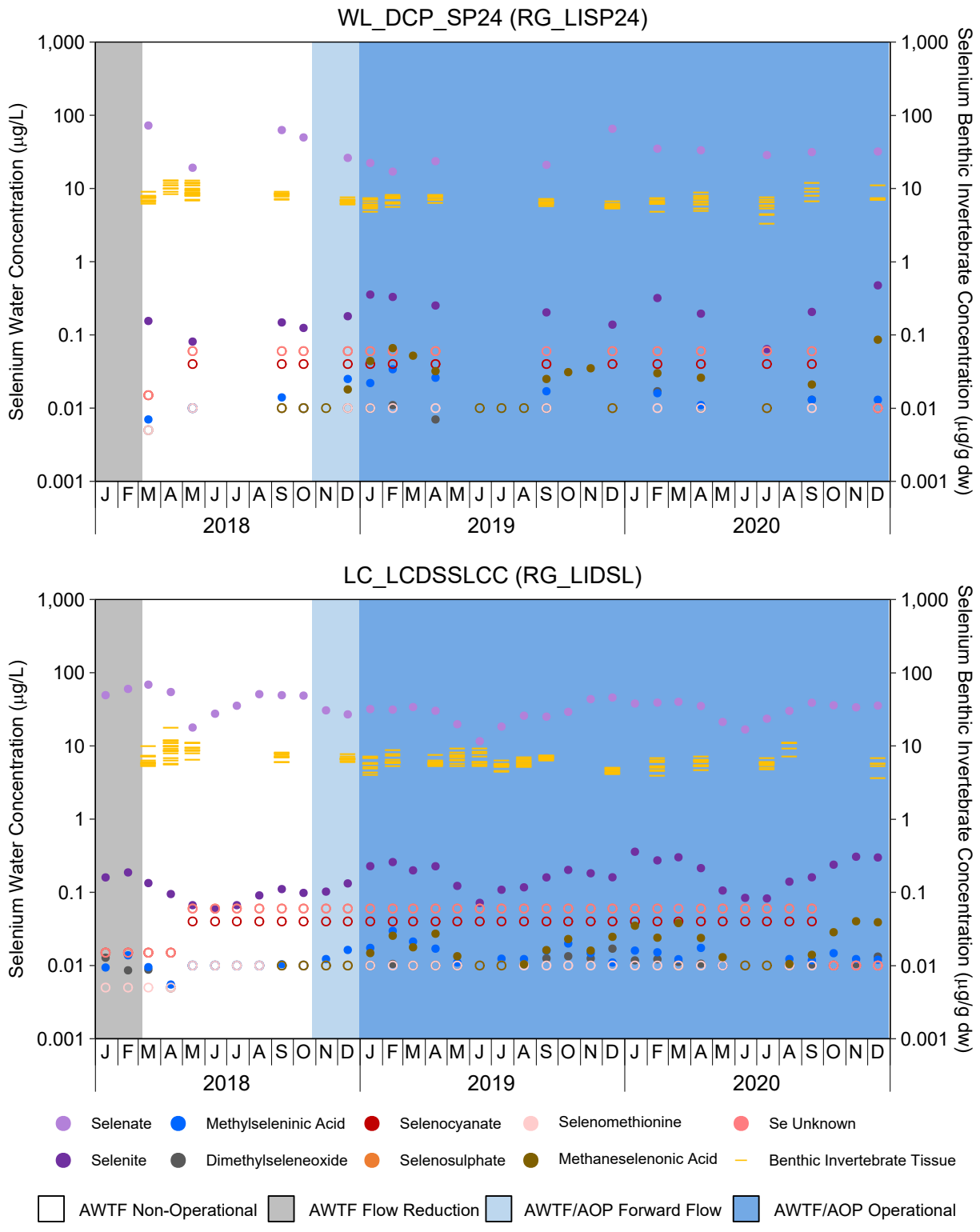


Figure 4.5: Monthly Mean Selenium Species and Benthic Invertebrate Tissue Selenium at Mine-exposed and Reference Stations in Line Creek, LCO LAEMP, January 2018 to December 2020

Note: Samples at the laboratory reporting limit (LRL) are plotted with an open symbol. µg/L = micrograms per litre. dw = dry weight.

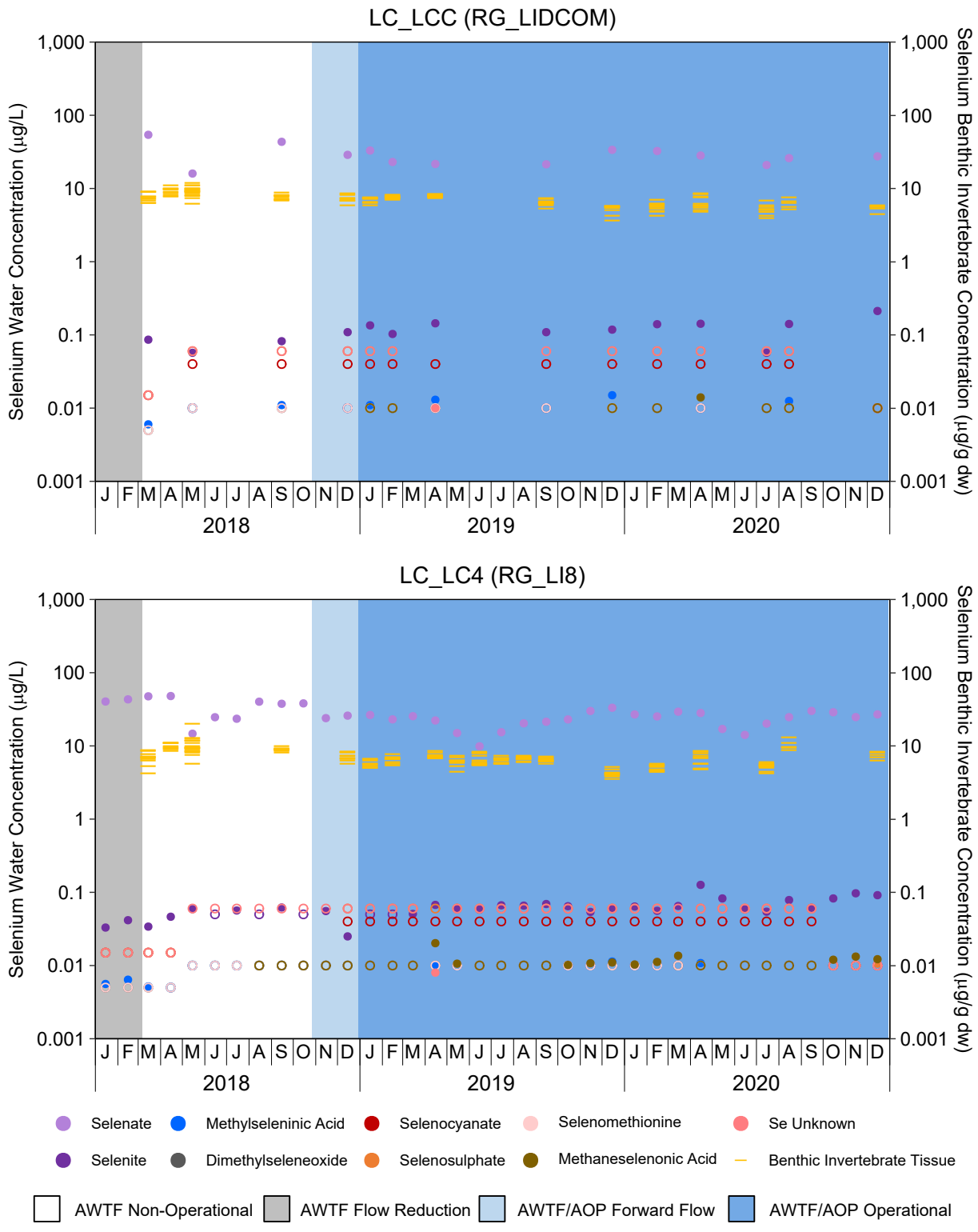


Figure 4.5: Monthly Mean Selenium Species and Benthic Invertebrate Tissue Selenium at Mine-exposed and Reference Stations in Line Creek, LCO LAEMP, January 2018 to December 2020

Note: Samples at the laboratory reporting limit (LRL) are plotted with an open symbol. µg/L = micrograms per litre. dw = dry weight.

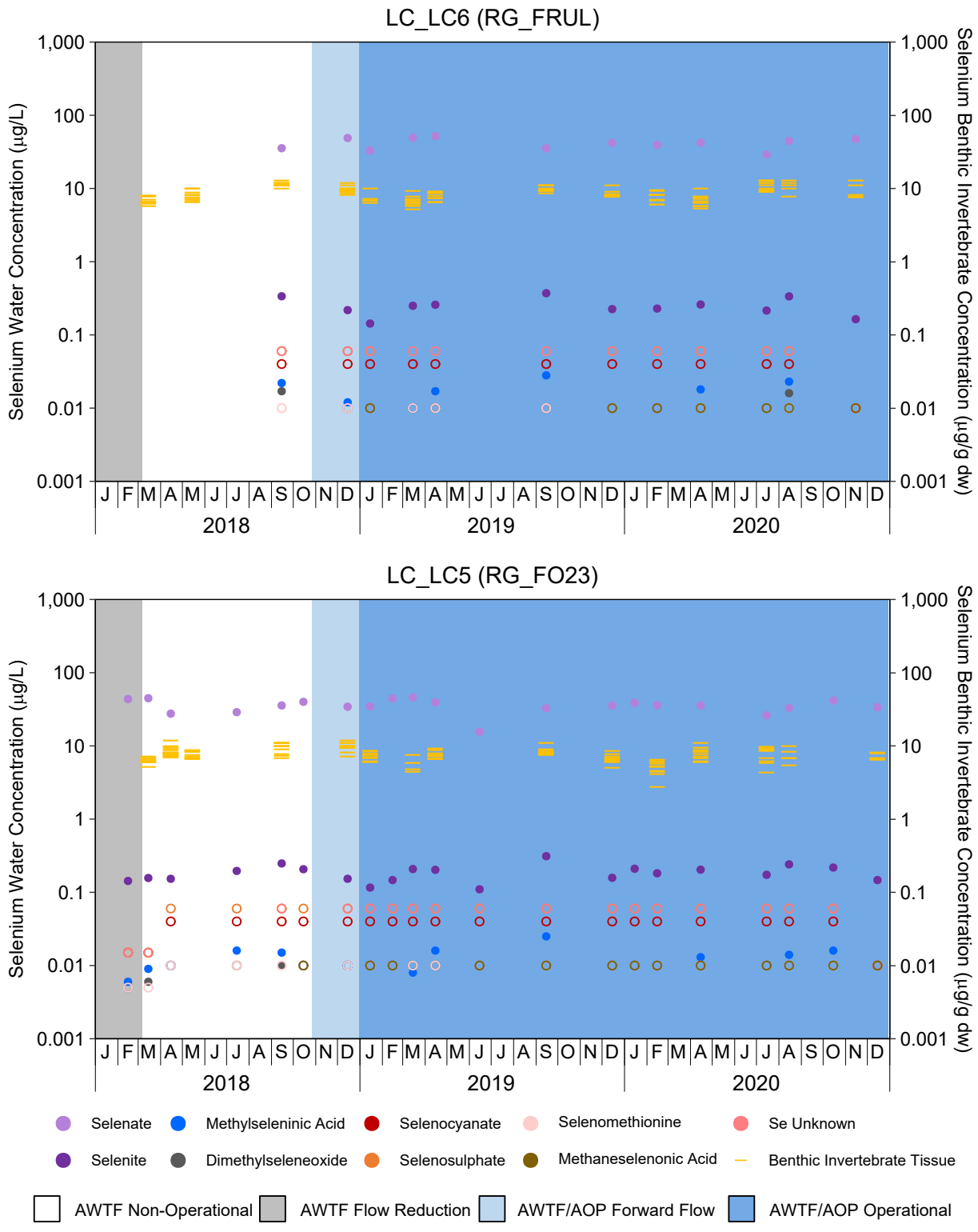


Figure 4.5: Monthly Mean Selenium Species and Benthic Invertebrate Tissue Selenium at Mine-exposed and Reference Stations in Line Creek, LCO LAEMP, January 2018 to December 2020

Note: Samples at the laboratory reporting limit (LRL) are plotted with an open symbol. µg/L = micrograms per litre. dw = dry weight.

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). As described in Section 1.3, in response to increased concentrations of chemically-reduced forms of aqueous selenium in AWTF effluent, the AWTF was recommissioned with an AOP to reverse the shift in selenium species back to a selenate-dominated condition. Concentrations of non-selenate species (including organoselenium species such as dimethylseleneoxide and methylseleninic acid) in 2020 (during AWTF with AOP) were similar to those in 2019 (Minnow, 2020a), and substantially lower at LC_LC3 than during AWTF operation without AOP in 2017 (Minnow 2020a). 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).

Seasonal trends in selenium speciation were noted during AWTF with AOP operation in 2019 and 2020, with higher concentrations of non-selenate species observed in winter months (specifically January to March) and lower concentrations observed in summer (June, July; Figure 4.5; Appendix Table C.21). This trend of higher aqueous concentrations in winter months has also been observed for analytes that include sulphate and total dissolved solids (Appendix Figure D.1 and D.5), suggesting that the observed seasonal increases may be related to decreased baseflow in Line Creek over the winter. In 2020, the highest selenite and dimethylselenoxide concentrations (1.17 and 0.048 µg/L, respectively) were reported at RG_LILC3 on March 9th, 2020. This represents a 3.5-fold increase in selenite for RG_LILC3 when compared to the remainder of the year (mean concentration 0.34 µg/L), while dimethylselenoxide was generally not detected (not detected in 23 of 53 sampling events) or detected at roughly 2-fold lower concentrations in 2020 at RG_LILC3 (mean concentration: 0.028 µg/L). Similarly, concentrations of methylseleninic acid in 2020 peaked on April 14th, 2020 (0.077 µg/L), but generally not detected throughout the remainder of the year (not detected in 40 of 53 sampling event; Figure 4.5; Appendix Table C.21). These peaks in non-selenate species observed in March and April 2020 at RG_LILC3 were followed by elevated benthic invertebrate selenium concentrations at RG_LILC3 (Figure 4.6; see Section 4.2 for details), suggesting that the seasonal increase in non-selenate species observed in the winter or early spring of 2020 may be linked to an increase in benthic invertebrate tissue selenium at this area. Despite this increase, benthic invertebrate tissue selenium concentrations at RG_LILC3 in April 2020 remained significantly lower than during AWTF without AOP operation (in 2016 and 2017; see Section 4.2 for details) and lower than those observed in 2018 immediately following shutdown of the ATWF without AOP (although not tested statistically; Figure 4.6, Table 4.1). This indicates that the AWTF with AOP functioned as intended to limit selenium accumulation by aquatic biota downstream

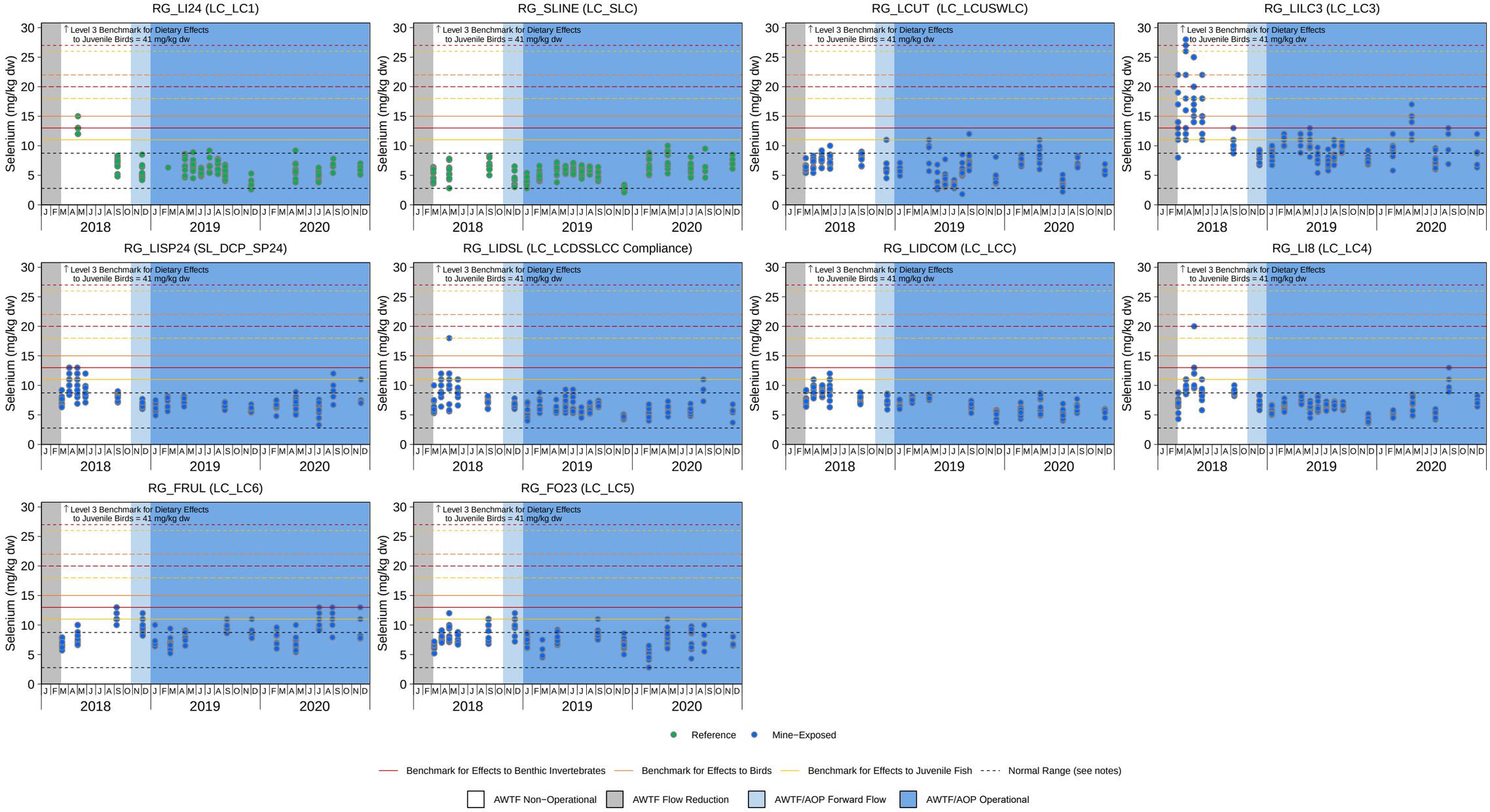


Figure 4.6: Selenium Concentrations in Benthic Invertebrate Composite−Taxa Samples from Line Creek and Fording River, 2018 to 2020

Notes: 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). Solid lines indicate Level 1 benchmarks, long dashed lines indicate level 2 benchmarks, and short dashed lines indicate Level 3 benchmarks. 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.

throughout 2020 (compared to AWTF operation without AOP), even with the April 2020 results were taken into account.

Benthic invertebrate tissue selenium results from 2012 to 2020 were plotted relative to the regional one-step water-to-invertebrate lotic selenium accumulation model (Figure 4.7; 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). Most plotted values were within or below the 95% prediction limits of the model (except three sampling events at RG_LILC3 in April 2020; Figures 4.7 and 4.8). This coincides with past observations, as the majority of plotted values have largely been within the model predictions, except for samples collected nearest the AWTF in 2016 and 2017 (e.g., RG_LILC3 in Figure 4.8). The three values from April at RG_LILC3 plotting above the model 95% prediction limits is indicative of increased bioaccumulation, which is consistent with the elevated tissue concentrations reported (see Section 4.2) and with the peak organoselenium species concentrations observed in March/April (as noted earlier). Despite this, the mean selenium tissue concentration for sampling in April was 14 mg/L, which is only slightly higher than the EVWQP Level 1 Benchmarks for invertebrates (~10% effect to growth, reproduction, and survival; 13 mg/kg dw) and juvenile fish (~10% dietary effect for growth; 11 mg/kg dw), but still below the EVWQP Level 1 Benchmark for birds (~10% effect for dietary effects to juvenile birds; 15 mg/kg dw). It should be noted that although complete removal of organoselenium species is not expected with the addition of AOP, lower selenium bioaccumulation was evident during AWTF operation with AOP than without. This was evidenced by benthic invertebrate selenium concentrations plotting closer to the model upper 95% prediction limit than during AWTF operation with AOP compared to without AOP (including the three values from April at RG_LILC3; Figure 4.8). Combined, the results support the conclusion that selenium accumulation in Line Creek during AWTF operation without AOP was related to higher-than-normal concentrations of non-selenate forms of selenium, and that the recommissioning of the AWTF with AOP has been functioning to decrease non-selenate forms and associated accumulation in aquatic biota.

Overall, the decreased concentrations of aqueous non-selenate selenium species, significant decrease in benthic invertebrate selenium concentrations compared to during AWTF operation without AOP and results relative to the selenium bioaccumulation model clearly indicate that the AWTF with AOP functioned as intended throughout 2020 to limit selenium accumulation by aquatic biota.

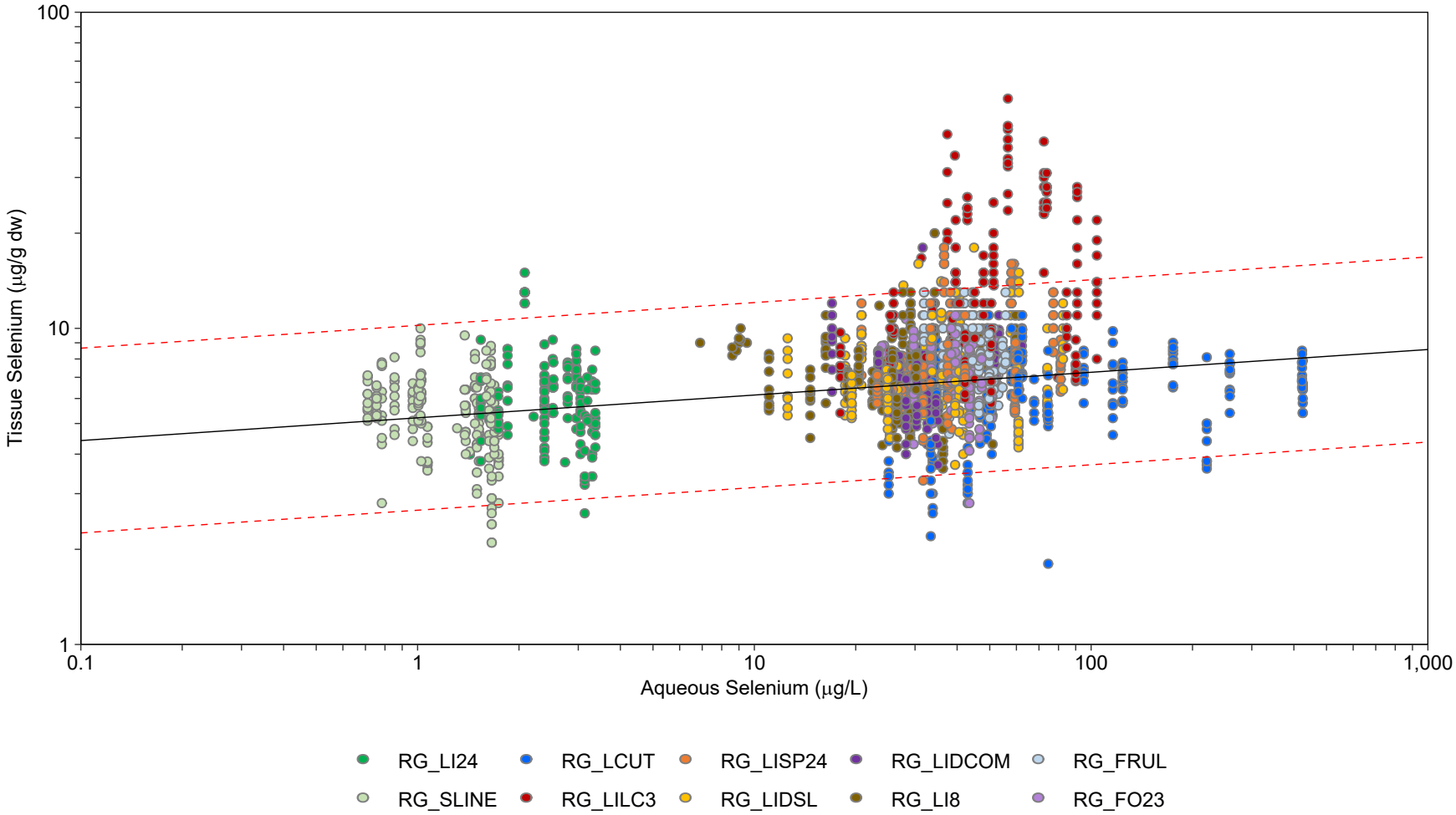


Figure 4.7: Observed and Modeled Selenium Concentrations in Benthic Invertebrate Composite Samples Relative to Total Aqueous Selenium Concentrations at Stations Upstream and Downstream of West Line Creek Active Water Treatment Facility, 2012 to 2020

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. Reference areas are shown in green. One data point for station FO23 on September 16th, 2015 is the average of two duplicate measurements.

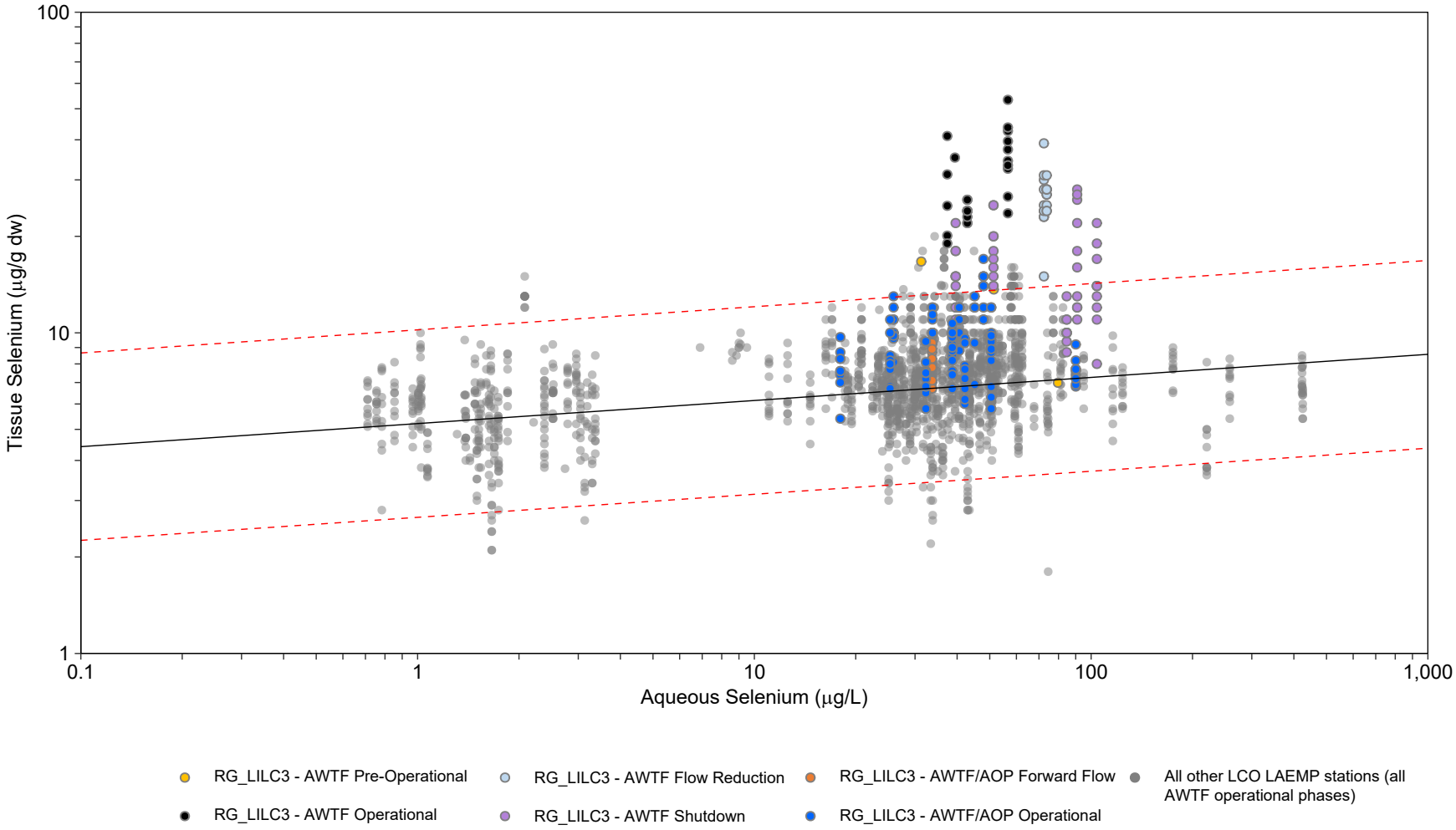


Figure 4.8: Observed and Modeled Selenium Concentrations in Benthic Invertebrate Composite Samples Relative to Total Aqueous Selenium Concentrations at RG_LILC3 Line Creek 2012 to 2020

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. All other Line Creek stations are shown in grey.

4.4 Summary

Concentrations of non-selenate forms of aqueous selenium in Line Creek were decreased during operation of the AWTF with AOP in 2020, compared to AWTF operation without AOP, which is consistent with results from 2019 during AWTF with AOP operation. Benthic invertebrate tissue monitoring in Line Creek identified substantially lower selenium concentrations in 2020 during AWTF with AOP operations compared to concentrations that were observed during AWTF without AOP operation. Mean benthic invertebrate selenium concentrations were below the EVWQP Level 1 benchmark at all areas downstream of the AWTF discharge with one exception (in April at RG_LILC3). Comparison of benthic invertebrate selenium concentrations to the selenium bioaccumulation model indicated that selenium bioaccumulation in 2020 was within expectations of the model except three samples at RG_LILC3 (in April), which were associated with a seasonal (i.e., winter) increase in concentrations of aqueous non-selenate species. Despite this, results for these samples remained closer to selenium bioaccumulation model predictions than those during ATWF operation without AOP. Combined, the aqueous selenium speciation and benthic invertebrate tissue selenium monitoring results all indicated that the recommissioned AWTF with AOP is functioning as intended to shift selenium speciation in AWTF effluent from chemically-reduced species back to a selenate-dominated condition, thereby reducing the bioavailability of selenium in Line Creek.

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 2020 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 2020 with discharge to the receiving environment occurring throughout the year (see Section 1.3 for details).

5.2 Temperature

Water temperatures measured by continuous loggers in Line Creek upstream (LC Intake Pond [Data logger T1]) and downstream (LC Mixing Zone Discharge [Data logger T4] and LC3 Downstream [Data logger T5]) of the AWTF in 2020 were generally similar to each other (Figure 5.1). These temperatures were slightly (~1°C) warmer than those collected further upstream at LC_LCUSWLC (Data logger T6) from January to September[28]. Canopy cover at LC_LCUSWLC (although limited) is denser than the complete absence of canopy cover where the temperature loggers further downstream are located, and the LC Intake Pond data logger (Data logger T1) is situated in a ponded area whereas the Data logger T6 (at LC_LCUSWLC) is in a free-flowing lotic area. Therefore, the slightly higher temperatures at monitoring locations downstream of LC_LCUSWLC are likely attributable to these habitat differences. Overall, although water temperatures downstream of the AWTF discharge were slightly higher than at a more covered area upstream (LC_LCUSWLC), the similarity to temperatures measured directly upstream of the AWTF discharge (Data logger T1) indicates that AWTF with AOP operation in 2020 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 2020 were within, or lower than, the optimum temperature ranges specified for different life stages of bull trout and westslope cutthroat trout (Figure 5.2).

[28] Temperature recordings at LC_LCUSWLC (Data logger T6) were not recorded after September 2, 2020 when the data logger was retrieved, downloaded, and redeployed (see Section 2.7.1).

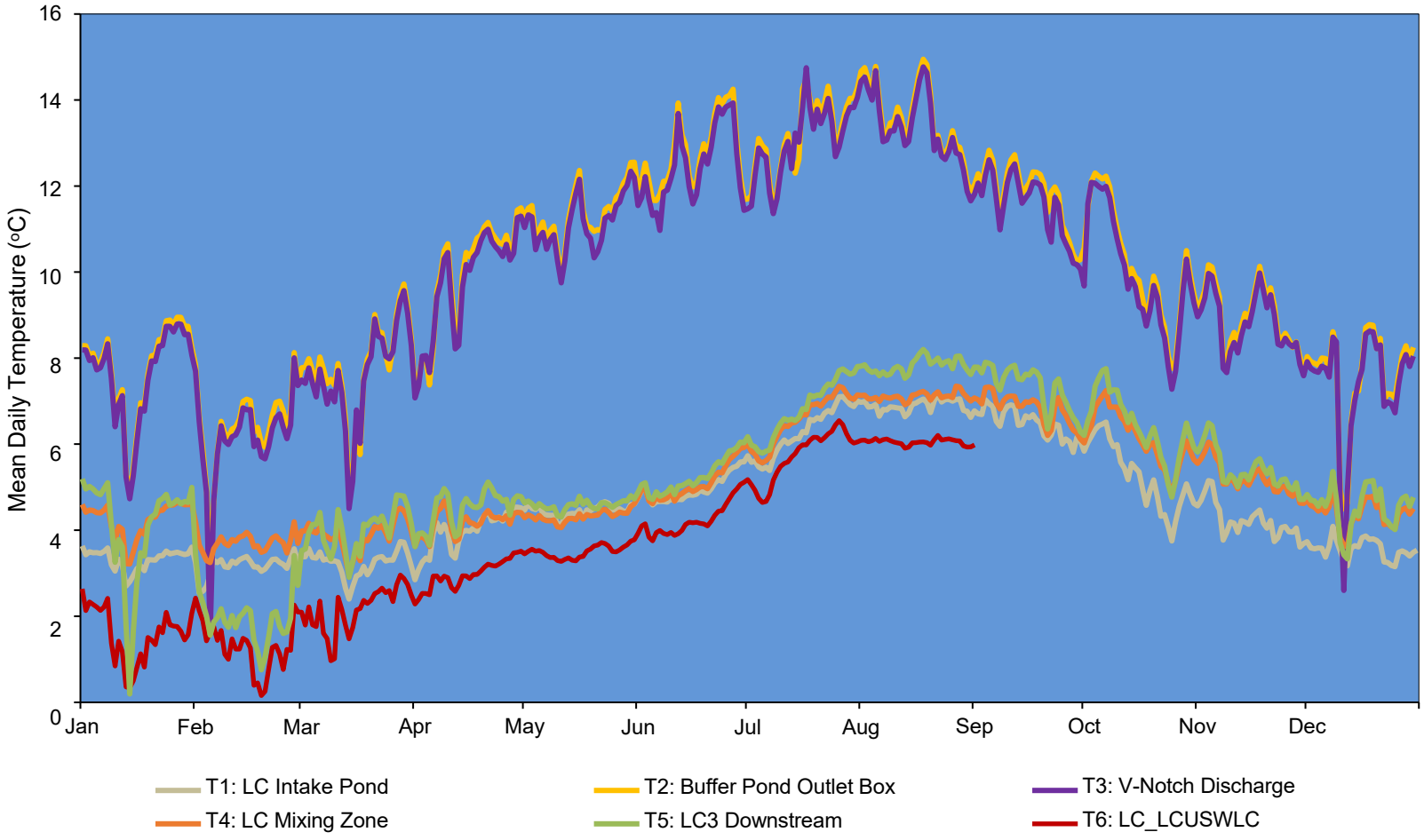


Figure 5.1: Mean Daily Water Temperature (°C) Recorded by Temperature Data Loggers, Line Creek LAEMP, 2020

Note: Temperatures for data logger deployed at LC_LCUSWLC were only recorded until September 2, 2020 when the data logger was retrieved.

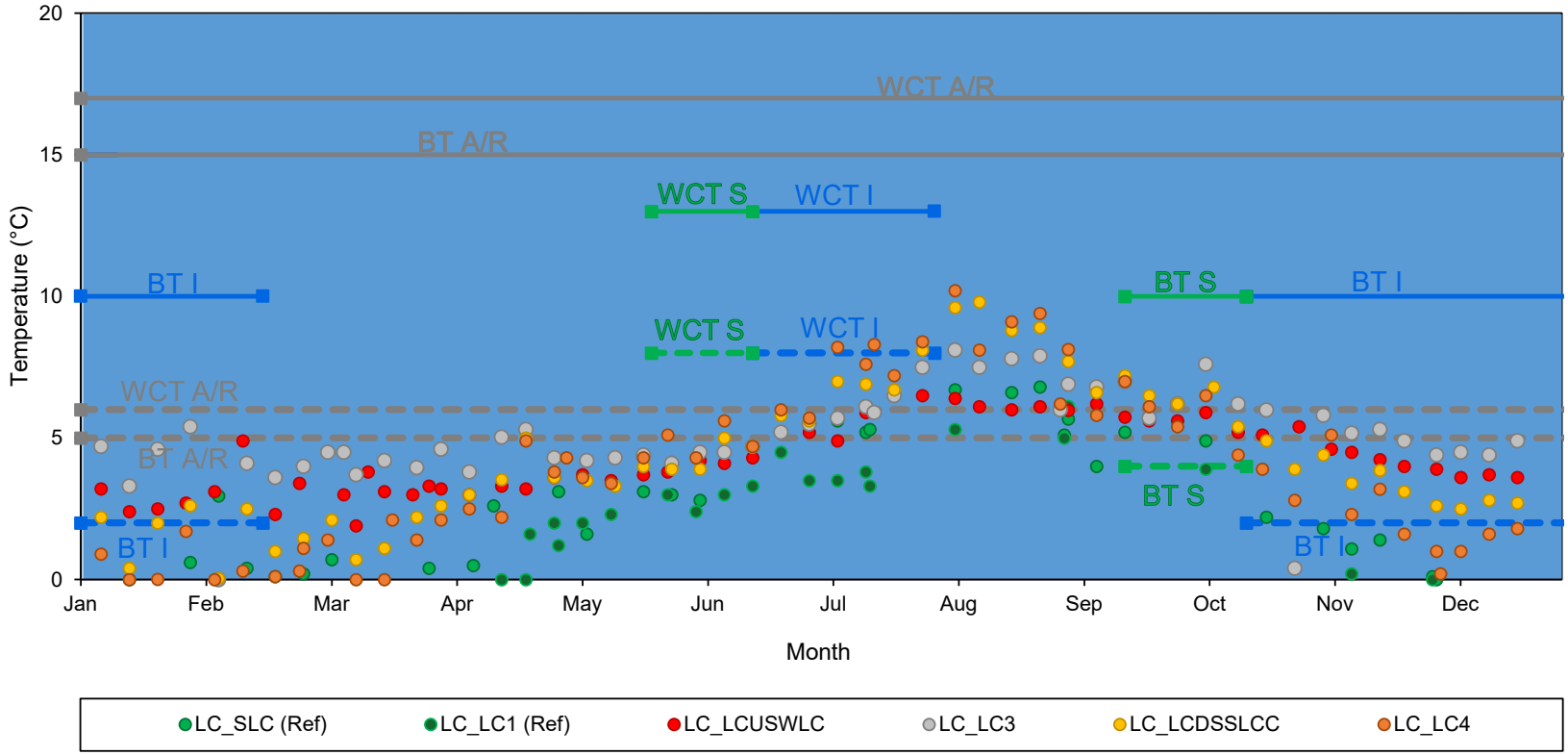


Figure 5.2: Water Temperatures at Monitoring Stations in Line Creek in 2020 Relative to BCMOE (2001b) Guidelines for Maximum (Solid Lines) and Minimum (Dotted Lines) Temperatures for Protection of Fish Species Found in Line Creek

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).

5.3 Dissolved Oxygen

Dissolved oxygen concentrations measured in 2020 upstream and downstream of the AWTF discharge were above the instantaneous minimum criterion for the protection of the most sensitive fish (embryo/alevin) life stages (9 mg/L; BCMOE 1997) and the 30-day mean for all other fish life stages (8 mg/L; Figure 5.3). However, monthly mean concentrations of dissolved oxygen were at or below the 30-day mean criterion of 11 mg/L for the most sensitive fish life stages (buried embryo/alevin) at mine-exposed and reference stations (except LC_WLC) during at least one month (specifically between May and November). The more frequent occurrence of dissolved oxygen concentrations below the 30-day mean criterion upstream of the AWTF discharge (LC_LCUSWLC; 7 months) than downstream (LC_LCDSSLCC [3 months], LC_LC4 [2 months], LC_LC3 and LC_LC4 [1 month]; Table 5.1) indicates that dissolved oxygen concentrations below the criterion were not related to AWTF operation.

5.4 Water Quality Analytes

Evaluation of analytes with early warning triggers under the AMP and those with BCWQG and/or water quality benchmarks (see Sections 2.2.1 and 2.7.1; Appendix Tables D.1 and D.2; Appendix Figures D.1 to D.28, C.4 and C.5) indicated that nitrate was detected with high frequency (>95% of samples) above the long-term BCWQG at mine-exposed stations (see Section 3.2 for the influence of nitrate on productivity). This was true for stations both upstream and downstream of the AWTF discharge in Line Creek and in the Fording River upstream and downstream of the Line Creek confluence. Total nitrate concentrations downstream of the AWTF discharge were higher than the Level 1 EVWQP benchmark at LC_LC3 in 4% of samples (or 2 of 53 weekly sampling events; Figure 3.6, Appendix Table D.2, Appendix Figure B.3), with one of those events being on September 21, 2020 during a shutdown event of the AWTF (as discussed earlier in the context of selenium). In both cases, nitrate was only slightly above the Level 1 EVWQP Benchmark (16.1 to 16.2 mg/L compared to 15.1 mg/L respectively). Total nitrate did not exceed the Level 1 EVWQP Benchmark at areas further downstream of the AWTF than RG_LILC3 (Figure 3.6, Appendix Table D.2, Appendix Figure B.3). In contrast, concentrations of total nitrate upstream of the AWTF discharge (LC_WLC and LCUSWLC) showed a much higher frequency (59 and 65%, respectively) of exceeding the Level 1 EVWQP Benchmarks. Thus, the higher concentrations upstream of the AWTF suggest that the AWTF is functioning as expected in reducing concentrations of nitrate downstream. Evaluation of selenium was also included in the assessment of water quality analytes and is discussed in detail in Section 4.3, therefore excluded here.

Concentrations of five other analytes had concentrations higher than applicable BCWQG and/or water quality benchmarks (i.e., EVWQP Benchmarks, Interim Screening Values [for nickel],

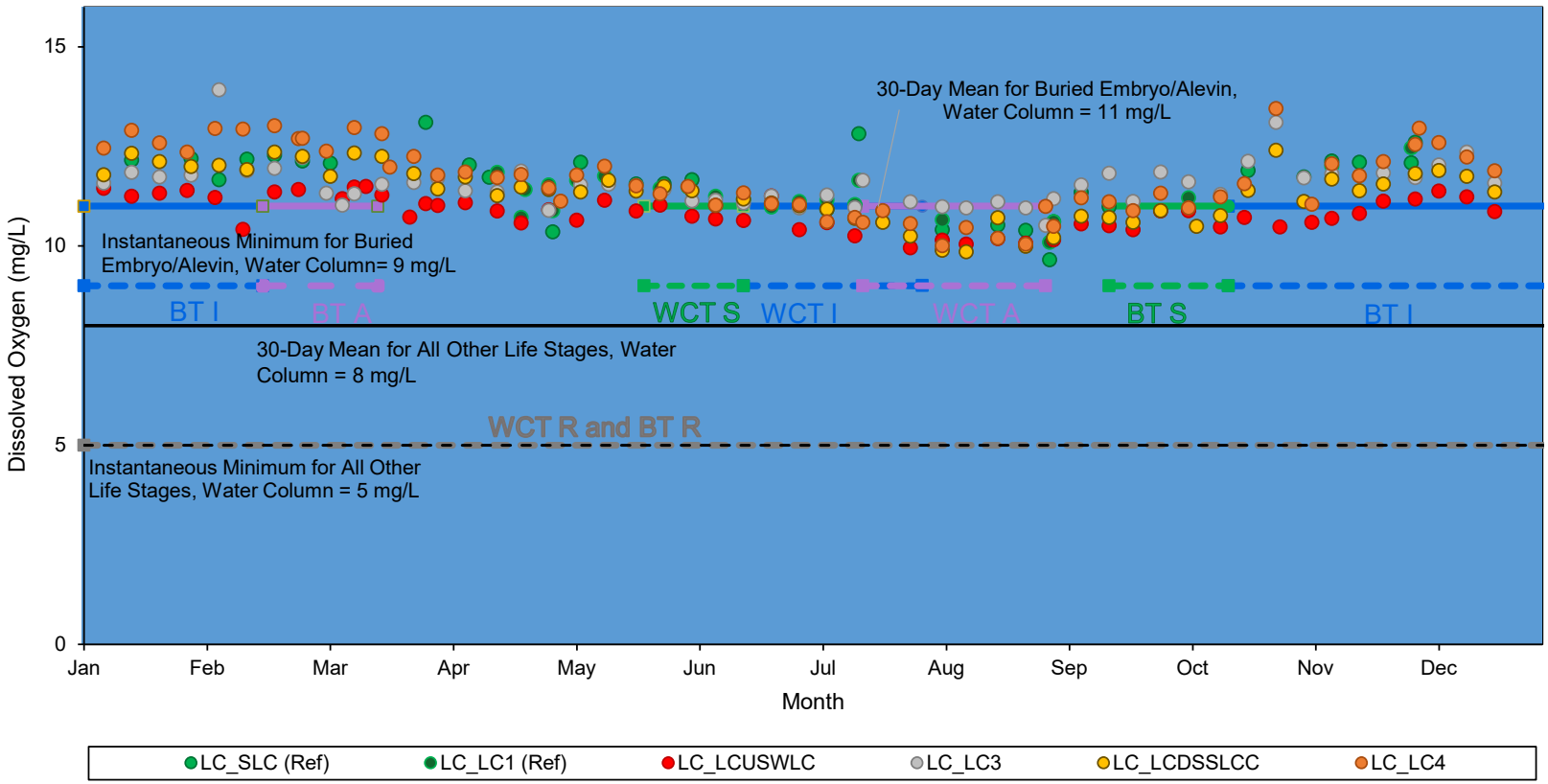


Figure 5.3: Dissolved Oxygen Concentrations at Sampling Stations in Line Creek in 2020, Relative to the BCMOE (1997) Criteria for the Protection of Fish Life Stages

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, 2020

Month	LC_LC1	LC_SLC	LC_LCUSWLC	LC_WLC	LC_LC3	LC_LCDSSLCC	LC_LCC	LC_LC4
January	-	12.2	11.4	11.2	11.7	12.1	-	12.6
February	-	12.1	11.1	11.4	12.5	12.1	12.1	12.9
March	-	12.6	11.2	11.2	11.4	11.9	11.6	12.4
April	11.3	11.4	10.8	11.0	11.4	11.5	10.8	11.6
May	11.6	11.7	10.9	11.3	11.5	11.5	-	11.7
June	11.2	11.7	10.7	11.1	11.1	11.1	-	11.2
July	11.3	11.6	10.9	11.1	11.2	10.6	11.8	10.7
August	10.4	10.3	10.1	11.1	10.9	10.1	10.3	10.3
September	10.6	11.0	10.6	11.3	11.5	10.6	-	11.0
October	11.2	11.4	10.6	11.1	12.0	11.3	-	11.8
November	12.2	12.0	10.8	11.3	11.8	11.4	-	11.8
December	-	-	11.2	11.2	12.0	11.7	12.1	12.4

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.

or Level 1 Screening Value [for total dissolved solid]) downstream of the AWTF discharge. These included total dissolved solids (> Level 1 Screening Value at LC_LC3), sulphate (> long-term BCWQG and Level 1 EVWQP Benchmark at LC_LC3), nickel (> Level 1 interim screening value at LC_LC3 and WL_DCP_SP24), dissolved cadmium (> long-term BCWQG and Level 1 EVWQP Benchmark at LC_LC3 and Level 1 EVWQP Benchmark at WL_DCP_SP24), and mercury (> long-term BCWQG at each area except LC_LC5; Appendix Table D.2; Appendix Figures D.1 to D.28). However, annual mean concentrations of these analytes were lower than at areas upstream of the AWTF discharge (as evidenced by fewer benchmark exceedances than upstream). In the case of mercury, past studies have shown that mercury inputs (total and methyl) are not mine-related in the Elk Valley Area (Azimuth 2019), and furthermore concentrations at the two reference areas were also higher than the long-term BCWQG at a similar frequency (5 to 15% of sampling events) to the mine-exposed areas (Appendix Table D.2) suggesting naturally elevated mercury concentrations in the area.

Visual inspection of results from 2012 to 2020 indicated temporal increases in analyte concentrations at monitoring stations downstream of the AWTF discharge (i.e., comparing results during AWTF with AOP operations to years without AOP or pre-AWTF) for three analytes. Specifically, temporal increases in dissolved cobalt, total manganese, and total molybdenum concentrations were noted during AWTF with AOP operation (2019 and 2020) at areas in close proximity downstream of the AWTF discharge (namely LC_LC3; Appendix Figures D.15, D.19, and D.21). Concentrations of total manganese and total molybdenum remained well below the long-term BCWQG at LC_LC3 (>14 and >125 times, respectively; Appendix Figures D.19 and D.21) while dissolved cobalt, which does not have an applicable BCWQG, was within the range of pre-AWTF results (Appendix Figure D.15). The increase in molybdenum concentration could be related to the use of antiscalant (which contains molybdenum) which started in 2018 (Traverse 2021, pers. comm. 2021).

5.5 Toxicity Results

Acute toxicity testing with was conducted with 31 effluent samples from WL_BFWB_OUT_SP21 using the water flea *Daphnia magna* and rainbow trout in 2020 (Teck 2021b). No samples caused mortality to either organism (Table 5.2; Appendix Table D.3). Chronic toxicity testing was also performed quarterly on samples collected at LC_LC3 and the Compliance Point (LC_LCDSSLCC) to evaluate potential effects to *Ceriodaphnia dubia* and *Pseudokirchneriella subcapitata*, while semi-annual chronic toxicity tests were conducted to evaluate potential effects to *H. azteca*, fathead minnow, and rainbow trout; results are discussed on species-specific basis below.

For all four quarters (with the exception of Q3), effects to *C. dubia* (survival and reproduction) were either not significantly different when compared to reference or were categorized as 'no

Table 5.2: Summary of Acute Toxicity Test Results for Line Creek Monitoring Stations, 2020 (Teck 2021a)

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	2020	0	31	0	31

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

adverse response' (i.e., based on low effect-size relative to reference and results falling within the local and normal range), according to decision criteria (Table 5.3; Golder 2021). In Q3, *C. dubia* reproduction for LC_LCDSSLCC showed a 'possible adverse response' (i.e., the response was within the local and regional normal ranges but exhibited a 30% effect size when compared to the average reference response in Q3). Overall, no water quality analyte was identified as a likely cause of the observed response, as analyte concentrations were equal to or lower than concentrations in reference waters and/or test site waters categorized as no adverse response. As this area is further downstream from the discharge in comparison to LC_LC3, which showed 'no adverse response' (which was also the case in 2019) it is unlikely that the toxicity observed was AWTF related. Although the magnitude of response at LC_LCDSSLCC was higher than in 2019 (which was categorized as no adverse response), it was still less than results from 2018 when the AWTF was not operational for most of the year (Table 5.3; Golder 2019, Golder 2020a).

Similar to *C. dubia*, effects to cell yield for *P. subcapitata* (cell yield) at LC_LC3 and LCDSSLCC were only observed in Q3, as all other results were either not significantly different when compared to reference or were categorized as 'no adverse response' (Golder 2021). *P. subcapitata* cell yield for LC_LC3 in Q3 showed a 'possible adverse response' (Table 5.3). Overall, no water quality analyte was identified as a likely cause of the observed response, as analyte concentrations were equal to or lower than concentrations in test site waters categorized as no adverse response and/ or were lower than the chronic BC WQG and lowest EVWQP Level 1 Benchmark. This is an improved response in comparison to those from 2019 when both LC_LC3 and LC_LCDSSLCC reported a 'likely adverse response' in *P. subcapitata* cell yield in Q3 (although it should be noted that the *P. subcapitata* results from Q3 2019 were considered anomalous as cell yield was unusually low across replicates for all study areas including reference; Golder 2020a).

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

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)	Reproduction (% control-normalized; 8-day)	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	92 ± 21	-	-	81.5 ± 4.5	-	-	-	-	100 ± 0	89 ± 14	87 ± 6	***90 ± 3***	98 ± 5
		Q2	100 ± 0	81 ± 6	81 ± 6	-	-	*110.8 ± 2.6*	101 ± 11	101 ± 15	104 ± 3	115 ± 5	-	-	-	-	-
		Q3	80 ± 42	92 ± 23	86 ± 19	90 ± 17	*51 ± 26*	***29.8 ± 3.3***	-	-	-	-	100 ± 0	***64 ± 12***	**71 ± 8**	104 ± 5	96 ± 7
		Q4	100 ± 0	88 ± 17	90 ± 21	**73 ± 35**	84 ± 51	***104.0 ± 10.0***	90 ± 6	86 ± 4	103 ± 2	107 ± 3	-	-	-	-	-
	2020	Q1	111 ± 0	93 ± 9	93 ± 9	-	-	***74 ± 5.3***	-	-	-	-	98 ± 3	***39 ± 29***	**52 ± 35**	117 ± 7	112 ± 0
		Q2	90 ± 32	86 ± 34	91 ± 31	107 ± 5	92 ± 18	**111 ± 5.6**	113 ± 18	109 ± 24	100 ± 7	103 ± 16	-	-	-	-	-
		Q3	90 ± 32	***70 ± 22***	***74 ± 22***	-	-	**105 ± 9.0**	-	-	-	-	100 ± 0	96 ± 10	87 ± 6	90 ± 6	100 ± 0
		Q4	100 ± 0	74 ± 15	***78 ± 7***	88 ± 17	63 ± 30	119 ± 4.4	***89 ± 8***	***87 ± 10***	102 ± 0	111 ± 8	-	-	-	-	-
LC_LC3	2019	Q1	100 ± 0	86 ± 12	86 ± 12	-	-	79.5 ± 8.0	-	-	-	-	100 ± 0	86 ± 4	89 ± 4	96 ± 1	100 ± 0
		Q2	100 ± 0	85 ± 12	85 ± 12	-	-	*113.8 ± 11.4*	92 ± 14	94 ± 13	104 ± 2	118 ± 8	-	-	-	-	-
		Q3	100 ± 0	105 ± 20	89 ± 17	75 ± 17	67 ± 26	***27.0 ± 3.6***	-	-	-	-	100 ± 0	95 ± 13	92 ± 5	105 ± 2	100 ± 0
		Q4	90 ± 32	76 ± 22	*73 ± 21*	***67 ± 45***	153 ± 25	122.8 ± 8.5	90 ± 5	83 ± 17	101 ± 3	104 ± 10	-	-	-	-	-
	2020	Q1	111 ± 0	88 ± 20	88 ± 20	-	-	***75 ± 3.8***	-	-	-	-	100 ± 0	96 ± 7	84 ± 4	96 ± 2	100 ± 0
		Q2	100 ± 0	*87 ± 18*	*92 ± 10*	*76 ± 46*	**75 ± 29**	120 ± 3.9	96 ± 29	**91 ± 33**	99 ± 8	116 ± 22	-	-	-	-	-
		Q3	100 ± 0	***82 ± 18***	***86 ± 9***	-	-	***83 ± 7.4***	-	-	-	-	92 ± 6	73 ± 12	98 ± 7	104 ± 5	94 ± 13
		Q4	100 ± 0	78 ± 18	**82 ± 15**	96 ± 9	49 ± 19	114 ± 5.5	**90 ± 2**	91 ± 2	101 ± 1	106 ± 12	-	-	-	-	-

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.

[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.

[c] Based on the Permit 107517 and 106970 Chronic Toxicity Program integration amendment (March 4, 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 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.

No effects to either survival or dry weight of *H. azteca* were noted at LC_LCDSLCC in 2020 (Golder 2021). *H. azteca* survival for LC_LC3, although highly variable (i.e., control-normalized survival response ranged from 0 to 109%), was significantly lower than a subset of reference areas (22 to 29% lower) resulting in a classification of "possible adverse response" in Q2. No water quality analyte was identified as a potential cause of the observed response in this assay. Furthermore, this same response (as well as the observed increased variability) was not observed in Q4 as *H. azteca* survival and biomass were not significantly different from reference, suggesting that the results encountered in Q2 might have been an artefact of testing in that quarter. Survival of *H. azteca* was higher in 2020 at LC_LC3, when compared to 2019, as survival of *H. azteca* was significantly lower than a subset of reference areas in both Q3 and Q4 in 2019 (Golder 2020a), and the absence of effects at LC_LCDSLCC also represent a decrease in adverse effects relative to prior years (2018, 2019; Golder 2019, 2020a).

Effects to fathead minnow at both areas (Q1 and Q3; via evaluation of hatch, survival, biomass, length, and normal development) were either not significantly different from reference or were categorized as "no adverse response", with the exception of survival and biomass in Q1 at LC_LCDSSLCC (Golder 2021). In this instance, both endpoints were categorized as a "likely adverse response" (Table 5.3). Overall, no water quality analyte was identified as a likely cause of the observed response in Q1, as analyte concentrations were equal to or lower than concentrations in reference waters and/or test site waters categorized as no adverse response, and/or were lower than the chronic BC WQG and lowest EVWQP Level 1 Benchmarks (except for selenium which also determined unlikely to contribute to toxicity; Golder 2021). It is possible that microbial activity may have influenced the outcome of the toxicity tests although uncertainty remains regarding that link to toxicity (Golder 2021). Similar responses in fathead minnow were observed in Q3 of 2019 (as survival and biomass responses were categorized as 'possible adverse response' in Q3; Golder 2020a), although again microbes were present, which could have influenced the results of the assay. Furthermore (and similar to results for *C. dubia*), the lack of toxicity at LC_LC3, an area upstream of LC_LCDSSLCC and in closer proximity to the AWTF, suggests that the observed toxicity for fathead minnows was unlikely related to the AWTF.

A "possible adverse response" was detected for *O. mykiss* in Q2 for viability at LC_LC3, one of the four test endpoints (survival, viability, length, and wet weight; Table 5.3; Golder 2021). While water quality analytes were unlikely the cause of the observed response in *O. mykiss* (Golder 2021), microbes may have contributed to the response detected for viability in Q2 (Golder 2021). In Q4, the viability of *O. mykiss* showed a "possible adverse response" for LC_LCDSSLCC test waters, as did *O. mykiss* survival for both areas in Q4, neither of which were associated water quality or microbial activity in the tests (Golder 2021). It should be noted that in Q4, markedly low variability was observed in the viability and survival endpoints for rainbow trout

for the reference area used for comparison (i.e., South Line Creek reference [LC_SLC]), possibly resulting in more conservative classifications of risk. For example, the standard deviation associated with viability in Q2 and Q4 for the reference area were 30% and 2%, respectively. Although these responses were significant when compared to references, the overall differences of effects of survival and viability when compared to reference areas was low (below 20%) and similar to reports from 2019, although these did not differ significantly from reference in 2019 (Golder 2020a).

Overall, acute toxicity testing of AWTF effluent showed no test failures in 2020 (Teck 2021a). Although chronic toxicity was noted on a few occasions in both areas, the response was generally low (<30% of an effect when control normalized), with the exception of fathead minnow effects to survival and biomass in Q1 at the Compliance Point (61 and 48% effect, respectively; Table 5.3). However, it is possible that the effects to fathead minnow survival and biomass were complicated by microbial activity in the test which may influence test outcomes. This and the absence of adverse response in closer proximity to the AWTF also suggest the fathead minnow responses was not AWTF-related. Temporal comparisons indicated that observed organism responses (or lack thereof) in 2020 were similar to or lower than previous years, except for rainbow trout responses, which were driven by markedly low reference variability. Additionally, evaluations of causality in instances where a 'possible' or 'likely adverse response' was observed provided no evidence in suggesting that mine-related analytes were at high enough concentrations to cause the noted effects suggesting a lack of influence of the AWTF. Combined, these results indicated the toxicity responses observed in 2020 were likely not related to AWTF with AOP operation. This conclusion is consistent with findings of benthic invertebrate community monitoring over the same time-period that indicated no obvious adverse change in community characteristics associated with the AWTF with AOP operation in 2020.

5.6 Summary

Operation of the AWTF with AOP in 2020 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 during AWTF with AOP operation in 2020. Additionally, chronic toxicity testing in most cases, with the exception of rainbow toxicity results in Q4 (which were within <20% of reference results), suggested that toxicity was either similar to or lower than previous years. Overall, there did not appear to be influences on aquatic biota associated with the WLC AWTF with AOP operations in 2020 that were not already being addressed through monitoring related to Study Questions #1 (productivity) and #2 (tissue selenium accumulation).

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 2020. In 2020, concentrations of nutrients (total phosphorus, orthophosphate, and nitrate) were generally in the ranges of concentrations observed in previous years (Table 6.1). In addition, results suggested that operation of the AWTF with AOP in 2019 and throughout 2020 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 a majority of mine-exposed and reference areas was moderate in 2020 (based on visual assessment) and was temporally consistent with past results except at two areas. Periphyton coverage increased at two areas (RG_LILC3 and RG_LIDCOM), but supporting evidence (i.e., nutrient concentrations and lack of temporal increases in periphyton coverage at other areas downstream of the AWTF) did not suggest that this increase was due an AWTF-related influence. 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 2020 related to operation of the AWTF with AOP. Benthic invertebrate total abundance (measured by kick and sweep) was within normal regional ranges and was largely similar to previous years (2017 to 2019) at mine-exposed areas in 2020. Where abundance was increased relative to pre-AWTF results, the absence of a change closest to the AWTF discharge indicated that the increase was likely unrelated to AWTF with AOP operation (consistent with the biomass and density results). 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 2020. Rather, continued increase in the percentage of sensitive taxa (E) in 2020 at areas of Line Creek furthest downstream from the AWTF (RG_LISP24, RG_LIDCOM, RG_LI8) was suggestive of an improvement in benthic invertebrate community structure (Table 6.1).

Overall, assessment of Study Question #1 indicated that biological productivity downstream from the WLC AWTF was not affected by the operation of the AWTF with AOP throughout 2020 relative to previous years.

Table 6.1: Summary of Measurement Endpoints, Analyses, and Results of Line Creek LAEMP, 2020

Study Question	Water				Biological			
	Measurement Endpoint	Indicator	Analysis/Evaluation	Result	Measurement Endpoint	Indicator	Analysis/Evaluation	Result
Is active water treatment affecting biological productivity downstream in Line Creek?	Nutrient concentrations	Nitrate	1) Comparison to SPO 2) Comparison to BCWQG and Water Quality Benchmarks	1) Nitrate in 2020 was below the SPO during a majority of 2020 (67% of sampling events) 2) Concentrations > BCWQG at all mine-exposed areas. Concentrations < Level 1 benchmark for most areas downstream of discharge (excluding LC_LC3 which exceeded the benchmark in 4% of sampling events)	Periphyton productivity	Visual Coverage Scores	Coverage scored according to CABIN guidance (Environment Canada 2012)	Coverage scored as moderate at a majority of mine-exposed areas (with the exception of RG_LILC3 and RG_LIDCOM which were slightly higher than years past) and mild-moderate at reference stations, similar to previous years.
					Benthic invertebrate productivity	Biomass	ANOVA analysis among years = 2014 to 2020 Areas: Ref = RG_SLINE, RG_LI24; Exp = RG_LILC3, RG_LIDSL	No adverse effect associated with AWTF with AOP operation in 2020. No significant differences in biomass at RG_LIDSL in 2020 when compared to previous years (relative to either reference or compared among years at RG_LIDSL). Biomass at RG_LILC3 significantly lower in 2020 than all prior years (when compared among years at RG_LILC3), and lower than 2014 and 2018 (relative to reference; RG_LI24 and RG_SLINE). Decrease in biomass at RG_LILC3 in 2020 represents a change towards reference conditions.
						Density	ANOVA analysis among years = 2014 to 2020 Areas: Ref = RG_SLINE, RG_LI24; Exp = RG_LILC3, RG_LIDSL	No adverse effect associated with AWTF with AOP operation in 2020. Density at RG_LIDSL significantly lower in 2020 than 2018 (when compared among years at RG_LIDSL), but no change among years relative to reference. Density at RG_LILC3 significantly higher in 2020 than 2015 and 2016 (when compared among years at RG_LILC3). Density in 2020 at RG_LILC3 also significantly higher than 2015 relative to one reference (RG_LI24), but not both (i.e., no difference among years relative to RG_SLINE).
		Total Phosphorus	1) Comparison to SPO 2) Comparison to the LC_LC3 baseline 97.5th percentile	1) Phosphorus did not exceed SPO in 2020. 2) Concentrations in 2020 were below the LC_LC3 baseline with the exception of one sample in May.	Benthic invertebrate community structure	Abundance	Comparison to past observations and reference normal range (NR)	No evidence of adverse effect on secondary productivity associated with AWTF with AOP operation in 2020. Average organism abundance at Exp areas were within NR in 2020 and within range of previous AWTF operational years. Abundance at RG_LIDSL, RG_LI8, and RG_FO23 higher than pre-ATWF conditions on occasion, but lack of increase at RG_LILC3 (immediately downstream of AWTF discharge) indicates increase is likely not AWTF-related.
						Richness	Comparison to past observations and reference normal range (NR)	No evidence of adverse effect associated with AWTF with AOP operation in 2020. Average species richness at all mine-exposed area were within both NR and SNR. Species richness at RG_LILC3 in 2020 was similar to before AWTF operation (2012 and 2013), therefore results not indicative of an adverse effect of AWTF operation.
		Orthophosphate	Comparison to the LC_LC3 baseline 97.5th percentile	Concentrations in 2020 were below the LC_LC3 baseline.		%EPT, %Ephemeroptera (%E), %Chironomidae (%C)	Comparison to past observations and reference normal range (NR)	No evidence of adverse effect associated with AWTF with AOP operation in 2020. Average %EPT was within NR except immediately downstream of the AWTF discharge (at RG_LILC3) and within or above range of previous years except at LIDCOM . %E in 2020 was similar or increased in comparison to previous years, with all areas being within NR except for RG_LILC3 and RG_LIDSL. %C downstream of AWTF discharge were within range of previous years or showed decreases in composition (except at RG_LIDCOM where %C increased slightly).

Notes: Ref = Reference sampling station/area; Exp = Mine-exposed sampling station/area; SPO = Site Performance Objective; BCWQG = British Columbia Water Quality Guideline; 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).

[a] The "AWTF with AOP Operational" period was initiated in December 2018 (Table 1.1). Within-period statistical contrasts were focused on 2020 data from the "AWTF with AOP Operational" period for two reasons; 1) data from 2020 are the focus on the present report, and 2) analysis of data from December 2018 to December 2019 during the "AWTF with AOP Operational" period was incorporated in the 2019 LCO LAEMP report (Minnow 2020a). 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 1.3 for more details).

Table 6.1: Summary of Measurement Endpoints, Analyses, and Results of Line Creek LAEMP, 2020

Study Question	Water				Biological			
	Measurement 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		1) ANOVA analysis: 2012 to 2019 for total Se at LC_LC1 2) Visual inspection of data	1) Significant increases in total Se in 2014, 2015, and 2017. No change between 2017 and 2020. 2) General decrease in total [Se] downstream of the AWTF discharge during AWTF with AOP operation in 2020, except for short-period events when the AWTF was non-operational.	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 (2020); Post-hoc contrasts limited to AWTF with AOP (2020)[a] vs. AWTF without AOP and Before, and within AWTF with AOP (2020). 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 (Feb 2020 to Dec 2020) 3) Comparison to reference normal range (NR) 4) Comparison to site-specific benchmarks	1) Significant decrease in tissue [Se] during AWTF with AOP in 2020 to without AOP at all Exp areas downstream of the AWTF, relative to change at reference over the same period. Tissue [Se] in 2020 similar to Before period (where data available), relative to change at reference. 2) Tissue [Se] downstream of AWTF discharge were similar to reference and/or upstream of AWTF (RG_LCUT) throughout 2020 except for one sampling event at RG_LILC3 in April). Spatial extent of elevated tissue [Se] in April limited to immediately downstream of AWTF discharge (RG_LILC3). 3) Average tissue [Se] results at Exp areas downstream of the AWTF were within or only slightly higher than NR except for one sampling event at RG_LILC3 in April. 4) Average tissue [Se] downstream of AWTF discharge were below the EVWQP Level 1 Benchmark throughout 2020 except of one sampling event at RG_LILC3 in April.
	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 2020 were higher in winter (January to March) and lowest during summer (June and July).				
	Selenium bioaccumulation model		Comparison of composite-taxa benthic tissue selenium results to one-step water-to-invertebrate model	Tissue selenium concentrations reported during 2020 AWTF with AOP fall within the model prediction intervals except April sampling event for RG_LILC3. April sampling at RG_LILC3 fell slightly above upper prediction interval but well below results at RG_LILC3 during AWTF with AOP operation.	Benthic invertebrate community structure	Abundance	Comparison to past observations and reference normal range (NR)	No evidence of adverse effect on secondary productivity associated with AWTF with AOP operation in 2020. Average organism abundance at Exp areas were within NR in 2020 and within range of previous AWTF operational years. Abundance at RG_LIDSL, RG_LI8, and RG_FO23 higher than pre-ATWF conditions on occasion, but lack of increase at RG_LILC3 (immediately downstream of AWTF discharge) indicates increase is likely not AWTF-related.
						Richness	Comparison to past observations and reference normal range (NR)	No evidence of adverse effect associated with AWTF with AOP operation in 2020. Average species richness at all mine-exposed area were within both NR and SNR. Species richness at RG_LILC3 in 2020 was similar to before AWTF operation (2012 and 2013), therefore results not indicative of an adverse effect of AWTF operation.
						%EPT, %Ephemeroptera (%E), %Chironomidae (%C)	Comparison to past observations and reference normal range (NR)	No evidence of adverse effect associated with AWTF with AOP operation in 2020. Average %EPT was within NR except immediately downstream of the AWTF discharge (at RG_LILC3) and within or above range of previous years except at LIDCOM . %E in 2020 was similar or increased in comparison to previous years, with all areas being within NR except for RG_LILC3 and RG_LIDSL. %C downstream of AWTF discharge were within range of previous years or showed decreases in composition (except at RG_LIDCOM where %C increased slightly).

Notes: Ref = Reference sampling station/area; Exp = Mine-exposed sampling station/area; SPO = Site Performance Objective; BCWQG = British Columbia Water Quality Guideline; 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).

[a] The "AWTF with AOP Operational" period was initiated in December 2018 (Table 1.1). Within-period statistical contrasts were focused on 2020 data from the "AWTF with AOP Operational" period for two reasons; 1) data from 2020 are the focus on the present report, and 2) analysis of data from December 2018 to December 2019 during the "AWTF with AOP Operational" period was incorporated in the 2019 LCO LAEMP report (Minnow 2020a). 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 1.3 for more details).

Table 6.1: Summary of Measurement Endpoints, Analyses, and Results of Line Creek LAEMP, 2020

Study Question	Water				Biological			
	Measurement 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?	Temperature	Data loggers	Comparison downstream relative to upstream of the AWTF	No evidence that AWTF with AOP operation increased downstream temperature in 2020 when compared to upstream data loggers in similar habitat.	Benthic invertebrate community structure	Abundance	Comparison to past observations and reference normal range (NR)	No evidence of adverse effect on secondary productivity associated with AWTF with AOP operation in 2020. Average organism abundance at Exp areas were within NR in 2020 and within range of previous AWTF operational years. Abundance at RG_LIDSL, RG_LI8, and RG_FO23 higher than pre-ATWF conditions on occasion, but lack of increase at RG_LILC3 (immediately downstream of AWTF discharge) indicates increase is likely not AWTF-related.
		Routine monitoring	Comparison to BCWQG	Temperatures within or below guideline temperature ranges for both bull trout and westslope cutthroat trout.				
	Dissolved oxygen		Comparison to BCWQG	DO concentrations in 2020 > instantaneous minimum criterion and > 30-day average for all other life stages but < 30-day criterion for sensitive life stages (namely during summer months [May to November]). Similar trends were noted in areas both upstream and downstream of AWTF in 2020, suggesting this was not due to AWTF with AOP operation.		Richness	Comparison to past observations and reference normal range (NR)	No evidence of adverse effect associated with AWTF with AOP operation in 2020. Average species richness at all mine-exposed area were within both NR and SNR. Species richness at RG_LILC3 in 2020 was similar to before AWTF operation (2012 and 2013), therefore results not indicative of an adverse effect of AWTF 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 2020 with the exception of dissolved cobalt, total manganese, total molybdenum (which were still well below benchmark values [Mn and Mo] or within the pre-AWTF range [Co]). 2) Long-term BCWQG were exceeded for [NO_3], [SO_4], total [Se], and dissolved [Cd] both upstream and downstream of AWTF discharge, and for total [Hg] downstream of AWTF discharge and at reference. 3) Level 1 EVWQP benchmark was exceeded for [TDS], [SO_4], [NO3], total [Ni], total [Se] and dissolved [Cd] in both upstream and downstream areas. Exceedances in downstream areas were generally confined to areas directly downstream of the discharge (such as LC_LC3). Upstream areas showed a greater level of exceedance as LC_WLC exceeded Level 2 EVWQP benchmark for total [Se] as well as Interim Level 3 benchmark for total [Ni].				
	Toxicity		Comparison of acute and chronic toxicity test results to reference, and past results	No acute toxicity was reported in 2020 and thus testing met criterion (< 50% mortality). Majority of chronic toxicity testing results suggested that toxicity was either similar to or lower than previous years and/or that observed toxicity was not related to AWTF discharge (i.e. based on a lack of toxic effect further upstream and/or the presence of confounding factors, such as microbes).		%EPT, %Ephemeroptera (%E), %Chironomidae (%C)	Comparison to past observations and reference normal range (NR)	No evidence of adverse effect associated with AWTF with AOP operation in 2020. Average %EPT was within NR except immediately downstream of the AWTF discharge (at RG_LILC3) and within or above range of previous years except at LIDCOM . %E in 2020 was similar or increased in comparison to previous years, with all areas being within NR except for RG_LILC3 and RG_LIDSL. %C downstream of AWTF discharge were within range of previous years or showed decreases in composition (except at RG_LIDCOM where %C increased slightly).

Notes: Ref = Reference sampling station/area; Exp = Mine-exposed sampling station/area; SPO = Site Performance Objective; BCWQG = British Columbia Water Quality Guideline; 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).

[a] The "AWTF with AOP Operational" period was initiated in December 2018 (Table 1.1). Within-period statistical contrasts were focused on 2020 data from the "AWTF with AOP Operational" period for two reasons; 1) data from 2020 are the focus on the present report, and 2) analysis of data from December 2018 to December 2019 during the "AWTF with AOP Operational" period was incorporated in the 2019 LCO LAEMP report (Minnow 2020a). 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 1.3 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 total aqueous 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 during the operational phase with AOP compared to concentrations during the operational phase of AWTF without AOP at all mine-exposed areas downstream of the AWTF discharge. In 2020, mean benthic invertebrate selenium concentrations were below the EVWQP Level 1 benchmark at all areas downstream of the AWTF discharge, except at RG_LILC3 (immediately downstream of the AWTF discharge) in April 2020. Comparison of benthic invertebrate selenium concentrations to the selenium bioaccumulation model indicated that bioaccumulation in 2020 was within expectations of the model except for three samples at RG_LILC3 (in April). Benthic invertebrate selenium concentrations at RG_LILC3 in April were associated with a seasonal (i.e., winter) increase in concentrations of aqueous non-selenate species. Despite this, selenium tissue concentrations of these April benthic invertebrate samples from RG_LILC3 remained significantly lower and closer to the bioaccumulation model upper prediction limit than those during ATWF operation without AOP.

Overall, assessment of Study Question #2 in 2020 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 operation of the AWTF with AOP in 2020 did not significantly change water temperature or dissolved oxygen concentrations downstream in Line Creek. Evaluation of water quality analytes with early warning triggers also demonstrated no changes for a majority of analyte concentrations in 2020 related to operation of the AWTF with AOP and those that did increase remained well below guideline values. Effluent samples showed no acute toxicity, while

chronic toxicity at LC_LC3 or LCLCDSSLCC was either not-significantly different from reference areas, was similar to or lower than prior years, and/or was not AWTF related. Overall, there did not appear to be influences on aquatic biota associated with the WLC AWTF with AOP operations in 2020 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 Program (Teck 2018) and Table 6.2 summarizes material presented in this report that is relevant to the AMP. The results from this study also supported the evaluation of biological triggers which are intended to identify unexpected monitoring results that may lead to responses under the AMP response framework. Biological trigger results indicated that all mine-exposed areas evaluated (RG_LCUT, RG_LILC3, RG_LIDSL, RG_LI8, and RG_FO23) as well one reference area (RG_LI24) exceeded the %EPT biological trigger (Table 6.3). Although uncertainty remains around the cause of biological responses associated with the change in %EPT at the areas identified by the biological triggers, this trigger will continued to be monitored as part of the 2021 LCO LAEMP and the RAEMP. Other efforts are also currently underway (i.e., predictive modeling) to resolve uncertainty around effects of mine-related stressors on benthic invertebrate community endpoints (further information regarding the response for these biological triggers can be found in Appendix E). A subset of replicates for RG_LILC3 during the April sampling event exceeded the biological trigger for the evaluation of selenium in benthic invertebrate tissues. This biological trigger exceedance does not warrant further investigation since this was an isolated event (4 of 10 replicates and during only one sampling period [out of 5]), showed a low magnitude of exceedance (see Appendix E), and may be related to seasonal increases in concentrations of non-selenate species (as noted in Section 4.2). Regardless, monitoring of the benthic invertebrate selenium biological trigger at this area (and other LCO LAEMP areas) will continue under both the 2021 LCO LAEMP and the RAEMP. Overall, results of the biological trigger evaluation were consistent with the findings of the integrated assessment conducted under the 2020 LCO LAEMP. 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 2020

Key Question(s)	Data Evaluation Process	Outcome(s)	Responses & Adjustments in 2020	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 2020.	None	Proposed 2020 study design discussed at in-person meeting February 18, 2020. 2020 Study Design submitted to ENV/EMC May 1, 2020. Draft data package of 2020 results and outline of proposed 2021 Study Design submitted to EMC March 1, 2021 and discussed by tele-conference March 8, 2021. Written input from EMC on March draft data package and proposed 2021 Study Design received March 24, 2021
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 2020 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 2020 with few exceptions. The level of replication for benthic invertebrate tissue selenium monitoring in 2020 differed from that implemented in 2019 (in accordance with the 2020 LCO LAEMP study design and per discussions with EMC). Replication of 5 samples per area was proposed in the 2020 LCO LAEMP study design for July, September, and December monitoring. This differed from the level of replication of n=10 that has been implemented in prior years, however results of a power analysis for the 2020	

Table 6.2: Summary of Findings, Responses and Adjustments Related to the LCO LAEMP in 2020

Key Question(s)	Data Evaluation Process	Outcome(s)	Responses & Adjustments in 2020	EMC Engagement
			LCO LAEMP study design indication this replication was sufficient to detect temporal changes. Five samples per area were collected in September and December (in accordance with the study design) while 10 samples per area were collected in July 2020.	
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	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 remain either well below guidelines (manganese and molybdenum) or within the range of per-AWTF conditions (dissolved cobalt). Ongoing monitoring of these analytes in 2021 will provide further information regarding the nature of these increases. Effluent samples showed no acute toxicity. Chronic toxicity at LC_LC3 or	None	

Table 6.2: Summary of Findings, Responses and Adjustments Related to the LCO LAEMP in 2020

Key Question(s)	Data Evaluation Process	Outcome(s)	Responses & Adjustments in 2020	EMC Engagement
	that corresponds with a change in WLC AWTF operational status.	LCLCDSSLCC was either not-significantly different from reference areas, was similar to or lower than prior years, and/or not AWTF related.		

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 and Selenium Benthic Invertebrate Tissue, Line Creek and Fording River, 2020

Waterbody	Area		% EPT [a]		Selenium BIT [b]	
			Number Replicates Evaluated	Number of Replicates Reaching Biological Trigger [c]	Number Replicates Evaluated	Number of Replicates Reaching Biological Trigger [d]
Line Creek	RG_SLINE	Reference	5	0	40	0
	RG_LI24		5	1	30	0
	RG_LCUT	Mine-exposed	1	1	40	0
	RG_LILC3		5	5	40	4
	RG_LIDSL		5	5	40	0
	RG_LI8		3	1	40	0
Fording River	RG_FO23	Mine-exposed	5	4	40	0

Notes: % EPT = Percent EPT (Ephemeroptera ([mayflies], Plecoptera [stoneflies], and Trichoptera [caddisflies]); Selenium BIT = Selenium concentrations in benthic invertebrate tissue (mg/kg dw).

[a] Biological Trigger analysis for %EPT was for the August/September sampling event.

[b] Biological Trigger analysis for Selenium BIT was for the February, April, July, August/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 E.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 E.2.3 for more details.

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APPENDIX A - DATA QUALITY REVIEW (DQR)

APPENDIX A DATA QUALITY REVIEW

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A1 INTRODUCTION

A1.1 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. The magnitude of inaccuracy and/or imprecision have the potential to affect the reliability of conclusions made from the data. Therefore, it is important to ensure that programs incorporate appropriate steps to control the non-natural sources of data variability (i.e., minimize variability that does not reflect natural spatial and/or temporal variability in the environment).

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 to establish a relevant basis for judging whether the data set is adequate. A Data Quality Review (DQR) involves comparisons of field and laboratory measurement performance to Data Quality Objectives (DQOs) established for a particular study, such as evaluation of Laboratory Reporting Limits (LRLs), 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 [CRMs]).

Samples for chemical analyses were sent to laboratories accredited by the Canadian Association of Laboratory Accreditation (CALA) or the National Environmental Laboratory Accreditation Program (NELAP). Data were reviewed to determine if DQOs set by the laboratory (Table A.1) were met. Programs involving many samples and analytes often yield some results that exceed DQOs. This is particularly so for multi-element scans because the analytical conditions are not necessarily optimal for every element included in the scan.

The following DQR was conducted on laboratory data reported in 2020 for samples collected in support of the Line Creek LAEMP. The objective of this DQR was to define the overall quality of the data, and, by extension, the confidence with which the data can be used to derive conclusions. The intent of a DQR is not to reject measurements that did not meet a laboratory's DQO, but to ensure that questionable data received more scrutiny to determine what effects, if any, were had on interpretation of results within the context of the project.

A1.2 Laboratory Reporting Limits

A Laboratory Reporting Limit (LRL) is the lowest concentration of an analyte that can be reported with a reasonable degree of accuracy and precision and is ideally synonymous with the lower limit of quantitation (LLOQ). The LLOQ is the lowest concentration of an analyte that can be reliably measured within specific limits of precision and accuracy during routine

Table A.1: Laboratory Data Quality Objectives for the Line Creek LAEMP, 2020

Quality Control Measure	Quality Control Sample Type/Check	Study Component			
		Water Chemistry	Selenium Speciation	Benthic Invertebrate Tissue Chemistry	
		ALS	Brooks	SRC[a]	TrichAnalytics[b]
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, 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 and benchmarks
Blank Analysis	Field or Laboratory Blank	Concentrations measured in blank samples should be < LRL	Concentrations measured in blank samples should be < LRL	-	-
Laboratory Precision	Laboratory Duplicates	≤10% RPD (conductivity) ≤15% RPD (ORP, turbidity) ≤20% RPD (all remaining analytes)	≤20% RPD (total selenium) ≤25% RPD (selenium species)	-[c]	≤60% RPD (calcium and strontium) ≤40% RPD (all remaining analytes)
Laboratory Accuracy	Recovery of Blank Spike	6.9 to 7.1 (pH) 60 to 140% (total silicon) 75 to 125% (TKN) 80 to 120% (orthophosphate, phosphorus, TOC, DOC, total and dissolved metals) 85 to 115% (alkalinity, ammonia, bromide, TSS, TDS, turbidity) 90 to 110% (conductivity, chloride, fluoride, nitrate, nitrite, sulfate)	75 to 125% (methylseleninic acid, selenate, selenite, selenocyanate, selenomethionine, total selenium)	-	-
	Recovery of Matrix Spike	70 to 130% (DOC, orthophosphate, total phosphorus, TKN, TOC, total and dissolved metals) 75 to 125% (ammonia, bromide, chloride, fluoride, nitrate, nitrite, sulfate)	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	80 to 120% (orthophosphate, total phosphorus) 85 to 115% (alkalinity, turbidity) 90 to 110% (conductivity) 210 to 230% (ORP) 6.9 to 7.1 (pH)	75 to 125% (total selenium)	≤25% RPD (all remaining analytes) ≤35% RPD (silver) ≤50% RPD (mercury)	60 to 140% (antimony, barium, boron, silver, titanium, tin) 70 to 130% (all remaining analytes) 90 to 110% (selenium)
	Internal Reference Material	-	-	-	-
	Laboratory Control Sample	6.9 to 7.1 (pH) 75 to 125% (TKN) 80 to 120% (ORP, DOC, TOC, total phosphorus, all metals) 85 to 115% (all remaining analytes) 90 to 110% (conductivity, fluoride, nitrate, nitrite, sulfate)	-	-	-

Notes: ALS = ALS Environmental; Brooks = Brooks Applied Laboratory; SRC = Saskatchewan Research Council; LRL = Laboratory Reporting Limit; RPD = Relative Percent Difference; DQO = Data Quality Objectives; ORP = oxidation-reduction potential; PAHs = polycyclic aromatic hydrocarbons; TKN = Total Kjeldahl Nitrogen; TOC = total organic carbon; DOC = dissolved organic carbon; TSS = total suspended solids; TDS = total dissolved solids; "-" indicates quality control method was not applied.

[a] Benthic invertebrate tissue samples collected in February, 2020, were analyzed by the Saskatchewan Research Council (SRC).

[b] Benthic invertebrate tissue samples collected in April, July, August, September, and December were analyzed by TrichAnalytics.

[c] Duplicate samples could not be analyzed due to insufficient sample volume.

operating conditions, which in most cases is the lowest concentration on the calibration curve. This differs from the lowest concentration that can be detected (i.e., reliably distinguished from a blank sample) which is known as the method detection limit (MDL). The LRL is typically three to ten times the method detection limit (MDL); however, some guidelines are so low the LRL is equal to the MDL to meet the guideline. Achieving satisfactory LRLs is important when comparing concentrations to guidelines for that medium. If the LRL is above the guideline, the data cannot be accurately interpreted. Consistency is also important for LRLs when taking consecutive samples. Changes in LRLs between laboratory reports can affect summary calculations and introduce confounding factors when assessing trends. For the present study, LRLs were screened against guidelines including British Columbia Water Quality Guidelines for the protection of Aquatic Life (BCWQG; BCMOECCS 2019, 2021), Elk Valley Water Quality Plan (EVWQP) benchmarks (Teck 2014), and site-specific screening values, as appropriate.

A1.3 Quality Control Samples

Typically, 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. Quality control samples collected for this project, and a description of each QC sample type, are as follows:

- **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 reflect 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). Concentrations of analytes should be below the LRL.
- **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 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 greatest extent possible in the field, split, and analyzed separately in the laboratory. The duplicate samples are handled and analyzed in an identical manner in the laboratory. These samples reflect variability introduced during the handling of samples (e.g., during collection and homogenization), both in the field and laboratory, and therefore provide a measure of field sampling and laboratory precision.

- **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, BS) are created using laboratory control materials whereas matrix spikes (MS) are created using field-collected samples. The analysis of spiked samples provides an indication of the accuracy of analytical results.
- **CRM** or **IRM** are commercially or internally prepared or homogenized reference materials containing known chemical concentrations that are processed and analyzed along with batches of environmental samples. The sample results are then compared to target results to provide a measure of analytical accuracy. The results are reported as the percent of the known concentration that was recovered in the analysis.
- **LCS** are laboratory control samples 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.
- **Organism recovery checks** for benthic invertebrate community samples involve the reprocessing of previously sorted material from a randomly selected sample to determine the number of invertebrates that were not recovered during the original sample processing. The reprocessing is conducted by an analyst not involved in the original processing to reduce bias. This check allows for the determination of accuracy through assessment of recovery efficiency.
- **Sub-sampling error** is assessed for studies in which benthic invertebrate community samples require sub-sampling (due to excessive sample volume and/or high invertebrate density). By comparing the numbers of benthic invertebrates recovered between at least two sub-samples, this measure provides an evaluation of how effective the sub-sampling method was in evenly dividing the original sample. Therefore, sub-sampling error provides a measure of analytical accuracy and precision. The processing of entire benthic invertebrate community samples in representative sample fractions also allows an evaluation of sub-sampling accuracy.

A2 WATER CHEMISTRY

A2.1 Laboratory Reporting Limits

The analytical reports for water chemistry from ALS Environmental and Brooks Applied Labs (BAL; see Appendix G for laboratory reports) were examined to assess LRLs relative to applicable guidelines (Tables A.2 and A.3). The LRLs for water quality analytes were assessed relative to British Columbia Water Quality Guidelines (BCWQG; BCMOECCS 2019, 2021) for the protection of freshwater aquatic life, EVWQP Level 1 Benchmarks for water quality (Teck 2014), and relevant site-specific benchmarks.

Several analytes were entirely reported below the LRL (i.e., in 100% of samples; Tables A.2 and A.3). For those analytes with one or more result(s) below the LRL, achieved LRLs were consistently lower than the BCWQG and EVWQP Level 1 Benchmarks for water quality (Teck 2014). Therefore, the achieved LRLs were appropriate for this study.

A2.2 Laboratory and Field Blanks

A total of 333 method blank samples for water chemistry (not including those for selenium speciation) were analyzed by ALS Environmental (Appendix G). These blank samples consisted of 1,425 individual analyte results. A concentration above the LRL was recorded in only one method blank sample for one analyte (total antimony; see lab report L2475301 in Appendix G). The detectable concentration of total antimony in this sample was 1.2-times higher than the LRL, and below the short-term BC WQG for total antimony. This result is expected to have a negligible impact on data interpretability.

A total of 57 laboratory blank samples were analyzed by BAL for selenium speciation, consisting of 281 individual analyte results. Laboratory blank results were all below the LRL. Detectable concentrations of total selenium were reported in five laboratory blank samples (see BAL laboratory report 2010044 in Appendix G) but were below the LRL (therefore meeting the DQO; Table A.1) despite exceeding the method detection limit (see Section A1.2 for a description of the difference between the method detection limit and laboratory reporting limits). Overall, laboratory blanks indicated no inadvertent sample contamination during analyses.

Five field blank samples and five trip blank samples were submitted to ALS Environmental for water chemistry analyses to assess the potential for field sampling contamination (Table A.4). The same DQOs that were used for laboratory blanks were also used for field blanks (i.e., concentrations should be < LRL). Of the 770 analyte results for field and trip blanks, only 20 (2.60%) had concentrations greater than the LRL (Table A.4). For analytes with reported

Table A.2: Laboratory Reporting Limit (LRL) Evaluation for Water Chemistry Analytes Measured by ALS Environmental with < LRL Results

Parameter	Units	BC WQG[a]		EVWQP Level 1 Benchmarks/ Relevant Screening Values[b]	Range of LRLs	No. LRLs > Guideline[c]	No. Sample Results < LRL
		Short-term	Long-term				
Physical Tests							
Total Suspended Solids	mg/L	-	-	-	1	-	27 (61.4%)
Turbidity	NTU	-	-	-	0.1	-	6 (13.6%)
Anions and Nutrients							
Acidity (as $CaCO_3$)	mg/L	-	-	-	1	-	38 (86.4%)
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	-	-	-	1	-	12 (27.3%)
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	-	-	-	1	-	26 (59.1%)
Alkalinity, Hydroxide (as $CaCO_3$)	mg/L	-	-	-	1	-	32 (72.7%)
Bromide (Br)	mg/L	-	-	-	0.05 to 0.25	-	44 (100%)
Chloride (Cl)	mg/L	600	150	-	0.5	0	4 (9.09%)
Ammonia, Total (as N)[d]	mg/L	0.752	0.102	-	0.005	0	16 (36.4%)
Nitrite (as N)[e]	mg/L	0.0600	0.0200	-	0.001 to 0.005	0	22 (50.0%)
Total Kjeldahl Nitrogen	mg/L	-	-	-	0.05 to 0.25	-	29 (65.9%)
Orthophosphate - Dissolved	mg/L	-	-	-	0.001	-	10 (22.7%)
Phosphorus (P) - Total	mg/L	-	-	-	0.002	-	19 (43.2%)
Organic / Inorganic Carbon							
Dissolved Organic Carbon	mg/L	-	-	-	0.5	-	20 (45.5%)
Total Organic Carbon	mg/L	-	-	-	0.5	-	16 (36.4%)
Total Metals							
Aluminum	mg/L	-	-	-	0.003	-	10 (22.7%)
Antimony	mg/L	-	0.00900	-	0.0001	0	12 (27.3%)
Arsenic	mg/L	0.00500	-	-	0.0001 to 0.0007	0	5 (11.4%)
Beryllium	µg/L	-	0.130	-	0.02	0	44 (100%)
Bismuth	mg/L	-	-	-	0.00005	-	44 (100%)
Boron	mg/L	-	1.20	-	0.01	0	18 (40.9%)
Cadmium	µg/L	-	-	-	0.005	-	1 (2.27%)
Cobalt	µg/L	110	4.00	-	0.1	0	36 (81.8%)
Copper	mg/L	0.200	0.200	-	0.0005 to 0.001	0	42 (95.5%)
Iron	mg/L	1.00	-	-	0.01	0	28 (63.6%)
Lead[f]	mg/L	0.124	0.00815	-	0.00005	0	40 (90.9%)
Manganese	mg/L	2.07	1.22	-	0.0001 to 0.0009	0	5 (11.4%)
Mercury[g]	µg/L	-	0.00125	-	0.0005	0	36 (81.8%)
Nickel[f]	mg/L	-	0.123	0.00530	0.0005	0	9 (20.5%)
Silver[f]	mg/L	0.00300	0.00150	-	0.00001	0	44 (100%)
Thallium	mg/L	-	0.000800	-	0.00001	0	36 (81.8%)
Tin	mg/L	-	-	-	0.0001	-	44 (100%)
Titanium	mg/L	-	-	-	0.01	0	44 (100%)
Vanadium	mg/L	-	-	-	0.0005	-	36 (81.8%)
Zinc[f]	mg/L	0.0698	0.0442	-	0.003	0	18 (40.9%)
Dissolved Metals							
Aluminum	mg/L	0.100	0.0500	-	0.003	0	41 (93.2%)
Antimony	mg/L	-	-	-	0.0001	-	12 (27.3%)
Arsenic	mg/L	-	-	-	0.0001	-	18 (40.9%)
Beryllium	µg/L	-	-	-	0.02 to 0.04	-	44 (100%)
Bismuth	mg/L	-	-	-	0.00005 to 0.0001	-	44 (100%)
Boron	mg/L	-	-	-	0.01 to 0.02	-	22 (50.0%)
Cadmium[f]	µg/L	0.826	0.269	0.177	0.005	0	1 (2.27%)
Chromium	mg/L	-	-	-	0.0001 to 0.0002	-	9 (20.5%)
Cobalt	µg/L	-	-	-	0.1 to 0.2	-	39 (88.6%)
Copper	mg/L	0.200	0.200	-	0.0002	0	20 (45.5%)
Iron	mg/L	0.350	-	-	0.01 to 0.02	0	43 (97.7%)
Lead[f]	mg/L	-	-	-	0.00005 to 0.0001	-	44 (100%)
Manganese	mg/L	-	-	-	0.0001	-	9 (20.5%)
Mercury[g]	µg/L	-	-	-	0.005	-	44 (100%)
Nickel[f]	mg/L	-	-	-	0.0005	-	8 (18.2%)
Silver[f]	mg/L	-	-	-	0.00001 to 0.00002	-	44 (100%)
Thallium	mg/L	-	-	-	0.00001	-	35 (79.5%)
Tin	mg/L	-	-	-	0.0001 to 0.0002	-	42 (95.5%)
Titanium	mg/L	-	-	-	0.01	-	44 (100%)
Vanadium	mg/L	-	-	-	0.0005 to 0.001	-	44 (100%)
Zinc[f]	mg/L	-	-	-	0.001	-	3 (6.82%)

Notes: Only analytes with one or more sample results < LRL are displayed. The total number of samples in 2020 (n) was 44. EVWQP = Elk Valley Water Quality Plan; LRL = Laboratory Reporting Limit, "-" indicates no applicable guideline exists.

[a] British Columbia Water Quality Guidelines for the protection of Aquatic Life (BCMOECCS 2019, 2021).

[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).

[d] Based on most conservative guideline using highest temperature (20) and pH (9).

[e] Minimum water quality guidelines for Nitrite (as N) reported in BCMOECCS (2021) for chloride concentrations < 2 mg/L.

[f] Hardness-based guidelines calculated using the minimum hardness observed for all samples (139 mg/L).

[g] The most conservative guideline (0.00125 µg/L) was applied.

Table A.3: Laboratory Reporting Limit (LRL) Evaluation for Selenium Speciation Analytes Measured by Brooks Applied Labs with < LRL Results

Parameter	Units	Range of LRLs	No. Sample Results < LRL
Dimethylselenoxide-Dissolved	µg/L	0.01	38 (86.4%)
MeSe(IV) - methylseleninic acid CH3SeO2H-Dissolved	µg/L	0.01	32 (72.7%)
Methaneselenonic Acid CH4O3Se-Dissolved[a]	µg/L	0.01	35 (77.8%)
Se(IV) - selenite SeO3(-2)-Dissolved	µg/L	0.01 to 0.05	8 (18.2%)
SeCN - selenocyanate SeCN(-1) - Dissolved	µg/L	0.01 to 0.04	44 (100%)
SeMe - selenomethionine CH3SeCH2CH2CH(NH2)CO2H-Dissolved	µg/L	0.01	44 (100%)
Selenosulfate-Dissolved	µg/L	0.01 to 0.06	44 (100%)
Unknown Selenium Species-Dissolved	µg/L	0.01 to 0.06	44 (100%)

Notes: Only analytes with one or more sample results < LRL are displayed. The total number of samples in 2020 (n) was 44. EVWQP = Elk Valley Water Quality Plan; LRL = Laboratory Reporting Limit. "-" indicates that no applicable guideline exists for that analyte. No applicable BC WQG short-term guidelines exist for selenium or selenium species. All LRLs were below the EVWQP and BC WQG long-term guideline for total selenium.

[a] The selenium species methaneselenonic acid was identified as an “unknown” selenium species eluting between methylseleninic acid and selenomethionine in December laboratory results. This species has been identified as methaneselenoic acid for the purposes of interpretation, consistent with the LCO Baseline Study (Minnow 2020).

Table A.4: Field Blank and Trip Blank Evaluation for Water Chemistry Analytes Measured by ALS Environmental with Detectable Results (> LRL)

Parameter	Units	Range of LRLs	No. Field Blank Sample Results > LRL	No. Trip Blank Sample Results > LRL
Anions and Nutrients				
Acidity (as CaCO3)	mg/L	1	5 (100%)	5 (100%)
Ammonia, Total (as N)	mg/L	0.005	3 (60%)	3 (60%)
Total Kjeldahl Nitrogen	mg/L	0.05	0	1 (20%)
Total Metals				
Sodium	mg/L	0.05	1 (20%)	0
Dissolved Metals				
Calcium	mg/L	0.05	1 (20%)	0
Sodium	mg/L	0.05	1 (20%)	0

Notes: Only analytes with one or more blank results > LRL are displayed. Five field blanks and five trip blanks were analyzed. For dissolved metals, only Cd, Mg, K and Na were analyzed in trip blanks. LRL = Laboratory Reporting Limit.

concentrations greater than the LRL, only two had concentrations greater than 5-times the LRL (ammonia and total sodium; see laboratory reports L2475301 and L2498675 in Appendix G).

Three field blank samples were analyzed for selenium speciation (Table A.5). Only one analyte (dissolved selenium) in one field blank was greater than the LRL. This result was 5-fold lower than the LRL and was 80% lower than the lowest sample result for dissolved selenium, indicating a low degree of contamination. Trip blanks were not collected for selenium speciation.

Overall, the number of detectable concentrations was relatively low among laboratory, trip, and field blank samples, and the majority of detectable concentrations were within 5-times the LRL. Therefore, these results are expected to have a negligible impact on data interpretability in this study.

A2.3 Data Accuracy and Precision

Data accuracy for water chemistry analyses completed by ALS Environmental (excluding selenium speciation) was evaluated based on results for 17 certified reference materials (CRM) samples, 333 laboratory control samples (LCS), and 28 matrix spike (MS) samples (Appendix G). Results of CRM, LCS, and MS sample analyses generally met the laboratory DQO (Table A.1), with the following exceptions:

- total barium in seven MS samples;
- dissolved beryllium in one LCS sample;
- total calcium in seven MS samples;
- total magnesium in seven MS samples;
- nitrate in two MS samples;
- total selenium in two MS samples;
- total sodium in five MS samples;
- total strontium in eight MS samples;
- sulfate in two MS samples; and
- total uranium in two MS samples.

For the LCS sample that did not meet the laboratory DQO (dissolved beryllium), the DQO was exceeded by less than 10% (see laboratory report L2475301 in Appendix G). For the MS

Table A.5: Field Blank Evaluation for Selenium Speciation Analytes Measured by Brooks Applied Labs with Detectable Results (> LRL)

Parameter	Units	Range of LRLs	No. Sample Results > LRL
Selenium (Se)-Dissolved	µg/L	0.17 to 0.275	1 (33.3%)

Indicates analyte concentration was below detection (< LRL) in at least one sample.

Notes: Only analytes with one or more blank results > LRL are displayed. Three field blanks were analyzed.

results which did not meet the laboratory DQO, analyte concentrations were high in the background sample (i.e., the field sample used as the base for the MS sample) and the analytical laboratory was unable to accurately calculate the recovery of the spiked material (see laboratory reports L2420788, L2421373, L2475301, and L2496902 in Appendix G). Otherwise, accuracy for all analytes in CRM, LCS, and MS samples were within the laboratory DQO. Therefore, the overall accuracy achieved by the laboratory was considered good.

Data accuracy for selenium speciation analyses completed by BAL was evaluated based on the results for 24 CRM samples, 57 blank spike (BS) samples, 14 MS samples, and 14 matrix spike duplicate (MSD) samples (Appendix G). All CRM, BS, MS, and MSD samples met the laboratory DQO. Therefore, the overall accuracy achieved by the laboratory was considered excellent.

Analytical precision of water chemistry analyses completed by ALS Environmental (excluding selenium speciation) was evaluated by examining a total of 29 laboratory duplicate samples (Appendix G). For all paired samples, concentration comparisons were within the DQO set by the analytical laboratory. Analytical precision of selenium speciation analyses completed by BAL was evaluated by examining 14 laboratory duplicate samples (Appendix G). For all paired samples, concentration comparisons were within the DQO set by the analytical laboratory. Therefore, laboratory analytical precision can be considered good for both ALS Environmental and BAL results.

Five sets of field duplicate samples were collected to assess field sampling precision of water chemistry measured by ALS Environmental (excluding selenium speciation; Table A.6). Relative percent differences (RPDs) between field duplicate samples for most analytes (> 90% of detected analytes) were below 30%, with the exceptions of:

- turbidity in one set of samples (RPD = 66.7%);
- alkalinity (bicarbonate) in one set of samples (RPD = 198%);
- alkalinity (carbonate) in two sets of samples (RPD = 33.3 to 141%);
- alkalinity (hydroxide) in one set of samples (RPD = 198%);
- ammonia in three sets of samples (RPD = 77.3 to 111%);
- total Kjeldahl nitrogen in one set of samples (RPD = 92.6%);
- phosphorus in one set of samples (RPD = 71.0%);

Table A.6: Field Duplicate Results for Water Chemistry Analyses Completed by ALS Environmental

Parameter	Units	RG_SLINE_WS_2020-02-26_1020	RG_RIVER_WS_2020-02-26_1700	RPD (%)	RG_SLINE_WS_2020-04-28_1305	RG_RIVER_WS_2020-04-28_1400	RPD (%)
Physical Tests							
Conductivity (@ 25°C)	µS/cm	406	404	0.494	295	294	0.340
Hardness (as $CaCO^3$)	mg/L	222	217	2.28	189	184	2.68
pH	pH	8.26	8.28	0.242	8.34	8.35	0.120
ORP	mV	324	256	23.4	372	321	14.7
Total Suspended Solids	mg/L	<1	<1	-	1.2	<1	18.2
Total Dissolved Solids	mg/L	269	271	0.741	209	198	5.41
Turbidity	NTU	0.2	<0.1	66.7	0.42	0.49	15.4
Anions and Nutrients							
Acidity (as $CaCO_3$)	mg/L	<1	<1	-	<1	<1	-
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	140	140	0	144	138	4.26
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	<1	<1	-	2	2.8	33.3
Alkalinity, Hydroxide (as $CaCO_3$)	mg/L	<1	<1	-	<1	<1	-
Alkalinity, Total (as $CaCO_3$)	mg/L	140	140	0	146	141	3.48
Bromide (Br)	mg/L	<0.05	<0.05	-	<0.05	<0.05	-
Chloride (Cl)	mg/L	0.67	0.67	0	<0.5	<0.5	-
Fluoride	mg/L	0.411	0.398	3.21	0.323	0.338	4.54
Ammonia, Total (as N)	mg/L	<0.005	<0.005	-	0.0246	0.0071	110
Nitrate (as N)	mg/L	0.113	0.115	1.75	0.0841	0.0855	1.65
Nitrite (as N)	mg/L	<0.001	<0.001	-	<0.001	<0.001	-
Total Kjeldahl Nitrogen	mg/L	<0.05	<0.05	-	0.075	0.101	29.5
Orthophosphate-Dissolved	mg/L	0.0024	0.0024	0	0.0025	0.0027	7.69
Phosphorus (P)-Total	mg/L	<0.002	<0.002	-	0.0022	0.0021	4.65
Sulfate	mg/L	84.1	84.1	0	38.3	38.2	0.261
Anion Sum	meq/L	4.59	4.6	0.218	3.73	3.63	2.72
Cation Sum	meq/L	4.5	4.4	2.25	3.82	3.72	2.65
Organic / Inorganic Carbon							
Dissolved Organic Carbon	mg/L	<0.5	<0.5	-	0.85	0.73	15.2
Total Organic Carbon	mg/L	<0.5	<0.5	-	0.74	0.79	6.54
Total Metals							
Aluminum	mg/L	<0.003	<0.003	-	0.0093	0.0093	0
Antimony	mg/L	<0.0001	<0.0001	-	<0.0001	<0.0001	-
Arsenic	mg/L	<0.0005	<0.0005	-	0.00023	0.00024	4.26
Barium	mg/L	0.0451	0.042	7.12	0.0348	0.0354	1.71
Beryllium	µg/L	<0.02	<0.02	-	<0.02	<0.02	-
Bismuth	mg/L	<0.00005	<0.00005	-	<0.00005	<0.00005	-
Boron	mg/L	<0.01	<0.01	-	<0.01	<0.01	-
Cadmium	µg/L	0.0131	0.0273	70.3	0.0164	0.016	2.47
Calcium	mg/L	60.7	54.1	11.5	44.1	43.3	1.83
Chromium	mg/L	0.00026	0.00014	60.0	0.00018	0.00019	5.41
Cobalt	µg/L	<0.1	<0.1	-	<0.1	<0.1	-
Copper	mg/L	<0.0005	<0.0005	-	<0.0005	<0.0005	-
Iron	mg/L	<0.01	<0.01	-	<0.01	<0.01	-
Lead	mg/L	<0.00005	<0.00005	-	<0.00005	<0.00005	-
Lithium	mg/L	0.0055	0.005	9.52	0.004	0.004	0
Magnesium	mg/L	19	18.5	2.67	14.6	14.4	1.38
Manganese	mg/L	<0.0002	<0.0002	-	0.0003	0.00034	12.5
Mercury	ug/L	<0.0005	<0.0005	-	0.00058	<0.0005	14.8
Molybdenum	mg/L	0.00146	0.00141	3.48	0.00103	0.00103	0
Nickel	mg/L	<0.0005	<0.0005	-	0.00052	<0.0005	3.92
Potassium	mg/L	0.402	0.387	3.80	0.404	0.406	0.494
Selenium	µg/L	1.65	1.9	14.1	1.02	0.963	5.75
Silicon	mg/L	2.24	2.21	1.35	2.03	2.06	1.47
Silver	mg/L	<0.00001	<0.00001	-	<0.00001	<0.00001	-
Sodium	mg/L	1.11	1.11	0	0.838	0.836	0.239
Strontium	mg/L	0.208	0.206	0.966	0.165	0.166	0.604
Thallium	mg/L	<0.00001	<0.00001	-	<0.00001	<0.00001	-
Tin	mg/L	<0.0001	<0.0001	-	<0.0001	<0.0001	-
Titanium	mg/L	<0.01	<0.01	-	<0.01	<0.01	-
Uranium	mg/L	0.00174	0.00178	2.27	0.00141	0.00143	1.41
Vanadium	mg/L	0.00059	0.00059	0	0.00064	0.00062	3.17
Zinc	mg/L	0.0094	0.0031	101	<0.003	<0.003	-
Dissolved Metals							
Aluminum	mg/L	<0.003	<0.003	-	<0.003	<0.003	-
Antimony	mg/L	<0.0001	<0.0001	-	<0.0001	<0.0001	-
Arsenic	mg/L	0.00011	0.00012	8.70	0.00012	0.00012	0
Barium	mg/L	0.0426	0.0433	1.63	0.0376	0.0357	5.18
Beryllium	µg/L	<0.02	<0.02	-	<0.02	<0.02	-
Bismuth	mg/L	<0.00005	<0.00005	-	<0.00005	<0.00005	-
Boron	mg/L	<0.01	<0.01	-	<0.01	<0.01	-
Cadmium	µg/L	0.0178	0.0171	4.01	0.0167	0.0133	22.7
Calcium	mg/L	58	56.9	1.91	50.5	48.8	3.42
Chromium	mg/L	0.00015	0.00014	6.90	0.00014	0.00012	15.4
Cobalt	µg/L	<0.1	<0.1	-	<0.1	<0.1	-
Copper	mg/L	0.00034	<0.0002	51.9	<0.0002	<0.0002	-
Iron	mg/L	<0.01	<0.01	-	<0.01	<0.01	-
Lead	mg/L	<0.00005	0.000052	3.92	<0.00005	<0.00005	-
Lithium	mg/L	0.0041	0.0041	0	0.004	0.004	0
Magnesium	mg/L	18.8	18.3	2.70	15.2	15.1	0.660
Manganese	mg/L	0.0003	<0.0001	100	<0.0001	0.00011	9.52
Mercury	µg/L	<0.005	<0.005	-	<0.005	<0.005	-
Molybdenum	mg/L	0.00143	0.00137	4.29	0.00104	0.000994	4.52
Nickel	mg/L	<0.0005	<0.0005	-	<0.0005	<0.0005	-
Potassium	mg/L	0.385	0.385	0	0.428	0.414	3.33
Selenium	µg/L	1.61	1.81	11.7	1.13	1.13	0
Silicon	mg/L	2.07	2.07	0	2.05	2.03	0.980
Silver	mg/L	<0.00001	<0.00001	-	<0.00001	<0.00001	-
Sodium	mg/L	1.16	1.13	2.62	0.856	0.844	1.41
Strontium	mg/L	0.214	0.21	1.89	0.173	0.162	6.57
Thallium	mg/L	<0.00001	<0.00001	-	<0.00001	<0.00001	-
Tin	mg/L	<0.0001	<0.0001	-	<0.0001	<0.0001	-
Titanium	mg/L	<0.01	<0.01	-	<0.01	<0.01	-
Uranium	mg/L	0.00182	0.0018	1.10	0.00143	0.00142	0.702
Vanadium	mg/L	<0.0005	<0.0005	-	<0.0005	<0.0005	-
Zinc	mg/L	0.0034	0.0035	2.90	0.0026	0.0024	8.00

Indicates RPD above 30%.

Notes: the RPD was calculated using < LRL results at the LRL if one result in a duplicate pair was below the LRL. The RPD was not calculated if both results were <LRL. RPD = relative percent difference; "-"= no data/not calculated; LRL = Laboratory Reporting Limit.

Table A.6: Field Duplicate Results for Water Chemistry Analyses Completed by ALS Environmental

Parameter	Units	RG_LI8_WS_2020-07-15_1320	RG_RIVER_WS_2020-07-15_1200	RPD (%)	RG_LCUT_WS_2020-09-01_1208	RG_RIVER_WS_2020-09-01_1208	RPD (%)
Physical Tests							
Conductivity (@ 25°C)	µS/cm	517	519	0.386	906	919	1.42
Hardness (as $CaCO^3$)	mg/L	338	288	16.0	543	551	1.46
pH	pH	8.38	8.39	0.119	8.38	8.38	0
ORP	mV	310	323	4.11	432	465	7.36
Total Suspended Solids	mg/L	<1	<1	-	<1	<1	-
Total Dissolved Solids	mg/L	432	431	0.232	735	731	0.546
Turbidity	NTU	0.19	0.23	19.0	0.26	0.2	26.1
Anions and Nutrients							
Acidity (as $CaCO_3$)	mg/L	<1	<1	-	3.6	3	18.2
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	<1	163	198	<1	<1	-
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	<1	5.8	141	<1	<1	-
Alkalinity, Hydroxide (as $CaCO_3$)	mg/L	173	<1	198	227	223	1.78
Alkalinity, Total (as $CaCO_3$)	mg/L	173	169	2.34	227	223	1.78
Bromide (Br)	mg/L	<0.05	<0.05	-	<0.25	<0.25	-
Chloride (Cl)	mg/L	2.57	2.59	0.775	6.5	6.48	0.308
Fluoride	mg/L	0.166	0.169	1.79	0.14	0.14	0
Ammonia, Total (as N)	mg/L	<0.005	<0.005	-	0.0221	0.0777	111
Nitrate (as N)	mg/L	5.42	5.41	0.185	16.2	16.4	1.23
Nitrite (as N)	mg/L	0.0019	0.0021	10.0	<0.005	<0.005	-
Total Kjeldahl Nitrogen	mg/L	0.477	0.175	92.6	<0.05	<0.05	-
Orthophosphate-Dissolved	mg/L	0.0013	0.0015	14.3	0.0025	0.0021	17.4
Phosphorus (P)-Total	mg/L	0.0035	0.0033	5.88	0.0042	<0.002	71.0
Sulfate	mg/L	121	121	0	293	294	0.341
Anion Sum	meq/L	6.45	6.36	1.41	12	11.9	0.837
Cation Sum	meq/L	6.96	5.94	15.8	11.3	11.4	0.881
Organic / Inorganic Carbon							
Dissolved Organic Carbon	mg/L	0.79	0.62	24.1	<0.5	<0.5	-
Total Organic Carbon	mg/L	0.65	0.63	3.13	0.76	<0.5	41.3
Total Metals							
Aluminum	mg/L	0.0039	0.0043	9.76	0.003	0.003	0
Antimony	mg/L	0.00019	0.0002	5.13	0.0004	0.00039	2.53
Arsenic	mg/L	0.00012	0.00015	22.2	0.00018	0.00018	0
Barium	mg/L	0.0516	0.0505	2.15	0.0609	0.0608	0.164
Beryllium	µg/L	<0.02	<0.02	-	<0.02	<0.02	-
Bismuth	mg/L	<0.00005	<0.00005	-	<0.00005	<0.00005	-
Boron	mg/L	0.012	0.012	0	0.021	0.021	0
Cadmium	µg/L	0.19	0.18	5.41	0.515	0.489	5.18
Calcium	mg/L	77.8	75.5	3.00	130	130	0
Chromium	mg/L	0.00017	0.00014	19.4	0.00013	0.00012	8.00
Cobalt	µg/L	<0.1	<0.1	-	<0.1	<0.1	-
Copper	mg/L	<0.0005	<0.0005	-	<0.0005	<0.0005	-
Iron	mg/L	<0.01	<0.01	-	<0.01	<0.01	-
Lead	mg/L	<0.00005	<0.00005	-	<0.00005	<0.00005	-
Lithium	mg/L	0.0254	0.0248	2.39	0.0669	0.0668	0.150
Magnesium	mg/L	31.1	30.2	2.94	59.7	58.8	1.52
Manganese	mg/L	0.00053	0.00066	21.8	0.00021	0.00027	25.0
Mercury	µg/L	<0.0005	<0.0005	-	<0.0005	<0.0005	-
Molybdenum	mg/L	0.0014	0.00141	0.712	0.00178	0.00183	2.77
Nickel	mg/L	0.00415	0.00397	4.43	0.0123	0.0121	1.64
Potassium	mg/L	0.934	0.908	2.82	1.82	1.82	0
Selenium	ug/L	26.5	25.3	4.63	60.7	59.1	2.67
Silicon	mg/L	1.93	1.92	0.519	2.44	2.45	0.409
Silver	mg/L	<0.00001	<0.00001	-	<0.00001	<0.00001	-
Sodium	mg/L	3.87	3.79	2.09	8.76	8.65	1.26
Strontium	mg/L	0.153	0.157	2.58	0.249	0.254	1.99
Thallium	mg/L	<0.00001	<0.00001	-	0.000017	0.000021	21.1
Tin	mg/L	<0.0001	<0.0001	-	<0.0001	<0.0001	-
Titanium	mg/L	<0.01	<0.01	-	<0.01	<0.01	-
Uranium	mg/L	0.00234	0.00226	3.48	0.00454	0.0044	3.13
Vanadium	mg/L	<0.0005	<0.0005	-	<0.0005	<0.0005	-
Zinc	mg/L	0.006	0.0069	14.0	0.0199	0.0199	0
Dissolved Metals							
Aluminum	mg/L	<0.003	<0.003	-	<0.003	<0.003	-
Antimony	mg/L	0.00018	0.00018	0	0.00036	0.00036	0
Arsenic	mg/L	<0.0001	0.00011	9.52	0.00014	0.0001	33.3
Barium	mg/L	0.0527	0.0489	7.48	0.0612	0.0604	1.32
Beryllium	µg/L	<0.02	<0.02	-	<0.02	<0.02	-
Bismuth	mg/L	<0.00005	<0.00005	-	<0.00005	<0.00005	-
Boron	mg/L	0.01	0.011	9.52	0.017	0.017	0
Cadmium	µg/L	0.131	0.128	2.32	0.471	0.475	0.846
Calcium	mg/L	82.8	68.6	18.8	129	133	3.05
Chromium	mg/L	0.00015	0.00013	14.3	<0.0001	0.00011	9.52
Cobalt	µg/L	<0.1	<0.1	-	<0.1	<0.1	-
Copper	mg/L	0.00021	<0.0002	4.88	0.00037	0.00035	5.56
Iron	mg/L	<0.01	<0.01	-	<0.01	<0.01	-
Lead	mg/L	<0.00005	<0.00005	-	<0.00005	<0.00005	-
Lithium	mg/L	0.0262	0.0253	3.50	0.0612	0.0613	0.163
Magnesium	mg/L	31.7	28.3	11.3	53.8	53	1.50
Manganese	mg/L	0.00027	0.00026	3.77	0.00016	0.00013	20.7
Mercury	µg/L	<0.005	<0.005	-	<0.005	<0.005	-
Molybdenum	mg/L	0.00138	0.00132	4.44	0.0017	0.00178	4.60
Nickel	mg/L	0.00403	0.0037	8.54	0.0126	0.0123	2.41
Potassium	mg/L	1.07	0.969	9.91	1.84	1.83	0.545
Selenium	µg/L	26.1	30.7	16.2	57.4	56.2	2.11
Silicon	mg/L	1.78	1.91	7.05	2.26	2.2	2.69
Silver	mg/L	<0.00001	<0.00001	-	<0.00001	<0.00001	-
Sodium	mg/L	4.27	3.85	10.3	8.89	8.7	2.16
Strontium	mg/L	0.167	0.154	8.10	0.255	0.246	3.59
Thallium	mg/L	<0.00001	<0.00001	-	0.000019	0.00002	5.13
Tin	mg/L	<0.0001	<0.0001	-	<0.0001	<0.0001	-
Titanium	mg/L	<0.01	<0.01	-	<0.01	<0.01	-
Uranium	mg/L	0.00235	0.00227	3.46	0.00438	0.00451	2.92
Vanadium	mg/L	<0.0005	<0.0005	-	<0.0005	<0.0005	-
Zinc	mg/L	0.0055	0.0052	5.61	0.0193	0.0191	1.04

Indicates RPD above 30%.

Notes: the RPD was calculated using < LRL results at the LRL if one result in a duplicate pair was below the LRL. The RPD was not calculated if both results were <LRL. RPD = relative percent difference; "-"= no data/not calculated; LRL = Laboratory Reporting Limit.

Table A.6: Field Duplicate Results for Water Chemistry Analyses Completed by ALS Environmental

Parameter	Units	RG_LCUT_WS_ 2020-12-01_1315	RG_RIVER_WS_ 2020-12-01_1230	RPD (%)
Physical Tests				
Conductivity (@ 25°C)	µS/cm	1070	1070	0
Hardness (as $CaCO_3$)	mg/L	672	666	0.897
pH	pH	8.28	8.29	0.121
ORP	mV	441	469	6.15
Total Suspended Solids	mg/L	<1	<1	-
Total Dissolved Solids	mg/L	831	824	0.846
Turbidity	NTU	0.11	0.12	8.70
Anions and Nutrients				
Acidity (as $CaCO_3$)	mg/L	<1	<1	-
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	231	228	1.31
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	<1	<1	-
Alkalinity, Hydroxide (as $CaCO_3$)	mg/L	<1	<1	-
Alkalinity, Total (as $CaCO_3$)	mg/L	231	228	1.31
Bromide (Br)	mg/L	<0.25	<0.25	-
Chloride (Cl)	mg/L	8.57	8.52	0.585
Fluoride	mg/L	0.16	0.16	0
Ammonia, Total (as N)	mg/L	0.0113	<0.005	77.3
Nitrate (as N)	mg/L	19.6	19.3	1.54
Nitrite (as N)	mg/L	<0.005	<0.005	-
Total Kjeldahl Nitrogen	mg/L	<0.05	<0.05	-
Orthophosphate-Dissolved	mg/L	0.0026	0.0028	7.41
Phosphorus (P)-Total	mg/L	0.0031	0.0038	20.3
Sulfate	mg/L	364	360	1.10
Anion Sum	meq/L	13.8	13.7	0.727
Cation Sum	meq/L	13.9	13.8	0.722
Organic / Inorganic Carbon				
Dissolved Organic Carbon	mg/L	<0.5	<0.5	-
Total Organic Carbon	mg/L	<0.5	<0.5	-
Total Metals				
Aluminum	mg/L	0.0031	0.0032	3.17
Antimony	mg/L	0.0004	0.00039	2.53
Arsenic	mg/L	0.00015	0.00015	0
Barium	mg/L	0.0643	0.0635	1.25
Beryllium	µg/L	<0.02	<0.02	-
Bismuth	mg/L	<0.00005	<0.00005	-
Boron	mg/L	0.019	0.019	0
Cadmium	µg/L	0.343	0.34	0.878
Calcium	mg/L	142	140	1.42
Chromium	mg/L	0.00014	0.00015	6.90
Cobalt	µg/L	<0.1	<0.1	-
Copper	mg/L	<0.0005	<0.0005	-
Iron	mg/L	<0.01	<0.01	-
Lead	mg/L	<0.00005	<0.00005	-
Lithium	mg/L	0.0679	0.0676	0.443
Magnesium	mg/L	64.9	64.3	0.929
Manganese	mg/L	0.00014	0.0001	33.3
Mercury	µg/L	<0.0005	<0.0005	-
Molybdenum	mg/L	0.00196	0.00193	1.54
Nickel	mg/L	0.0107	0.0107	0
Potassium	mg/L	1.9	1.9	0
Selenium	µg/L	67.7	66.9	1.19
Silicon	mg/L	2.27	2.26	0.442
Silver	mg/L	<0.00001	<0.00001	-
Sodium	mg/L	9.49	9.58	0.944
Strontium	mg/L	0.267	0.256	4.21
Thallium	mg/L	0.000013	0.000014	7.41
Tin	mg/L	<0.0001	<0.0001	-
Titanium	mg/L	<0.01	<0.01	-
Uranium	mg/L	0.00461	0.00456	1.09
Vanadium	mg/L	<0.0005	<0.0005	-
Zinc	mg/L	0.0116	0.0118	1.71
Dissolved Metals				
Aluminum	mg/L	<0.003	<0.003	-
Antimony	mg/L	0.0004	0.00042	4.88
Arsenic	mg/L	0.00014	0.00013	7.41
Barium	mg/L	0.0684	0.0671	1.92
Beryllium	µg/L	<0.02	<0.02	-
Bismuth	mg/L	<0.00005	<0.00005	-
Boron	mg/L	0.018	0.018	0
Cadmium	µg/L	0.359	0.34	5.44
Calcium	mg/L	151	155	2.61
Chromium	mg/L	0.0001	0.00012	18.2
Cobalt	µg/L	<0.1	<0.1	-
Copper	mg/L	0.00031	0.00036	14.9
Iron	mg/L	<0.01	<0.01	-
Lead	mg/L	<0.00005	<0.00005	-
Lithium	mg/L	0.0755	0.0724	4.19
Magnesium	mg/L	71.5	67.5	5.76
Manganese	mg/L	<0.0001	<0.0001	-
Mercury	µg/L	<0.005	<0.005	-
Molybdenum	mg/L	0.0019	0.00203	6.62
Nickel	mg/L	0.0115	0.0111	3.54
Potassium	mg/L	2.02	1.97	2.51
Selenium	µg/L	69.6	69.4	0.288
Silicon	mg/L	2.26	2.2	2.69
Silver	mg/L	<0.00001	<0.00001	-
Sodium	mg/L	9.84	9.44	4.15
Strontium	mg/L	0.278	0.283	1.78
Thallium	mg/L	0.000016	0.000015	6.45
Tin	mg/L	<0.0001	<0.0001	-
Titanium	mg/L	<0.01	<0.01	-
Uranium	mg/L	0.00463	0.00473	2.14
Vanadium	mg/L	<0.0005	<0.0005	-
Zinc	mg/L	0.0135	0.0134	0.743

Indicates RPD above 30%.

Notes: the RPD was calculated using < LRL results at the LRL if one result in a duplicate pair was below the LRL. The RPD was not calculated if both results were <LRL. RPD = relative percent difference; "-"= no data/not calculated; LRL = Laboratory Reporting Limit.

- total organic carbon in one set of samples (RPD = 41.3%);
- total cadmium in one set of samples (RPD = 70.3%);
- total chromium in one set of samples (RPD = 60.0%);
- total manganese in one set of samples (RPD = 33.3%);
- total zinc in one set of samples (RPD = 101%);
- dissolved arsenic in one set of samples (RPD = 33.3%);
- dissolved copper in one set of samples (RPD = 51.9%); and
- dissolved manganese in one set of samples (RPD = 100%).

For eleven of the results listed above, the higher RPDs between paired results is due to at least one of these concentrations being detected close to (within 1.5-times) or below the LRL, where greater variability among paired results is anticipated. Seven pairs of samples in which RPDs exceeded 30% did not have at least one result near the LRL, and of these, three pairs of samples were from the water duplicate sample collected in February 2020, indicating lower field precision during this sampling event. Overall, as few analytes in field duplicates (less than 5%) had RPDs exceeding 30%, field sampling precision for water chemistry was considered acceptable for the purposes of this study.

Five sets of field duplicate samples were collected to assess field sampling precision of selenium speciation (Table A.7). RPDs between field duplicate samples for most analytes (> 90% of detected analytes) was below 30%, with the exceptions of selenate in one set of samples and methaneselenonic acid in another set of samples (37.7% and 33.3%, respectively). Field sampling precision for selenium speciation was considered acceptable for the purposes of this study.

Recommended hold times for oxidation-reduction potential (ORP) and pH were exceeded for all water chemistry samples prior to receipt of samples by the laboratory (Appendix G). The hold times for these analyses is 0.25 h, which is not feasible to meet while working in the field. All other recommended hold times were met for all samples.

A2.4 Data Quality Statement

Water chemistry data collected for the present study were of acceptable quality as characterized by good detectability, concentrations below LRLs in almost all method blank samples, good laboratory precision and accuracy, and acceptable field sampling precision. Therefore, the associated data are considered acceptable for this study.

Table A.7: Field Duplicate Results for Selenium Speciation Analyses Completed by Brooks Applied Labs

Parameter	Unit	RG_FO23_WS_2020-08-30_1813_NAL	RG_RIVER_WS_2020-08-30_1813_NAL	RPD (%)	RG_LCUT_WS_2020-12-01_1300_NAL	RG_RIVER_WS_2020-12-01_1245_NAL	RPD (%)	RG_LI8_WS_2020-07-15_NAL	RG_RIVER_WS_2020-07-15_NAL	RPD (%)	RG_LIDCOM_WS_2020-04-30_0825_NAL	RG_RIVER_WS_2020-04-30_0800_NAL	RPD (%)	RG_SLINE_WS_2020-02-26_1015_NAL	RG_DUPLICATE_WS_2020-02-26_0900_NAL	RPD (%)
Selenium (Se)-Total	µg/L	39.8	37.5	5.95	65.1	65.4	0.460	24.5	25	2.02	29.7	29.8	0.336	1.66	1.82	9.20
Selenium (Se)-Dissolved	µg/L	38.8	37.7	2.88	65.3	65.3	0	24.9	24.5	1.62	30.1	29.7	1.34	1.73	1.94	11.4
Dimethylselenoxide-Dissolved	µg/L	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-
MeSe(IV) - methylseleninic acid CH3SeO2H-Dissolved	µg/L	0.014	0.015	6.90	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-
Methaneselenonic Acid CH4O3Se-Dissolved[a]	µg/L	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	0.014	<0.01	33.3	<0.01	<0.01	-
Se(IV) - selenite SeO3(-2)-Dissolved	µg/L	0.241	0.24	0.416	0.093	0.077	18.8	<0.05	<0.05	-	0.142	0.161	12.5	<0.05	<0.05	-
Se(VI) - selenate SeO4(-2)-Dissolved	µg/L	33.1	38.2	14.3	55.2	37.7	37.7	23.5	23.1	1.72	28.2	26.7	5.46	1.5	1.45	3.39
SeCN - selenocyanate SeCN(-1) - Dissolved	µg/L	<0.04	<0.04	-	<0.01	<0.01	-	<0.04	<0.04	-	<0.04	<0.04	-	<0.04	<0.04	-
SeMe - selenomethionine CH3SeCH2CH2CH(NH2)CO2H-Dissolved	µg/L	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-
Selenosulfate-Dissolved	µg/L	<0.06	<0.06	-	<0.01	<0.01	-	<0.06	<0.06	-	<0.06	<0.06	-	<0.06	<0.06	-
Unknown Selenium Species-Dissolved	µg/L	<0.06	<0.06	-	<0.01	<0.01	-	<0.06	<0.06	-	<0.06	<0.06	-	<0.06	<0.06	-

Indicates RPD above 30%.

Notes: RPD was not calculated if both results were < LRL. If only one result was < LRL, the LRL was substituted for that value to calculate RPD. RPD = relative percent difference; "-"= no data/not calculated; LRL = Laboratory Reporting Limit.

[a] The selenium species methaneselenonic acid was identified as an “unknown” selenium species (Se_Unknown; see Appendix G) eluting between methylseleninic acid and selenomethionine in laboratory reports associated with the LCO LAEMP prior to December 2020. For the present report, these “unknown’ species results have been identified as methaneselenonic acid throughout 2020 results to maintain consistency in data interpretation of selenium speciation results

A3 BENTHIC INVERTEBRATE COMMUNITY

A3.1 Benthic Invertebrate Sub-Sampling Accuracy

The analytical reports from Cordillera Consulting Inc. (benthic invertebrate community structure) and Zeas Inc. (benthic invertebrate density and biomass; see Appendix G for laboratory reports) 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 benthic invertebrate community structure samples (n = 30) and 60% of density/biomass samples (n = 6) were subject to sub-sampling (Table A.8).

Sub-sampling efficiency was assessed by comparing the numbers of benthic invertebrates recovered between at least two sub-samples. Both the precision and accuracy of sub-sampling efficiency assessments in 2020 for both laboratories' met the respective DQO in all cases (≤ 20%; Table A.9). Thus, the precision and accuracy for sub-sampling of benthic invertebrate community samples was considered acceptable for this study.

A3.2 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. Sorting efficiency (i.e., percent recovery) of benthic invertebrate samples was excellent, achieving an average of 98% for the five community structure samples evaluated and an average of 99.0% for the three density/biomass samples evaluated (Table A.10). Recovery in quality control samples was above the laboratories' DQO (Cordillera: ≥ 95%; Zeas: ≥ 90%), so organism sorting efficiency was considered excellent.

A3.3 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 A.11). The analysts reported a total identification error rate (TIR) of 0 to 0.07%, a percent difference in enumeration (PDE) of 0 to 0.226%, a percent taxonomic disagreement (PTD) of 0.290 to 0.601%, and Bray Curtis Dissimilarity Index (BCDI, a measure of the differences in identifications between different analysts) of 0.00254 to 0.00542). 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 good.

Table A.8: Sub-Sampling Percentages and Total Organism Recovery for Benthic Invertebrate Community Samples

Laboratory	Sample ID	Laboratory ID	% Sampled	# Invertebrates
Benthic invertebrate community structure samples (Cordillera Consulting Inc.)	RG_LILC3_BIC-1_2020-08-27	CC210639	5	1,380
	RG_LILC3_BIC-2_2020-08-27	CC210640	5	754
	RG_LILC3_BIC-3_2020-08-27	CC210641	5	1,040
	RG_LILC3_BIC-4_2020-08-27	CC210642	5	1,193
	RG_LILC3_BIC-5_2020-08-27	CC210643	5	1,066
	RG_FO23_BIC-1_2020-08-28	CC210644	5	654
	RG_FO23_BIC-2_2020-08-28	CC210645	5	529
	RG_FO23_BIC-3_2020-08-28	CC210646	5	437
	RG_FO23_BIC-4_2020-08-28	CC210647	9	369
	RG_FO23_BIC-5_2020-08-28	CC210648	5	366
	RG_LCUT_BIC_2020-09-01	CC210649	5	923
	RG_LISP24_BIC_2020-09-01	CC210650	5	532
	RG_SLINE_BIC-1_2020-08-31	CC210651	10	317
	RG_SLINE_BIC-2_2020-08-31	CC210652	5	369
	RG_SLINE_BIC-3_2020-08-31	CC210653	5	401
	RG_LI24_BIC-1_2020-08-31	CC210654	6	336
	RG_LI24_BIC-2_2020-08-31	CC210655	10	436
	RG_LI24_BIC-3_2020-08-31	CC210656	7	359
	RG_LI24_BIC-4_2020-08-31	CC210657	5	334
	RG_LI24_BIC-5_2020-09-01	CC210658	10	306
	RG_LIDCOM_BIC_2020-08-30	CC210659	5	1,348
	RG_FRUL_BIC_2020-08-29	CC210660	5	376
	RG_LIDSL_BIC-1_2020-08-25	CC210661	5	666
	RG_LIDSL_BIC-2_2020-08-25	CC210662	5	583
	RG_LIDSL_BIC-3_2020-08-26	CC210663	5	445
	RG_LIDSL_BIC-4_2020-08-26	CC210664	5	469
	RG_LIDSL_BIC-5_2020-08-26	CC210665	5	537
	RG_LI8_BIC-1_2020-08-30	CC210666	5	852
	RG_LI8_BIC-2_2020-08-30	CC210667	5	835
	RG_LI8_BIC-3_2020-08-30	CC210668	5	818
Density (Zeas Inc.)	RG_LI24_HESS-1	LI24-1	100	109
	RG_LI24_HESS-2	LI24-2	100	197
	RG_LI24_HESS-3	LI24-3	100	212
	RG_LI24_HESS-4	LI24-4	100	106
	RG_LI24_HESS-5	LI24-5	100	159
	RG_LIDSL_HESS-1	LIDSL-1	100	526
	RG_LIDSL_HESS-2	LIDSL-2	100	316
	RG_LIDSL_HESS-3	LIDSL-3	50	413
	RG_LIDSL_HESS-4	LIDSL-4	50	428
	RG_LIDSL_HESS-5	LIDSL-5	100	699
	RG_LIDSL_HESS-6	LIDSL-6	100	832
	RG_LIDSL_HESS-7	LIDSL-7	50	484
	RG_LIDSL_HESS-8	LIDSL-8	100	635
	RG_LIDSL_HESS-9	LIDSL-9	50	500
	RG_LIDSL_HESS-10	LIDSL-10	100	334
	RG_LILC3_HESS-1	LILC3-1	25	792
	RG_LILC3_HESS-2	LILC3-2	25	540
	RG_LILC3_HESS-3	LILC3-3	25	1630
	RG_LILC3_HESS-4	LILC3-4	12.5	711
	RG_LILC3_HESS-5	LILC3-5	12.5	555
	RG_LILC3_HESS-6	LILC3-6	12.5	489
	RG_LILC3_HESS-7	LILC3-7	12.5	695
	RG_LILC3_HESS-8	LILC3-8	25	771
	RG_LILC3_HESS-9	LILC3-9	12.5	768
	RG_LILC3_HESS-10	LILC3-10	12.5	1497
	RG_SLINE_HESS-1	Sline-1	50	348
	RG_SLINE_HESS-2	Sline-2	100	244
	RG_SLINE_HESS-3	Sline-3	100	267
	RG_SLINE_HESS-4	Sline-4	100	309
	RG_SLINE_HESS-5	Sline-5	100	468

Table A.9: Summary of Subsampling Efficiency for Benthic Invertebrate Community Structure and Density

Laboratory	Laboratory ID	Sample ID	# of Organisms in Subsample										Total # of Organisms	Precision Error		Accuracy Error	
	Subsample #		1	2	3	4	5	6	7	8	9	10	Total	Min (%)	Max (%)	Min (%)	Max (%)
Cordillera Consulting Inc	CC210658	RG_LI24_BIC-5_2020-09-01	308	273	320	296	290	302	278	316	314	297	2994	0.34	14.7	0.8	8.82
	CC210651	RG_SLINE_BIC-1_2020-08-31	322	312	311	326	323	322	271	295	295	335	3112	0	19.1	0.06	12.9
	CC210655	RG_LI24_BIC-2_2020-08-31	412	410	407	451	413	417	416	437	444	402	4209	0.24	10.9	0.93	7.15
Zeas Inc.	LIDSL-6	RG_LIDSL_HESS-6	413	419	-	-	-	-	-	-	-	-	832	1.4	-	0.7	-

Notes: "-" indicates subsample not analyzed or data not calculable.

Table A.10: Summary of Sorting Efficiency for Benthic Invertebrate Community Samples

Laboratory	Sample ID	Laboratory ID	Number of Organisms Recovered (Initial Sort)	Organisms Recovered in Re-sort (Missed Organisms)		% Efficiency
				Taxon	Number	
Cordillera Consulting Inc.	RG_FO23_BIC-1_2020-08-28	CC210644	654	Diptera	1	99
				Chironomidae	2	
				Ephemeroptera	2	
				Plecoptera	1	
				Trombidiformes	1	
				Total	7	
	RG_LI24_BIC-1_2020-08-31	CC210654	336	None	0	100
	RG_FRUL_BIC_2020-08-29	CC210660	376	Diptera	2	
				Plecoptera	2	99
				Total	4	
	Average Recovery					99.3
Zeas Inc.	RG_LI24_HESS-3	LI24-3	212	-	213	99.5
	RG_LILC3_HESS-1	LILC3-1	792	-	795	99.6
	RG_SLINE_HESS-4	SLINE-4	309	-	312	99
	Average Recovery					99.4

Notes: As sorting progressed, at least 10% of samples were randomly chosen by senior members of the sorting team for resorting. All sorters working on a project had at least one sample resorted by another sorter. An efficiency of 90% was expected. If 90/95% efficiency was not met, samples from that sorter were re-sorted. To calculate sorting efficiency the following formula was used: (# organisms missed / total organisms found) X 100.

Table A.11: Taxonomic Quality Control Results for Benthic Invertebrate Community Samples [a]

Sample ID	Laboratory ID	Taxa Identified	TIR	PDE	PTD	BCDI
RG_LILC3_BIC-1_2020-08-27	CC210639	1,379	0.07	0.0362	0.290	0.0025
RG_SLINE_BIC-2_2020-08-31	CC210652	369	0.00	0	0.542	0.0054
RG_LIDSL_BIC-1_2020-08-25	CC210661	663	0.00	0.226	0.601	0.00376

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 the laboratory report (Appendix G)

A3.4 Data Quality Statement

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

A4 BENTHIC INVERTEBRATE TISSUE CHEMISTRY

A4.1 Laboratory Reporting Limits

Analytical reports of benthic invertebrate tissue metal concentrations from the Saskatchewan Research Council (SRC) and TrichAnalytics (see Appendix G for laboratory reports) were examined to provide an inventory of analyte results below the LRL and to compare the LRLs for these analytes to available benchmarks (Table A.12)[1].

Several analytes had results below the LRL in all benthic invertebrate tissue samples, including antimony, arsenic, beryllium, boron, chromium, cobalt, lead, mercury, molybdenum, nickel, thallium, tin, and uranium (Table A.12). The sole focus of interpretation of benthic invertebrate tissue chemistry results for the Line Creek LAEMP was selenium. Selenium was detectable (i.e., > LRL) in all benthic invertebrate samples, therefore comparison of the selenium LRL to the applicable benchmark (i.e., Elk Valley Water Quality Plan Level 1 benchmark for effects to invertebrates [13 mg/kg dry weight]; Teck 2014) was not necessary to assess whether adequate detectability was achieved. Overall, the detectability of selenium in all samples (i.e., > LRL) indicates that the achieved LRLs were suitable for the study.

A4.2 Data Accuracy and Precision

Data accuracy was evaluated based on the analysis of 36 CRM samples consisting of 1000 individual analyte results (Appendix G). CRM analyses results met the laboratory DQO (Table A.1) with the exceptions of:

- two results for lead (accuracy of 131 to 142%);
- two results for cadmium (accuracy of 132%);
- one result for nickel (accuracy of 148%); and
- one result for uranium (accuracy of 133%).

As indicated above, selenium was the sole focus of interpretation for benthic invertebrate tissue chemistry results for the Line Creek LAEMP. As such, the DQO exceedances for the other

[1] In previous LCO LAEMP studies (Minnow 2018, 2019, 2020), benthic invertebrate tissue quality samples were analyzed by SRC. Beginning in April 2020, benthic invertebrate tissue quality samples were submitted to TrichAnalytics Inc. instead of SRC for analyses (i.e., only samples collected in February 2020 were submitted to SRC for analyses). This change in the selected laboratory was based on the results of an Interlaboratory Tissue Analysis Validation Study completed in December 2020 (Golder 2020).

Table A.12: Laboratory Reporting Limit (LRL) Evaluation for Analytes in Benthic Invertebrate Tissue with < LRL Results

Parameter	Units	Range of LRLs	No. Sample Results < LRL
Antimony	ppm	0.02 to 0.1	19 (4.87%)
Arsenic	ppm	0.334 to 0.5	31 (7.95%)
Beryllium	ppm	0.02	45 (50.0%)
Boron	ppm	1 to 50	79 (20.3%)
Chromium	ppm	0.5 to 5	15 (3.85%)
Cobalt	ppm	0.5 to 5	28 (7.18%)
Lead	ppm	0.05 to 0.5	10 (2.56%)
Mercury	ppm	0.02 to 0.049	7 (1.79%)
Molybdenum	ppm	0.001 to 0.05	8 (2.05%)
Nickel	ppm	0.007 to 0.5	8 (2.05%)
Thallium	ppm	0.01 to 0.1	11 (2.82%)
Tin	ppm	0.1 to 2	65 (16.7%)
Uranium	ppm	0.1	5 (1.28%)

Notes: Only analytes with one or more sample results < LRL are displayed. The total number of samples analyzed (n) was 90. LRL = Laboratory Reporting Limit. LRLs were above applicable guidelines for selenium.

analytes listed above would not affect data interpretation. Accuracy achieved by the laboratory in this study can therefore be considered good.

Laboratory precision was evaluated based on duplicate analysis of benthic invertebrate tissue samples. Samples collected in April, July, August, September, and December (analyzed by TrichAnalytics) contained sufficient material to allow for laboratory duplicate analyses (n = 30), while samples material collected in February (analyzed by SRC) did not (Appendix F). Laboratory duplicate results for benthic invertebrate tissue were within the DQO set by TrichAnalytics, with the exceptions of potassium in one set of samples (RPD = 45.1%) and cadmium in one set of samples (RPD = 41.3%). The DQO for laboratory precision was met for all selenium results. Since selenium is the focus of benthic invertebrate tissue chemistry interpretation for the Line Creek LAEMP, laboratory analytical precision can be considered good for this study.

A4.3 Data Quality Statement

Benthic invertebrate tissue data collected for the present study were of good quality as characterized by good detectability, appropriate LRLs, and good 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.

A5 DATA QUALITY 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 2020 Line Creek LAEMP.

A6 REFERENCES

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APPENDIX B - PRODUCTIVITY

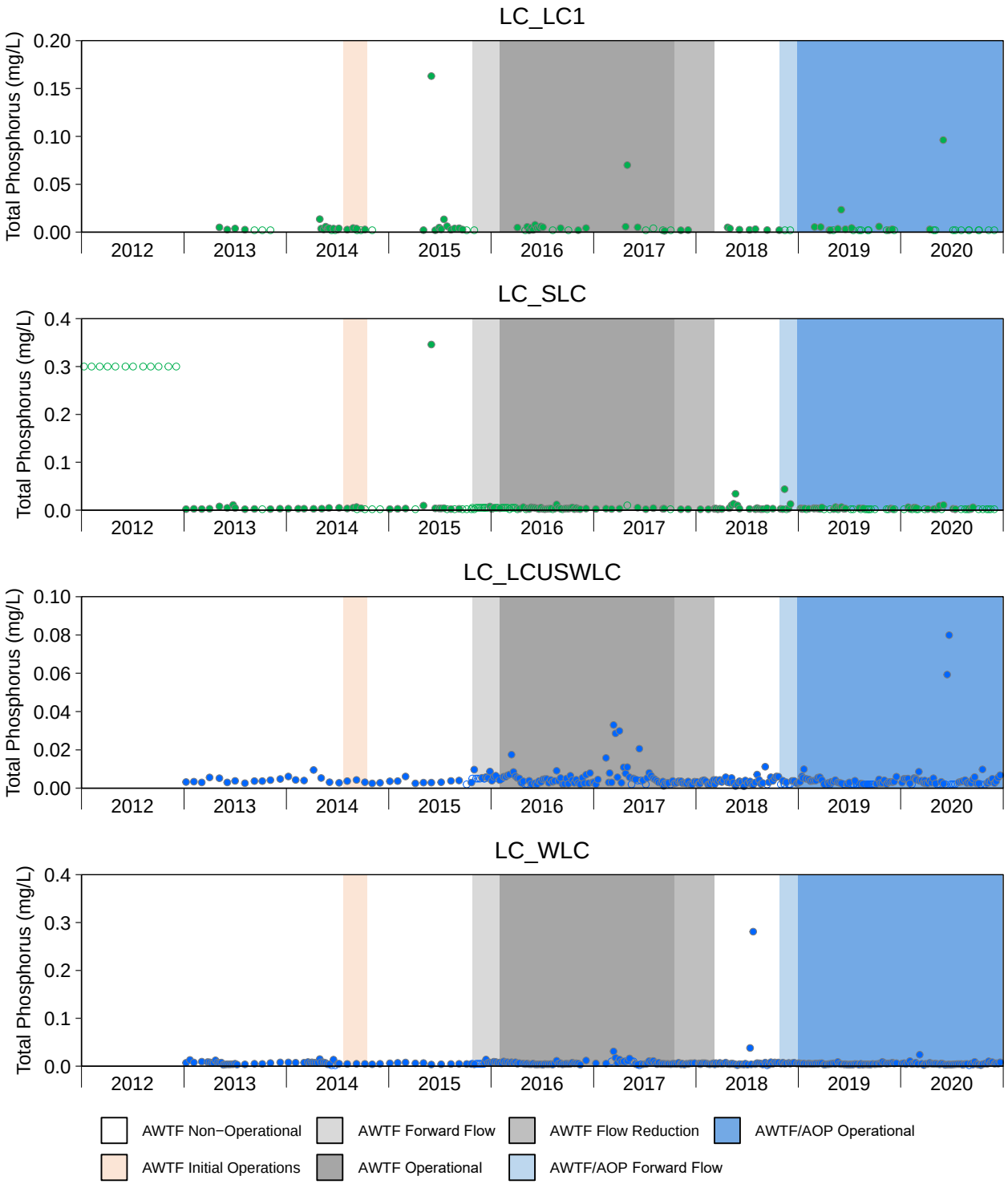
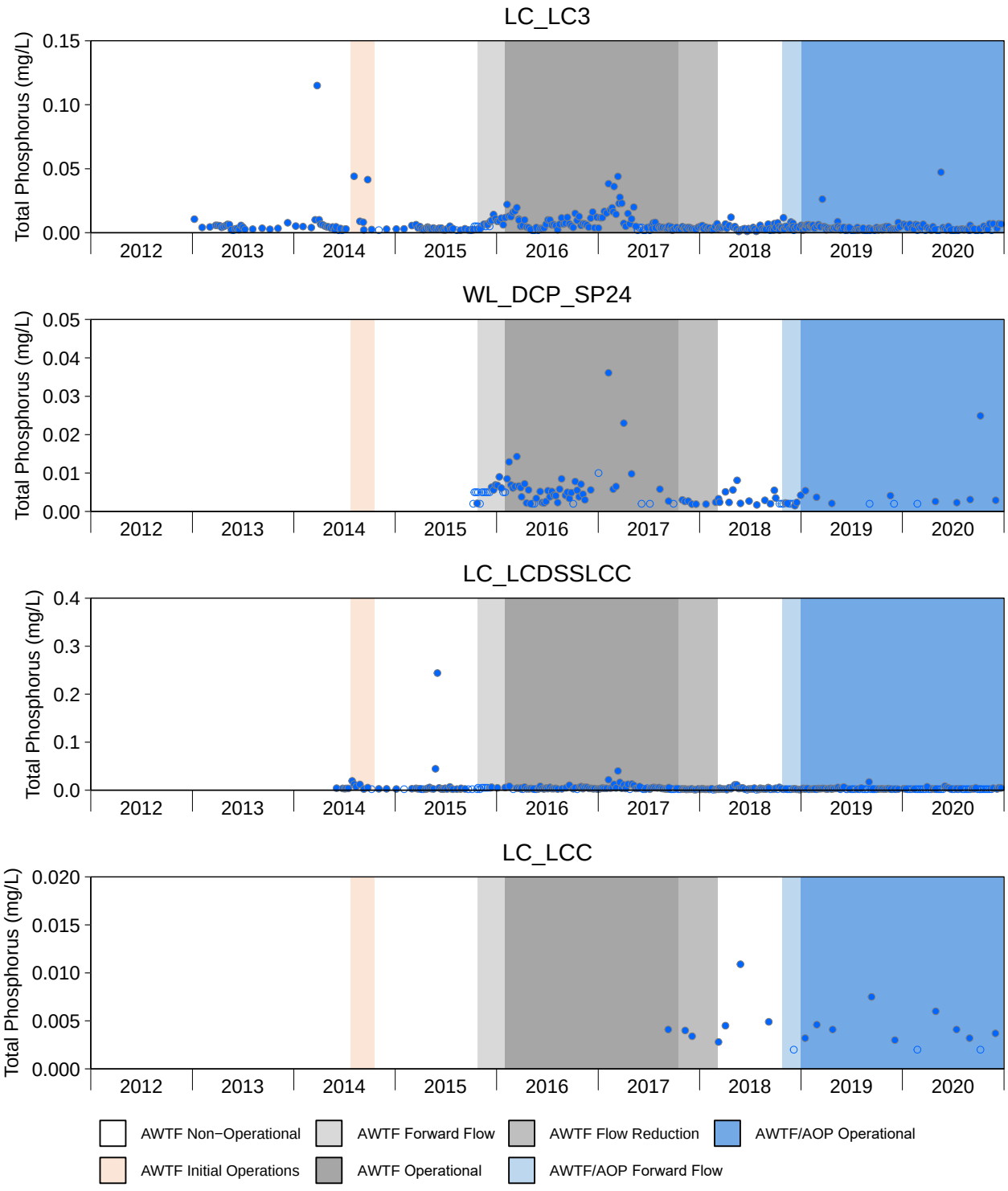


Figure B.1: Time Series Plots for Total Phosphorus Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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). 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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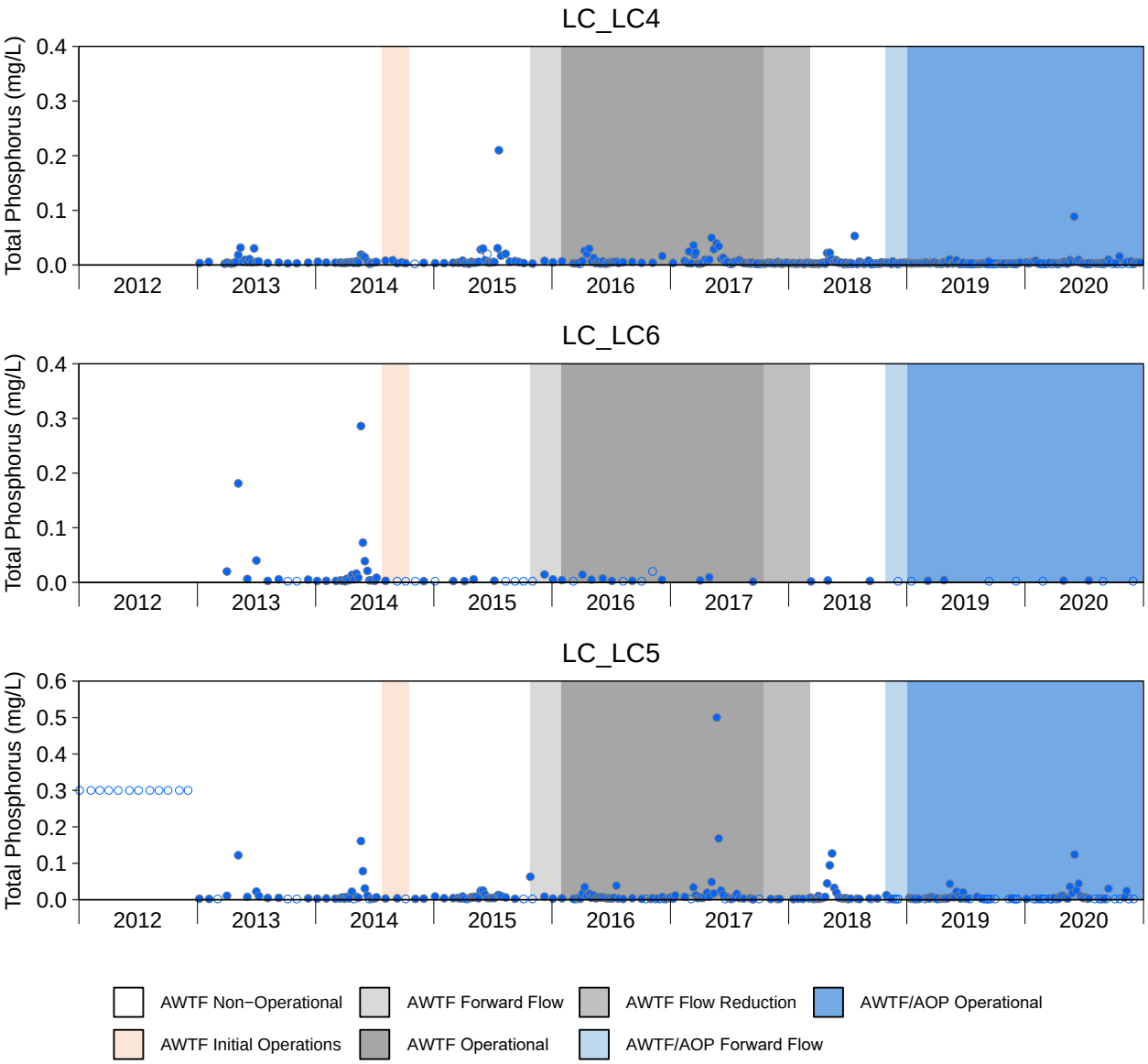

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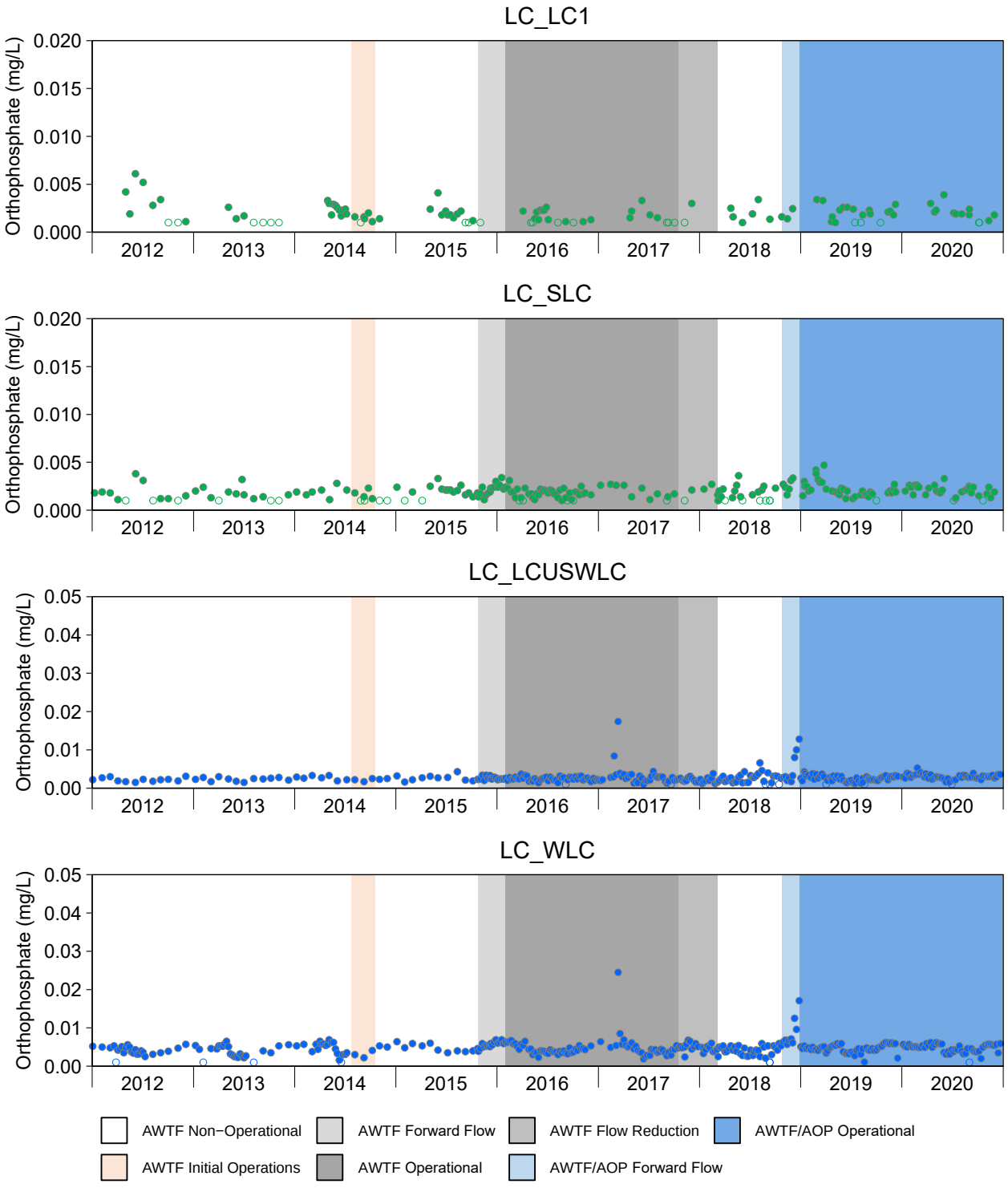

Figure B.2: Time Series Plots for Orthophosphate Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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). 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.

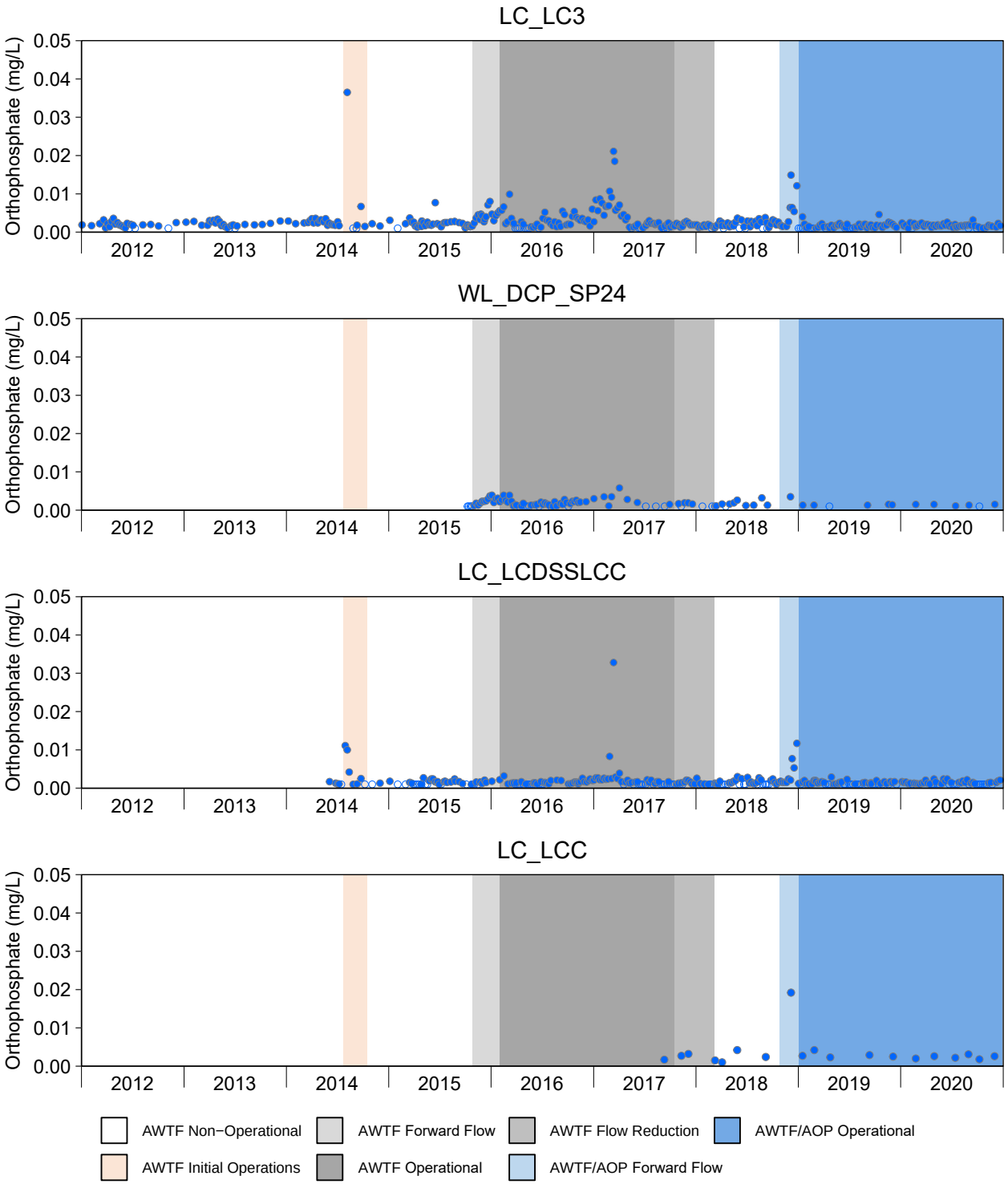

Figure B.2: Time Series Plots for Orthophosphate Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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). Red circle indicates outlier excluded from the calculation of baseline percentile.

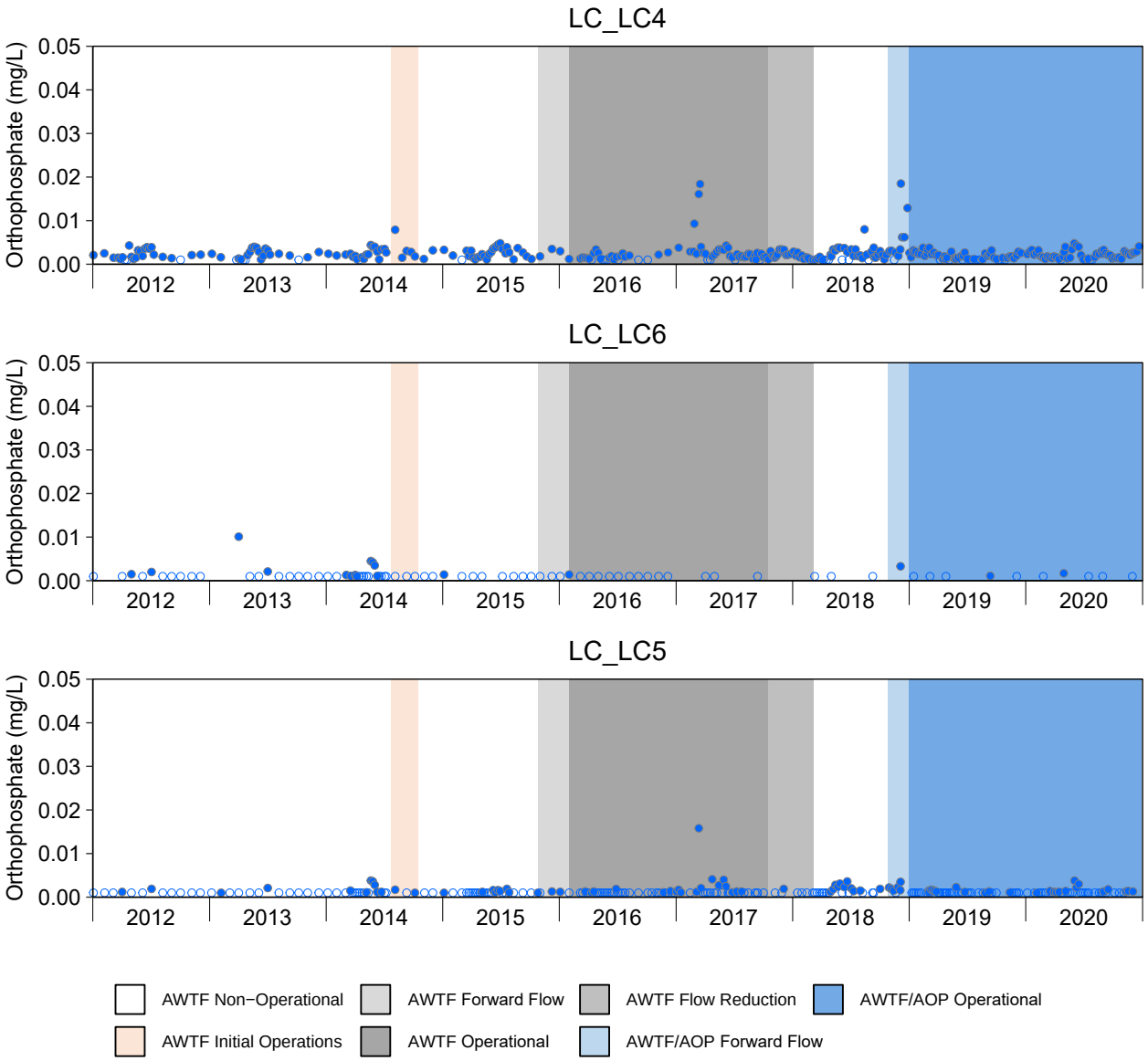

Figure B.2: Time Series Plots for Orthophosphate Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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).

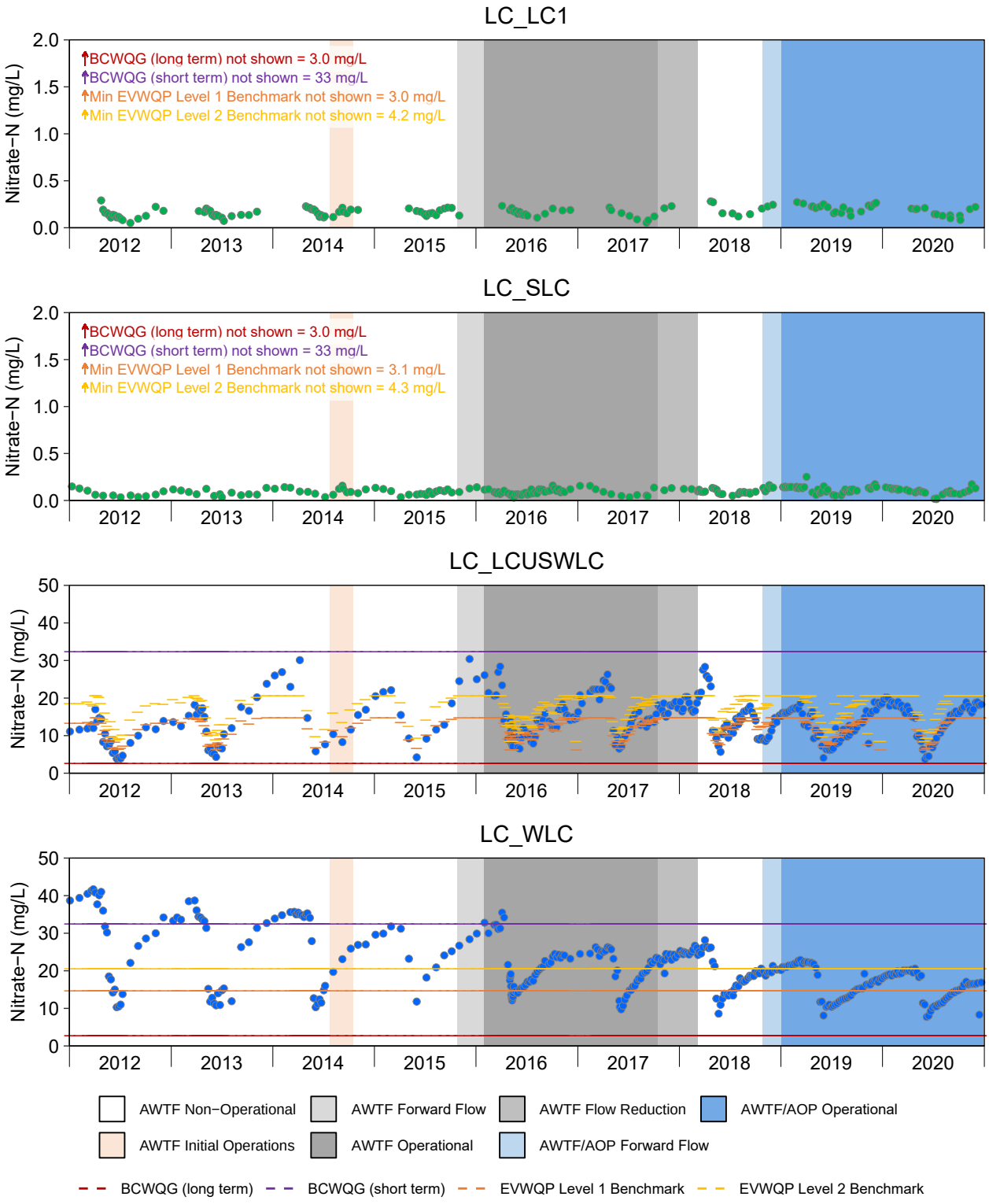

Figure B.3: Time Series Plots for Nitrate−N Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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). 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.

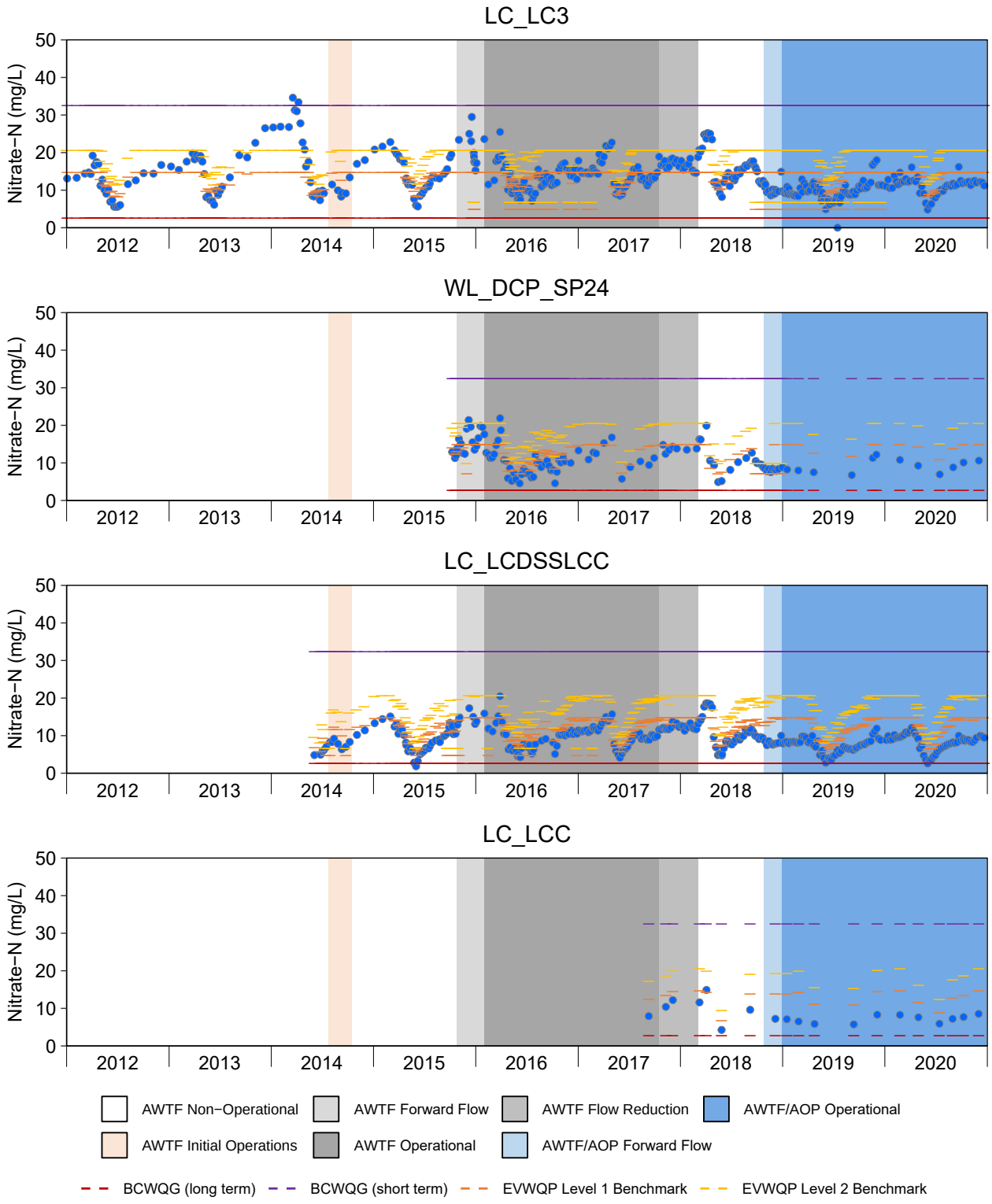

Figure B.3: Time Series Plots for Nitrate−N Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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).

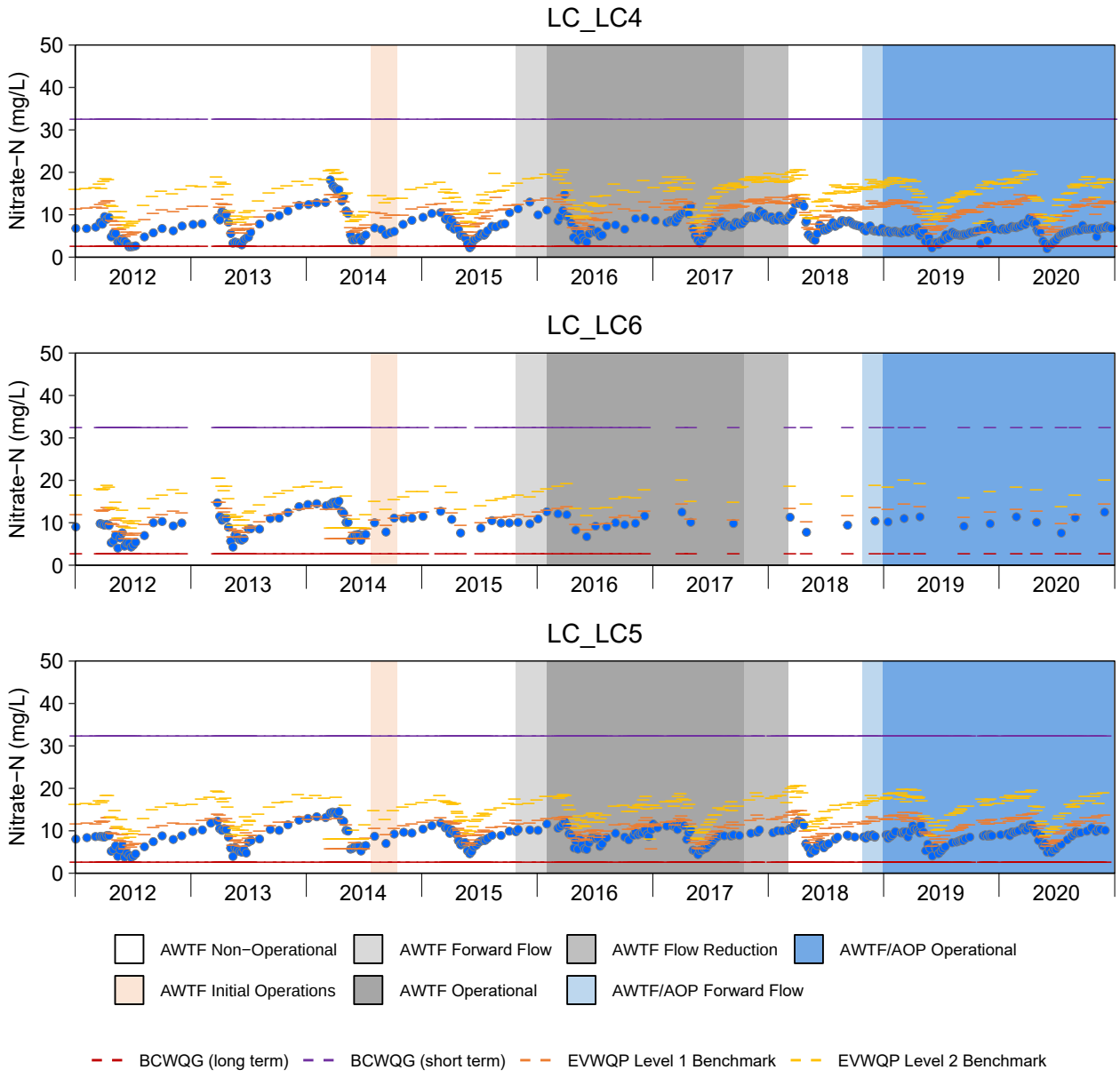

Figure B.3: Time Series Plots for Nitrate−N Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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).

Figure B.4: Periphyton Coverage and Site Photograph at Station RG_LI24 (Reference), August/September 2020

Note: Site photo was taken looking upstream.

Figure B.4: Periphyton Coverage and Site Photograph at RG_SLINE (Reference), August/September 2020

Note: Site photo was taken looking upstream.

Figure B.4: Periphyton Coverage and Site Photograph at RG_LCUT (Exposed), August/September 2020

Note: Site photo was taken looking upstream.

Figure B.4: Periphyton Coverage and Site Photograph at RG_LILC3 (Exposed), August/September 2020

Note: Site photo was taken looking upstream.

Figure B.4: Periphyton Coverage and Site Photograph at RG_LISP24 (Exposed), August/September 2020

Note: Site photo was taken looking upstream.

Figure B.4: Periphyton Coverage and Site Photograph at RG_LIDSL (Exposed), August/September 2020

Note: Site photo was taken looking upstream.

Figure B.4: Periphyton Coverage and Site Photograph at RG_LIDCOM (Exposed), August/September 2020

Note: Site photo was taken looking upstream.

Figure B.4: Periphyton Coverage and Site Photograph at RG_LI8 (Exposed), August/September 2020

Note: Site photo was taken looking upstream.

Figure B.4: Periphyton Coverage and Site Photograph at RG_FRUL (Exposed), August/September 2020

Note: Site photo was taken looking upstream.

Figure B.4: Periphyton Coverage and Site Photograph at RG_FO23 (Exposed), August/September 2020

Note: Site photo was taken looking upstream.

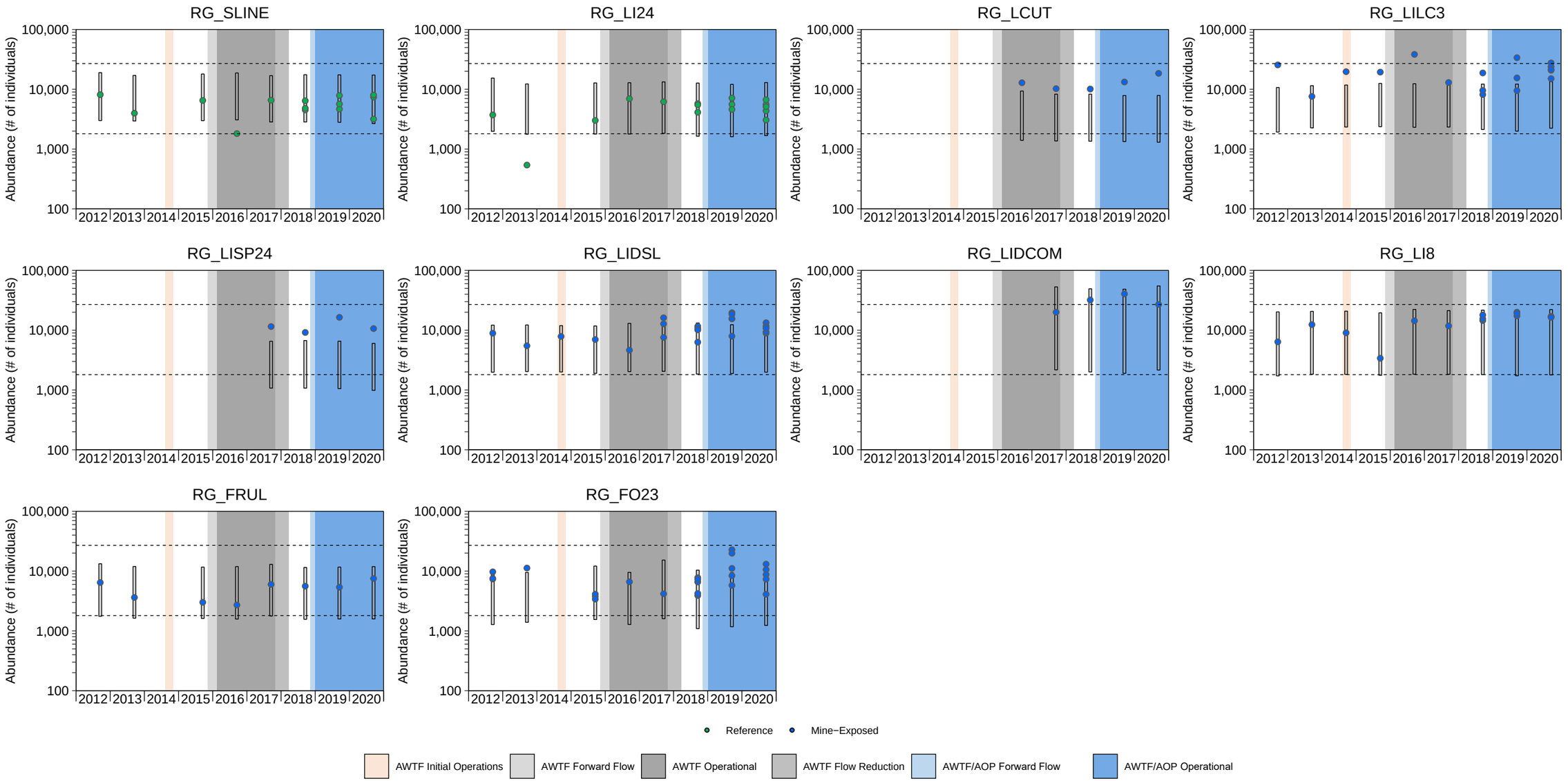

Figure B.5: Benthic Invertebrate Community Abundance (3-Minute Kick and Sweep Sampling) from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: Site specific normal ranges using regression models shown with grey shading and black rectangle (when available). 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).

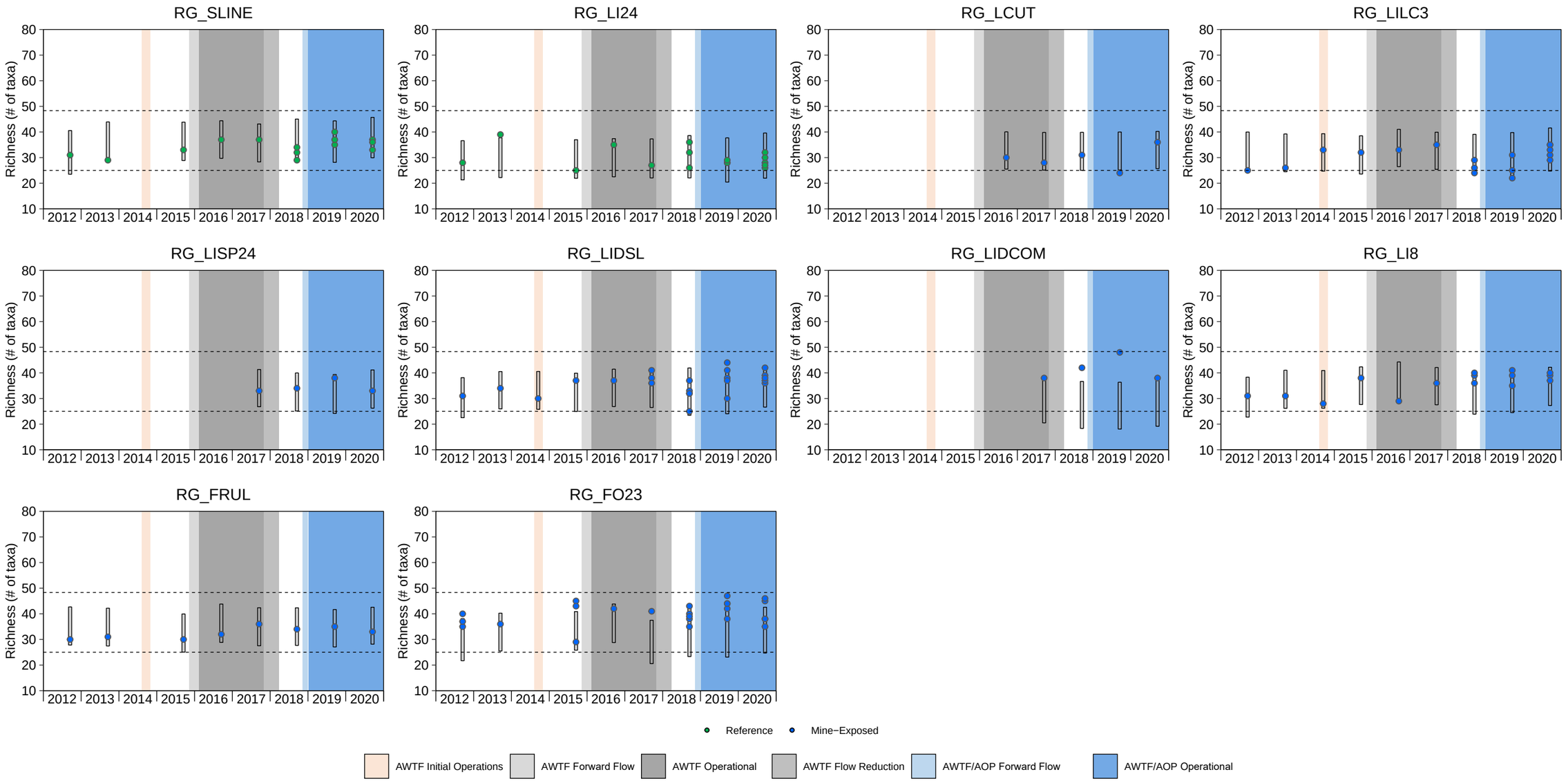

Figure B.6: Benthic Invertebrate Richness (Lowest Practical Level; 3-Minute Kick and Sweep Sampling) from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: Site specific normal ranges using regression models shown with grey shading and black rectangle (when available). 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).

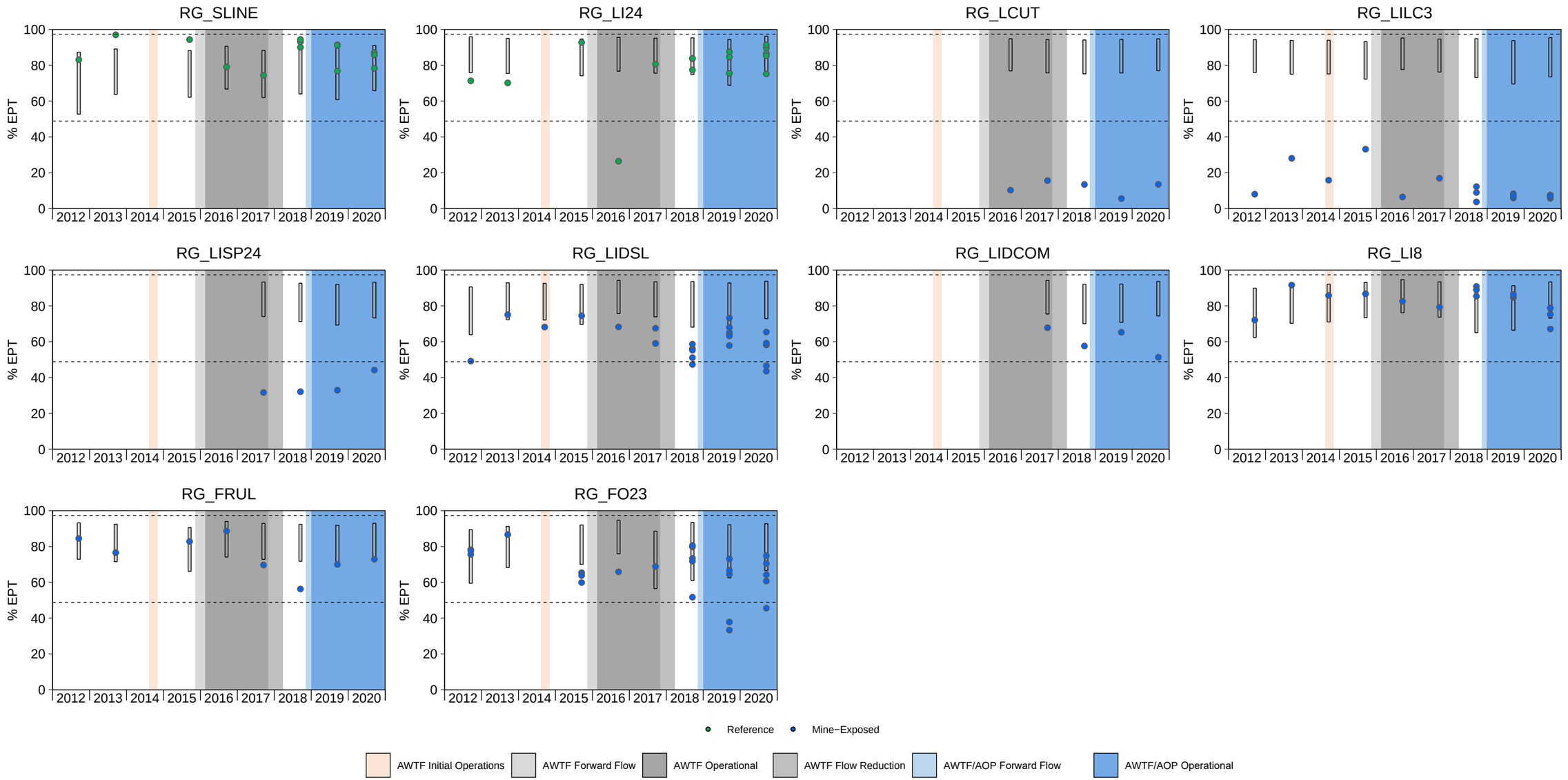

Figure B.7: Benthic Invertebrate Community Relative Ephemeroptera, Plecoptera, and Trichoptera Abundance (EPT%; 3-Minute Kick and Sweep Sampling) from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: Site specific normal ranges using regression models shown with grey shading and black rectangle (when available). 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).

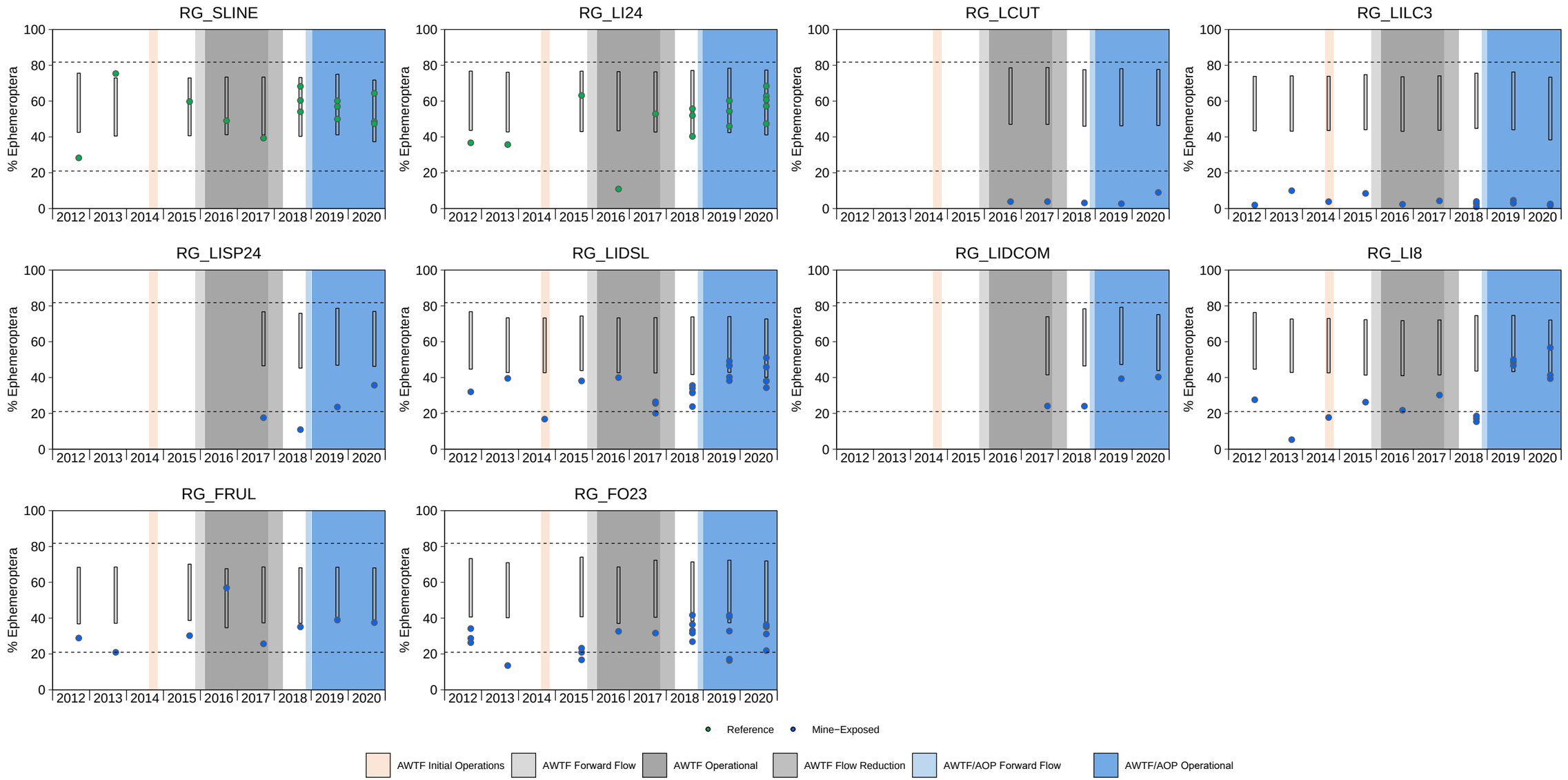

Figure B.8: Benthic Invertebrate Community Relative Relative Ephemeroptera Abundance (E%; 3-Minute Kick and Sweep Sampling) from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: Site specific normal ranges using regression models shown with grey shading and black rectangle (when available). 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).

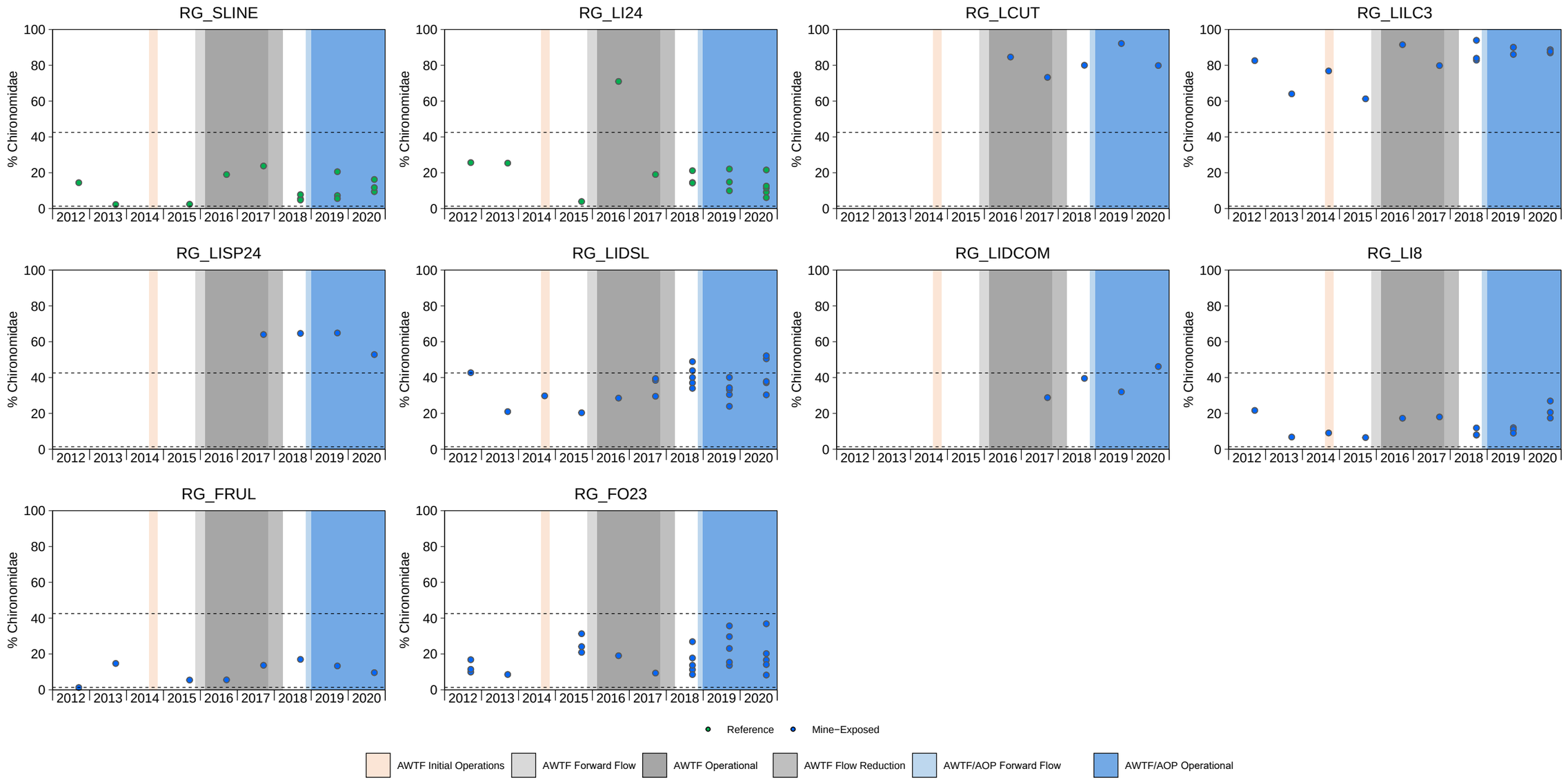

Figure B.9: Benthic Invertebrate Community Relative Chironomidae Abundance (%Chiron; 3-Minute Kick and Sweep Sampling) from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: Site specific normal ranges using regression models shown with grey shading and black rectangle (when available). 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).

Table B.1: Visual Periphyton Coverage Scores from Line Creek and Fording River, August/September 2020

Area		Biological Area Code	Replicate					Mean	Standard Deviation
			A	B	C	D	E		
Line Creek	Reference	RG_LI24	2	2	3	2	3	2	0.55
		RG_SLINE	1	3	1	1	1	1	0.89
	Mine-exposed	RG_LCUT	3	2	3	3	3	3	0.45
		RG_LILC3	4	4	4	4	4	4	0
		RG_LISP24	3	2	3	3	3	3	0.45
		RG_LIDSL	3	2	2	3	3	3	0.55
		RG_LIDCOM	4	4	4	4	4	4	0
		RG_LI8	2	2	2	2	2	2	0
Fording River	Mine-exposed	RG_FRUL	2	2	2	3	2	2	0.45
		RG_FO23	3	2	2	2	3	2	0.55

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 B.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 2020

Area	Comparison	Term	DF	F-Statistic	P-value	Comparisons Among Years						
						2014	2015	2016	2017	2018	2019	2020
RG_LIDSL	RG_LIDSL over time					AB	AB	AB	A	AB	B	AB
	RG_LIDSL vs RG_SLINE and RG_LI24 over time	Year	6	3.13	0.007							
		CI	1	227	<0.001							
		Area(CI)	1	20.0	<0.001							
		CI×Year	6	2.41	0.030	A	AB	AB	AB	AB	B	AB
		Area(CI)×Year	5	1.06	0.388							
		Error	138	-	-							
RG_LILC3	RG_LILC3 over time					A	A	A	A	A	A	B
	RG_LILC3 vs RG_SLINE and RG_LI24 over time	Year	6	7.11	<0.001							
		CI	1	751	<0.001							
		Area(CI)	1	19.7	<0.001							
		CI×Year	6	2.37	0.033	A	AB	AB	AB	A	AB	B
		Area(CI)×Year	5	1.04	0.397							
		Error	138	-	-							

Relevant p-value < 0.1.

Notes: Years that share a letter (e.g., A,B) are not significantly different (α=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.

Table B.3: Summary Metrics for Benthic Invertebrate Endpoints Collected by Hess Sampler at Line Creek, September 2020

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	1,090	1	760	640	280
		RG_LI24_HESS-2	1,970	7	1,760	1,210	100
		RG_LI24_HESS-3	2,120	7	1,600	990	120
		RG_LI24_HESS-4	1,060	4	780	480	80
	RG_SLINE	RG_SLINE_HESS-1	6,960	6	4,020	1,320	1,220
		RG_SLINE_HESS-2	2,440	6	1,820	680	290
		RG_SLINE_HESS-3	2,670	4	1,880	720	370
		RG_SLINE_HESS-4	3,090	10	2,440	1,490	330
		RG_SLINE_HESS-5	4,680	12	3,300	1,960	630
Mine-exposed	RG_LIDSL	RG_LIDSL_HESS-1	5,260	12	1,440	1,060	3,070
		RG_LIDSL_HESS-2	3,160	14	1,600	1,100	1,160
		RG_LIDSL_HESS-3	8,170	23	2,400	980	5,140
		RG_LIDSL_HESS-4	8,420	23	2,660	1,440	5,200
		RG_LIDSL_HESS-5	6,990	25	4,010	2,480	2,450
		RG_LIDSL_HESS-6	8,320	33	4,060	2,380	3,180
		RG_LIDSL_HESS-7	9,630	14	2,810	1,260	5,200
		RG_LIDSL_HESS-8	6,350	29	2,920	1,820	2,900
		RG_LIDSL_HESS-9	10,000	12	3,100	1,940	5,260
		RG_LIDSL_HESS-10	3,340	9	1,860	1,170	1,110
	RG_LILC3	RG_LILC3_HESS-1	30,930	43	890	120	27,480
		RG_LILC3_HESS-2	21,570	17	970	80	18,720
		RG_LILC3_HESS-3	65,200	19	1,960	760	50,760
		RG_LILC3_HESS-4	56,460	24	4,860	1,440	44,000
		RG_LILC3_HESS-5	42,370	41	1,810	400	31,040
		RG_LILC3_HESS-6	38,000	23	2,000	480	24,560
		RG_LILC3_HESS-7	55,600	10	2,800	1,120	40,240
		RG_LILC3_HESS-8	30,150	32	1,270	240	24,520
		RG_LILC3_HESS-9	60,950	13	2,310	400	43,520
		RG_LILC3_HESS-10	117,240	54	2,840	320	73,760

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

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

Table B.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 2020

Area	Comparison	Term	DF	F-Statistic	P-value	Comparisons Among Years						
						2014	2015	2016	2017	2018	2019	2020
RG_LIDSL	RG_LIDSL over time					ABC	ABC	C	AB	A	ABC	BC
	RG_LIDSL vs RG_SLINE and RG_LI24 over time	Year	6	6.96	<0.001							
		CI	1	309	<0.001							
		Area(CI)	1	17.2	<0.001							
		CI×Year	6	3.20	0.006							
		Area(CI)×Year	5	5.66	<0.001	CI×Year effect depends on Area						
		Error	138	-	-							
	RG_LIDSL vs RG_SLINE over time	Area	1	153	<0.001							
		Year	6	8.02	<0.001							
		Area×Year	6	5.40	<0.001	A	B	AB	AB	B	B	AB
		Error	104	-	-							
	RG_LIDSL vs RG_LI24 over time	Area	1	284	<0.001							
		Year	6	4.07	0.001							
		Area×Year	5	1.81	0.118							
		Error	97	-	-							
RG_LILC3	RG_LILC3 over time					AB	B	B	AB	AB	AB	A
	RG_LILC3 vs RG_SLINE and RG_LI24 over time	Year	6	4.36	<0.001							
		CI	1	1152	<0.001							
		Area(CI)	1	14.1	<0.001							
		CI×Year	6	2.91	0.011							
		Area(CI)×Year	5	4.63	<0.001	CI×Year effect depends on Area						
		Error	138	-	-							
	RG_LILC3 vs RG_SLINE over time	Area	1	673	<0.001							
		Year	6	5.41	<0.001							
		Area×Year	6	4.03	0.001	A	B	AB	AB	B	B	AB
		Error	104	-	-							
	RG_LILC3 vs RG_LI24 over time	Area	1	774	<0.001							
		Year	6	1.40	0.223							
		Area×Year	5	2.22	0.058	AB	B	-	AB	AB	B	A
		Error	97	-	-							

Relevant p-value < 0.1.

Notes: Years that share a letter (e.g., A,B) are not significantly different (α=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

Table B.5: Summary of Benthic Invertebrate Endpoints Collected by 3-Minute Kick and Sweep Sampling at Line Creek and Fording River, September 2020

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	3,170	33	20	2,760	87.1	2,040	64.4	300	9.46
		RG_SLINE-02	7,380	37	23	5,780	78.3	3,580	48.5	1,200	16.3
		RG_SLINE-03	8,020	36	20	6,880	85.8	3,800	47.4	940	11.7
	RG_LI24	RG_LI24-01	5,600	26	15	5,017	89.6	3,517	62.8	516	9.22
		RG_LI24-02	4,360	28	16	3,780	86.7	2,980	68.3	500	11.5
		RG_LI24-03	5,129	32	18	4,686	91.4	3,114	60.7	314	6.13
		RG_LI24-04	6,680	30	17	5,700	85.3	3,820	57.2	840	12.57
		RG_LI24-05	3,060	27	15	2,300	75.2	1,450	47.4	660	21.57
Mine-exposed	RG_LILC3	RG_LILC3-01	27,600	31	19	2,040	7.39	520	1.88	24,460	88.6
		RG_LILC3-02	15,080	29	16	860	5.70	300	1.99	13,160	87.3
		RG_LILC3-03	20,800	35	17	1,420	6.83	500	2.40	18,080	86.9
		RG_LILC3-04	23,860	35	18	1,800	7.54	400	1.68	21,160	88.7
		RG_LILC3-05	21,320	33	16	1,540	7.22	540	2.53	18,700	87.7
	RG_LIDSL	RG_LIDSL-01	13,320	42	19	6,200	46.5	5,080	38.1	6,720	50.5
		RG_LIDSL-02	11,660	36	16	5,080	43.6	4,000	34.3	6,080	52.1
		RG_LIDSL-03	8,900	39	18	5,820	65.4	4,540	51.0	2,700	30.3
		RG_LIDSL-04	9,380	37	18	5,460	58.2	4,300	45.8	3,480	37.1
		RG_LIDSL-05	10,740	38	17	6,360	59.2	4,080	38.0	4,060	37.8
	RG_LIDCOM	RG_LIDCOM-01	26,960	38	19	13,840	51.3	10,860	40.3	12,440	46.1
	RG_LCUT	RG_LCUT-01	18,460	36	19	2,500	13.5	1,660	8.99	14,740	79.8
	RG_LI8	RG_LI8-01	17,040	39	19	13,440	78.9	9,660	56.7	2,960	17.4
		RG_LI8-02	16,700	40	17	12,560	75.2	6,900	41.3	3,440	20.6
		RG_LI8-03	16,360	37	17	10,980	67.1	6,440	39.4	4,400	26.9
	RG_LISP24	RG_LISP24-01	10,640	33	15	4,700	44.2	3,800	35.7	5,620	52.8
	RG_FO23	RG_FO23-01	13,080	45	25	5,960	45.6	2,860	21.9	4,820	36.9
		RG_FO23-02	10,580	38	19	7,460	70.5	3,720	35.2	1,760	16.6
		RG_FO23-03	8,740	35	21	6,540	74.8	3,120	35.7	720	8.24
		RG_FO23-04	4,100	46	28	2,489	60.7	1,489	36.3	578	14.1
		RG_FO23-05	7,320	38	24	4,700	64.2	2,280	31.1	1,480	20.2
	RG_FRUL	RG_FRUL-01	7,520	33	21	5,480	72.9	2,820	37.5	720	9.57

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

APPENDIX C - SELENIUM

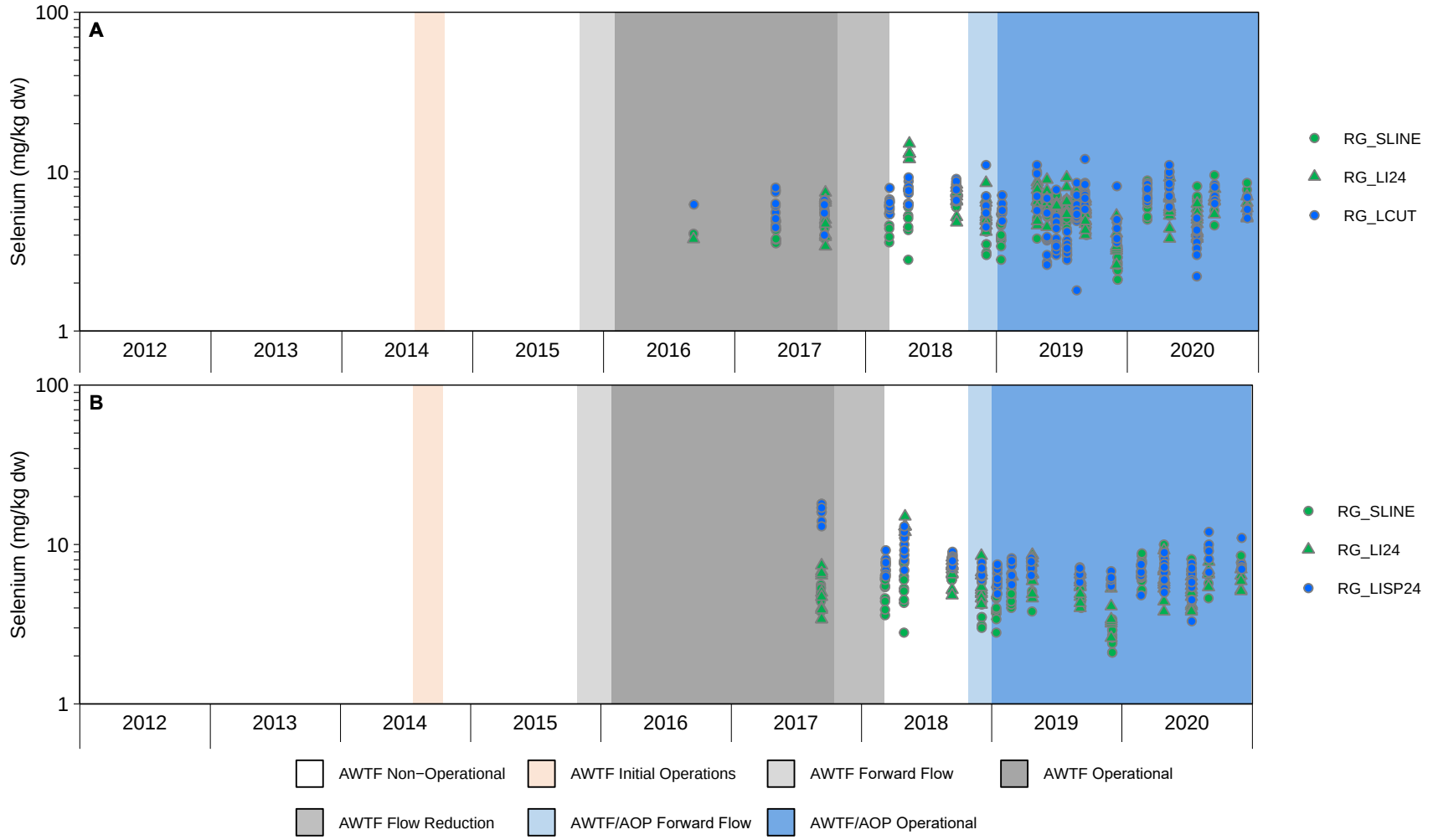

Figure C.1: Benthic Invertebrate Selenium Concentrations, for A) RG_LCUT and B) RG_LISP24 (Mine−exposed Areas) Relative to RG_SLINE and RG_LI24 (Reference Areas), 2012 to 2020

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 operations, 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.

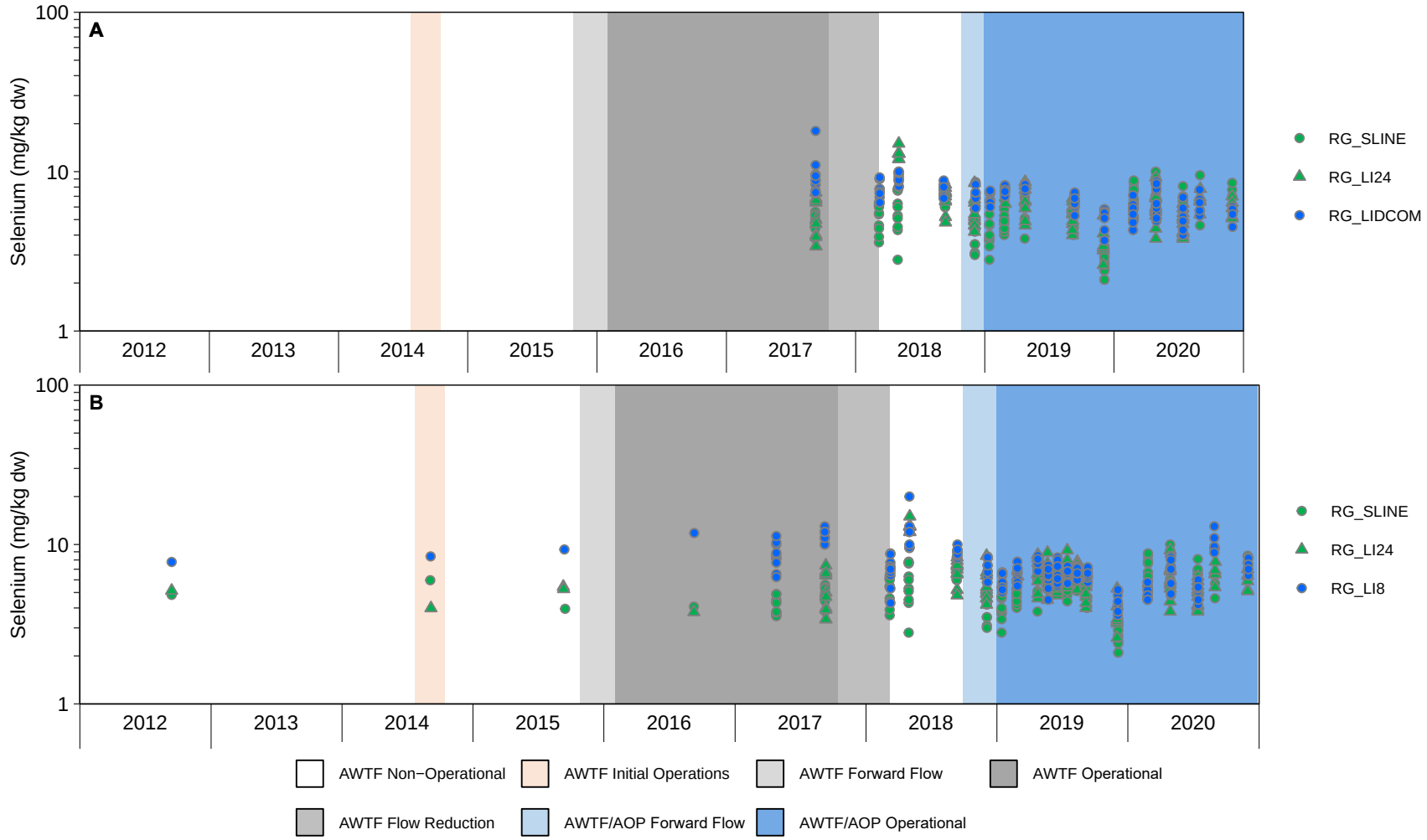

Figure C.2: Benthic Invertebrate Selenium Concentrations, for A) RG_LIDCOM and B) RG_LI8 (Mine−exposed Areas) Relative to RG_SLINE and RG_LI24 (Reference Areas), 2012 to 2020

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 operations, 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.

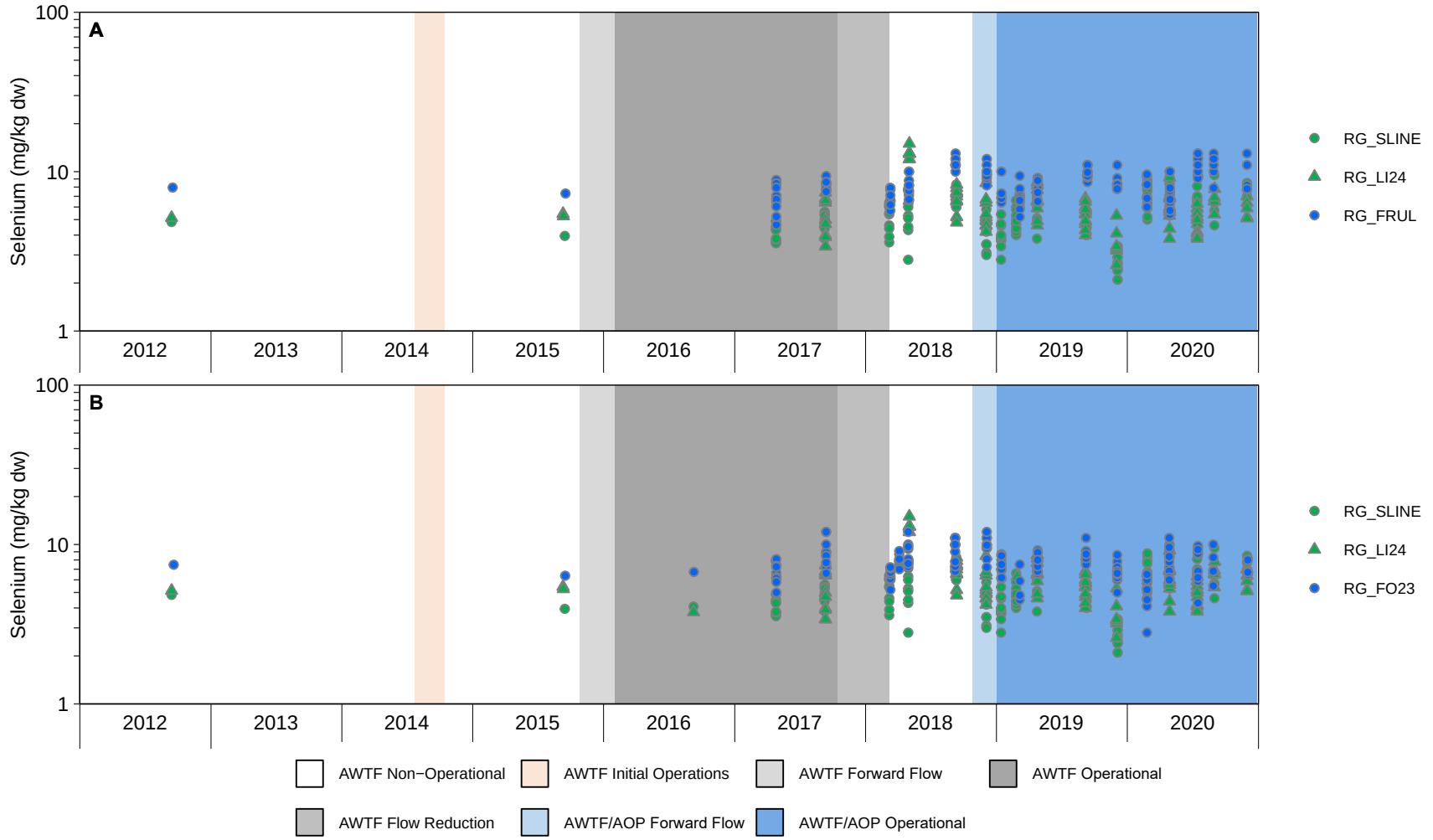

Figure C.3: Benthic Invertebrate Selenium Concentrations, for A) RG_FRUL and B) RG_FO23 (Mine−exposed Areas) Relative to RG_SLINE and RG_LI24 (Reference Areas), 2012 to 2020

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 operations, 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.

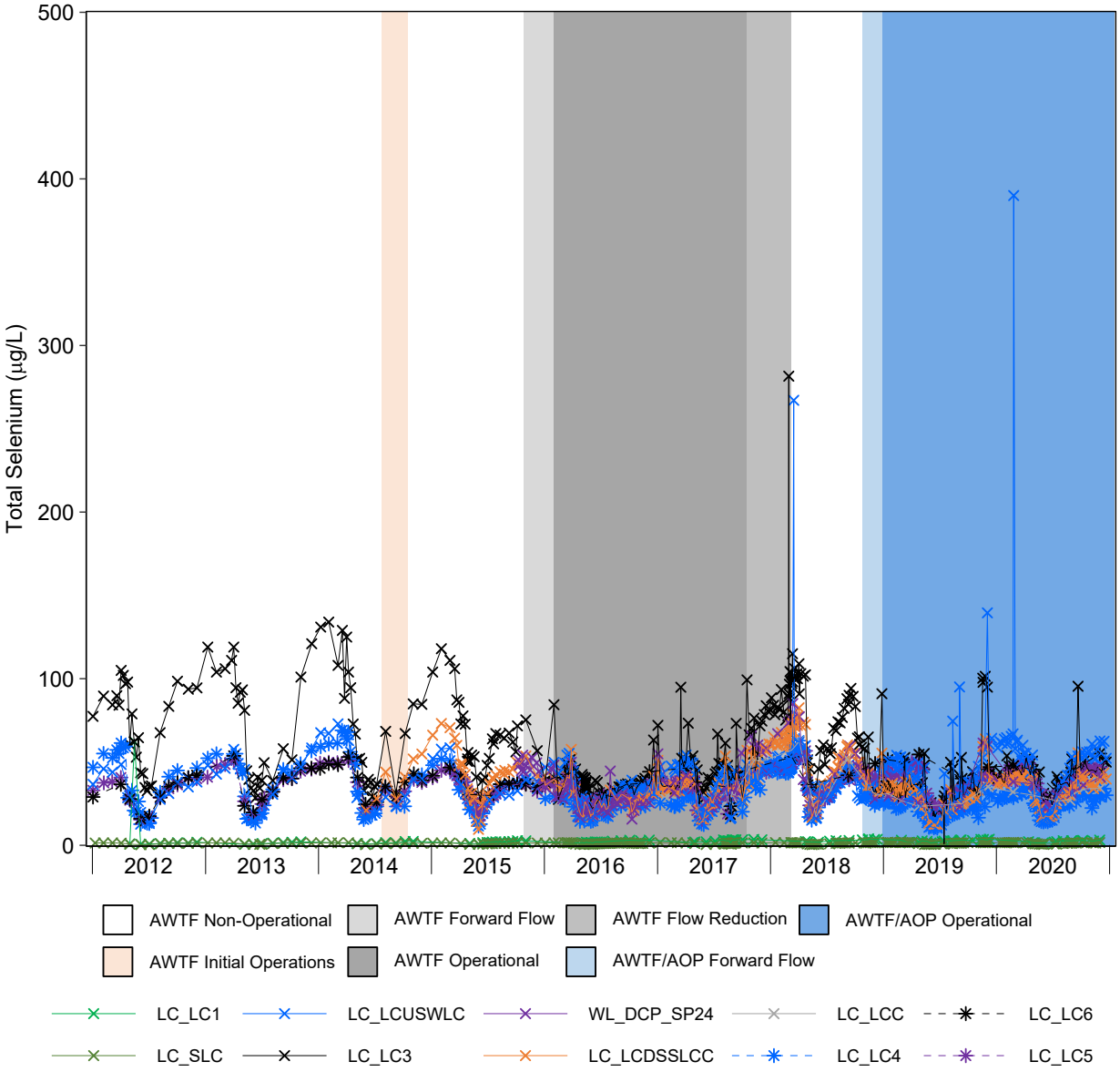

Figure C.4: Time Series Plots for Aqueous Total Selenium Concentrations from the Line Creek LAEMP Sampling Stations, 2012 to 2020

Notes: All concentrations reported by the laboratory were detectable. West Line Creek (WLC) Active Water Treatment Facility (AWTF) operational timelines pertain only to mine-exposed monitoring areas located downstream of the AWTF discharge. This plot excludes data from LC_WLC.

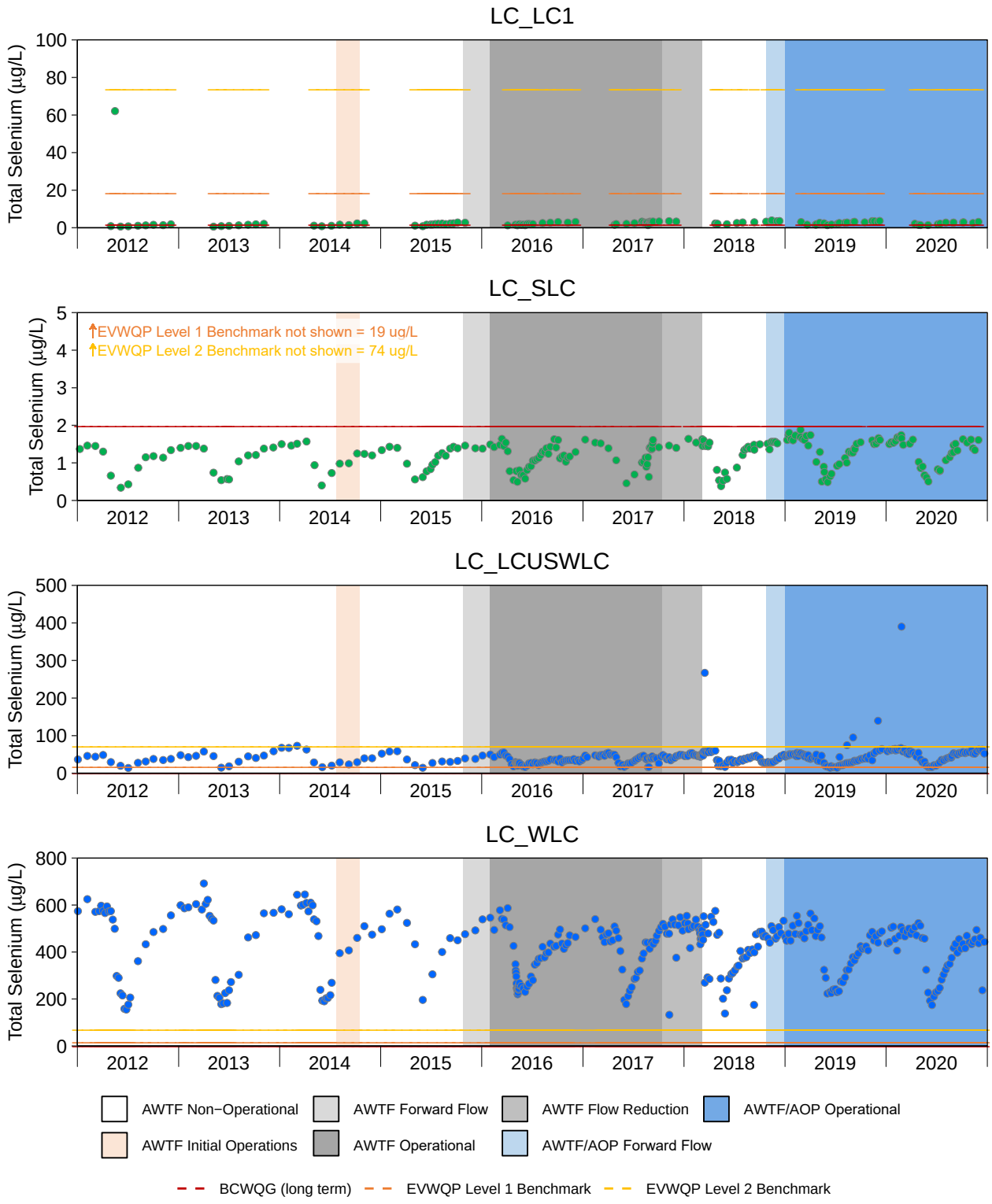

Figure C.5: Time Series Plots for Total Selenium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Note: 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). 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.

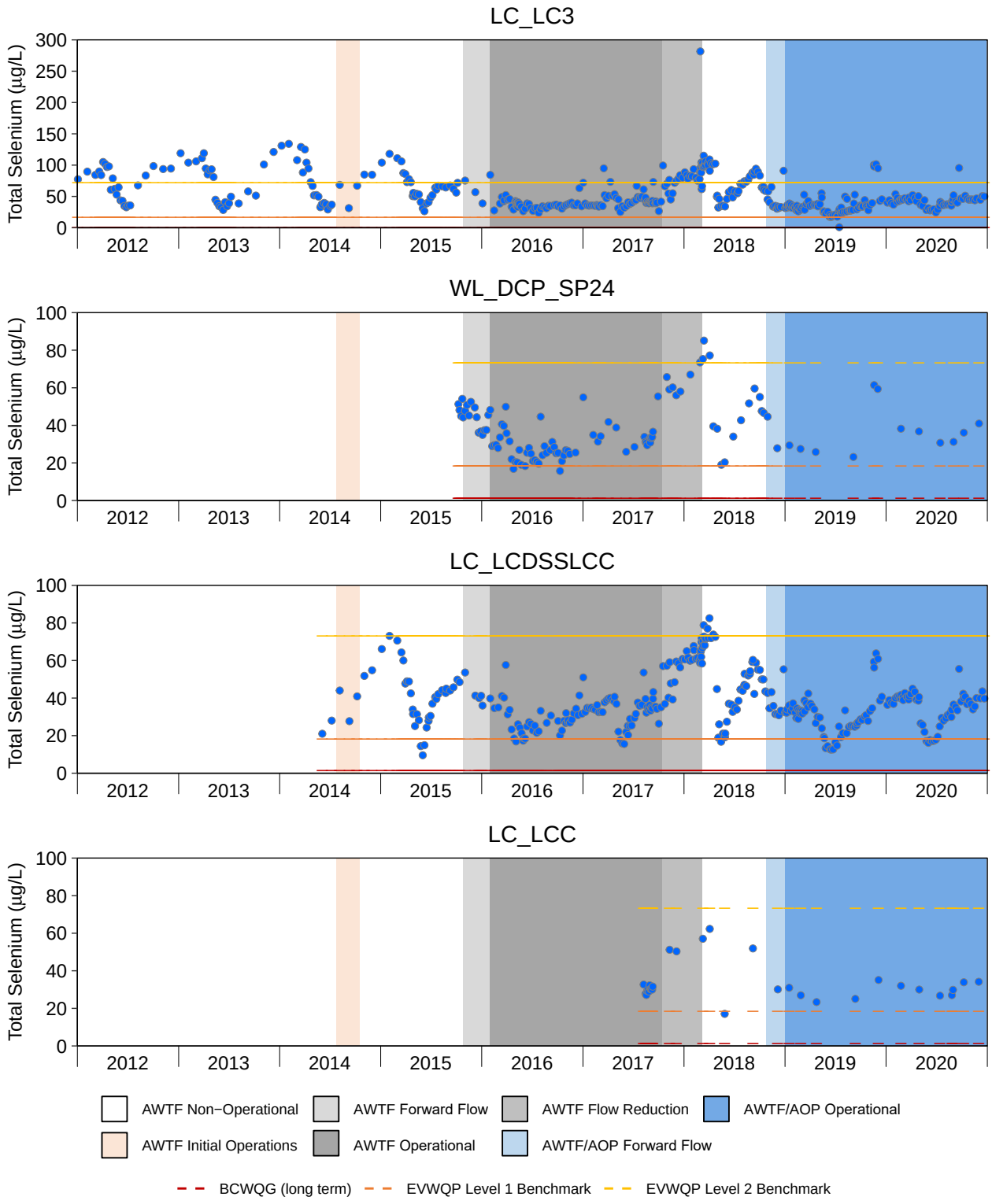

Figure C.5: Time Series Plots for Total Selenium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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).

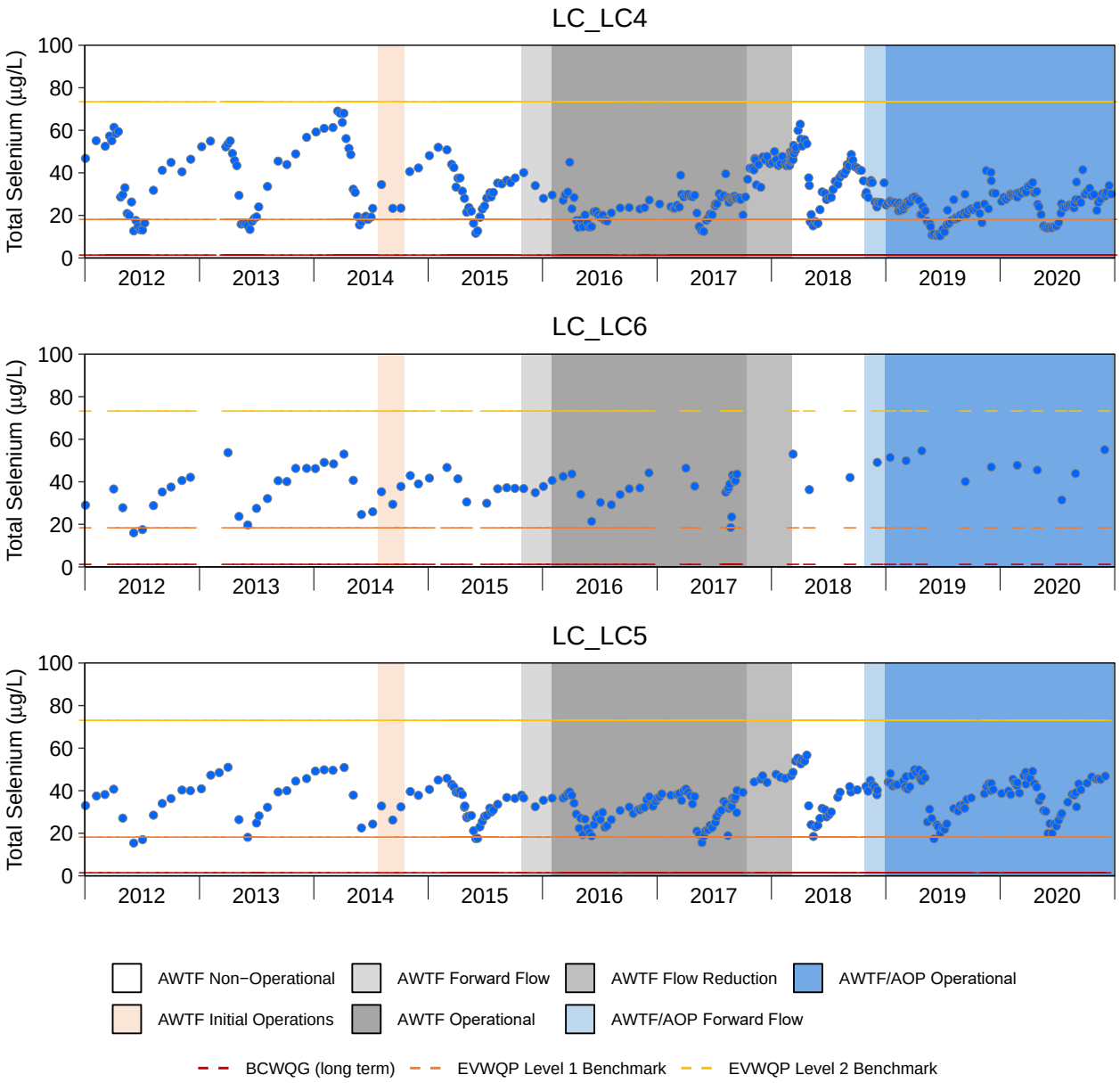

Figure C.5: Time Series Plots for Total Selenium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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).

Table C.1: Selenium Concentrations in Benthic Invertebrate Composite-Taxa Samples Collected from Line Creek and Fording River, Line Creek LAEMP, 2020

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[a]	RG_LI24_INV-1	28-Apr-20	Plec, Ephem, Trich (Rhyac)	5.8	5.9	3.8	9.2	6.1	1.5
			RG_LI24_INV-2	28-Apr-20	Ephem, Plec, Trich (Rhyac)	9.2					
			RG_LI24_INV-3	28-Apr-20	Ephem, Plec, Trich (Para)	6.0					
			RG_LI24_INV-4	28-Apr-20	Ephem, Plec, Trich (Para)	7.0					
			RG_LI24_INV-5	28-Apr-20	Ephem, Plec, Trich (Para)	3.8					
			RG_LI24_INV-6	28-Apr-20	Ephem, Plec, Trich (Para)	6.8					
			RG_LI24_INV-7	28-Apr-20	Plec, Ephem, Trich (Para)	4.4					
			RG_LI24_INV-8	28-Apr-20	Plec, Ephem, Trich (Rhyac)	6.9					
			RG_LI24_INV-9	28-Apr-20	Plec, Ephem, Trich (Para)	5.3					
			RG_LI24_INV-10	28-Apr-20	Plec, Ephem	5.6					
			RG_LI24_INV-1	14-Jul-20	Ephem, Plec, Dipt (Chiron)	5.9	4.9	3.8	6.3	4.9	0.9
			RG_LI24_INV-2	14-Jul-20	Ephem, Plec, Trich (Rhyac)	5.2					
			RG_LI24_INV-3	14-Jul-20	Ephem, Plec	5.5					
			RG_LI24_INV-4	14-Jul-20	Ephem, Plec, Trich	4.7					
			RG_LI24_INV-5	14-Jul-20	Plec, Ephem	4.2					
			RG_LI24_INV-6	14-Jul-20	Ephem, Plec, Trich (Rhyac)	5.0					
			RG_LI24_INV-7	14-Jul-20	Plec, Ephem	6.3					
			RG_LI24_INV-8	14-Jul-20	Ephem, Plec, Trich (Rhyac)	4.1					
			RG_LI24_INV-9	14-Jul-20	Ephem, Plec, Trich (Rhyac)	3.9					
			RG_LI24_INV-10	14-Jul-20	Ephem, Plec, Trich (Rhyac)	3.8					
			RG_LI24_INV-1	31-Aug-20	Ephem, Plec	6.6	6.6	5.4	7.8	6.6	0.9
			RG_LI24_INV-2	31-Aug-20	Ephem, Plec	6.5					
			RG_LI24_INV-3	31-Aug-20	Trich, Dipt (Tipul)	5.4					
			RG_LI24_INV-4	31-Aug-20	Ephem, Plec	6.9					
			RG_LI24_INV-5	1-Sep-20	Ephem	7.8					
			RG_LI24_INV-1	30-Nov-20	Ephem, Plec, Trich (Rhyac)	5.2	5.9	5.1	7.0	5.9	0.8
			RG_LI24_INV-2	30-Nov-20	Ephem, Plec, Dipt (Tipul)	7.0					
			RG_LI24_INV-3	30-Nov-20	Ephem, Plec, Trich (Rhyac)	6.4					
			RG_LI24_INV-4	30-Nov-20	Plec, Ephem, Trich (Rhyac)	5.1					
			RG_LI24_INV-5	30-Nov-20	Ephem, Plec, Dipt (Tipul)	5.9					
		RG_SLINE	RG_SLINE_INV-1	26-Feb-20	Plec, Trich (Rhyac, Para)	7.6	7.2	5.0	8.8	7.0	1.3
			RG_SLINE_INV-2	26-Feb-20	Plec, Trich (Para)	6.7					
			RG_SLINE_INV-3	26-Feb-20	Plec, Trich (Rhyac)	5.0					
			RG_SLINE_INV-4	26-Feb-20	Plec, Trich (Rhyac)	5.9					
			RG_SLINE_INV-5	26-Feb-20	Plec, Trich (Rhyac)	5.2					
			RG_SLINE_INV-6	26-Feb-20	Plec, Ephem, Trich (Para)	7.9					
			RG_SLINE_INV-7	26-Feb-20	Plec, Ephem, Trich (Rhyac)	6.3					
			RG_SLINE_INV-8	26-Feb-20	Plec, Ephem	8.5					
			RG_SLINE_INV-9	26-Feb-20	Plec, Trich (Rhyac)	8.8					
			RG_SLINE_INV-10	26-Feb-20	Trich (Rhyac), Plec, Ephem	7.7					
			RG_SLINE_INV-1	28-Apr-20	Plec, Ephem, Trich (Para)	9.2	7.8	5.3	10	7.7	1.6
			RG_SLINE_INV-2	28-Apr-20	Plec, Ephem, Trich (Para)	8.4					
			RG_SLINE_INV-3	28-Apr-20	Plec, Trich (Rhyac, Para)	6.1					
			RG_SLINE_INV-4	28-Apr-20	Ephem, Plec, Trich (Para)	8.9					
			RG_SLINE_INV-5	28-Apr-20	Plec, Ephem, Trich (Para)	6.7					
			RG_SLINE_INV-6	28-Apr-20	Ephem, Plec, Trich (Rhyac)	6.7					
			RG_SLINE_INV-7	28-Apr-20	Plec, Ephem, Trich (Para)	10					
			RG_SLINE_INV-8	28-Apr-20	Plec, Ephem, Trich (Para, Rhyac)	5.3					
			RG_SLINE_INV-9	28-Apr-20	Plec, Ephem, Trich (Rhyac)	9.0					
			RG_SLINE_INV-10	28-Apr-20	Plec, Ephem, Trich (Para)	7.1					
			RG_SLINE_INV-1	14-Jul-20	Ephem, Plec, Trich (Para)	4.8	6.3	4.6	8.1	6.2	1.1
			RG_SLINE_INV-2	14-Jul-20	Ephem, Plec, Trich	4.6					
			RG_SLINE_INV-3	14-Jul-20	Ephem, Plec, Trich	6.8					
			RG_SLINE_INV-4	14-Jul-20	Ephem, Plec, Trich (Rhyac)	6.5					
			RG_SLINE_INV-5	14-Jul-20	Ephem, Plec, Trich	6.5					
			RG_SLINE_INV-6	14-Jul-20	Ephem, Plec, Trich	5.7					
			RG_SLINE_INV-7	14-Jul-20	Ephem, Plec, Trich	8.1					
			RG_SLINE_INV-8	14-Jul-20	Plec, Ephem, Trich (Rhyac)	5.5					
			RG_SLINE_INV-9	14-Jul-20	Ephem, Plec, Trich	7.0					
			RG_SLINE_INV-10	14-Jul-20	Ephem, Plec, Trich (Rhyac)	6.1					
			RG_SLINE_INV-1	31-Aug-20	Trich, Plec	9.5	6.4	4.6	10	6.5	1.8
			RG_SLINE_INV-2	31-Aug-20	Trich, Plec	5.7					
			RG_SLINE_INV-3	31-Aug-20	Trich, Plec	6.4					
			RG_SLINE_INV-4	31-Aug-20	Trich, Plec	6.4					
			RG_SLINE_INV-5	31-Aug-20	Trich, Plec	4.6					
			RG_SLINE_INV-1	30-Nov-20	Ephem, Plec, Trich (Para)	7.0	7.0	6.1	9	7.2	0.9
			RG_SLINE_INV-2	30-Nov-20	Ephem, Plec, Trich (Rhyac)	7.7					
			RG_SLINE_INV-3	30-Nov-20	Ephem, Plec, Trich (Rhyac)	8.5					
			RG_SLINE_INV-4	30-Nov-20	Plec, Ephem, Trich (Para)	6.1					
			RG_SLINE_INV-5	30-Nov-20	Ephem, Plec, Trich (Para)	6.9					
	Mine-exposed	RG_LCUT	RG_LCUT_INV-1	26-Feb-20	Plec, Dipt (Culic)	7.1	7.3	6.5	8.5	7.4	0.7
			RG_LCUT_INV-2	26-Feb-20	Plec, Dipt (Culic)	8.5					
			RG_LCUT_INV-3	26-Feb-20	Plec, Dipt (Culic)	8.3					
			RG_LCUT_INV-4	26-Feb-20	Plec, Dipt (Culic)	7.8					
			RG_LCUT_INV-5	26-Feb-20	Plec, Dipt (Culic)	6.9					
			RG_LCUT_INV-6	26-Feb-20	Plec, Dipt (Culic)	6.8					
			RG_LCUT_INV-7	26-Feb-20	Plec, Dipt (Culic)	7.5					
			RG_LCUT_INV-8	26-Feb-20	Plec, Dipt (Culic)	6.5					
			RG_LCUT_INV-9	26-Feb-20	Plec, Dipt (Culic)	6.8					
			RG_LCUT_INV-10	26-Feb-20	Plec, Dipt (Culic)	7.8					

Notes: Abbreviation of taxa order was used. If a more specific level of taxonomy was noted for a sample, the family name or genus appears in brackets. Plec = Plecoptera (stonefly). Ephem = Ephemeroptera (mayfly). Trich = Trichoptera (caddisfly). Dipt = Diptera (true flies). Coleop = Coleoptera (beetles). Oligo = Oligochaeta (worms). Chiron = Chironomidae (non-biting midge). Tipul = Tipulidae (cranefly). Culic = Culicidae (mosquito). Rhyac = Rhyacophilidae. Para = Parapsyche.

[a] Benthic tissue samples at RG_LI24 in February 2020 could not be taken due to freezing of the site.

Table C.1: Selenium Concentrations in Benthic Invertebrate Composite-Taxa Samples Collected from Line Creek and Fording River, Line Creek LAEMP, 2020

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_LCUT	RG_LCUT_INV-1	27-Apr-20	Plec, Trich (Rhyac, other)	8.2	8.1	6.0	11	8.2	1.5
			RG_LCUT_INV-2	27-Apr-20	Plec, Trich (Rhyac, Para)	7.2					
			RG_LCUT_INV-3	27-Apr-20	Plec, Trich (Para), Dipt (Chiron)	7.1					
			RG_LCUT_INV-4	27-Apr-20	Plec, Trich (Para), Dipt (Chiron)	7.9					
			RG_LCUT_INV-5	27-Apr-20	Trich (Para, other), Plec	9.4					
			RG_LCUT_INV-6	27-Apr-20	Plec, Trich (Para, other)	9.9					
			RG_LCUT_INV-7	27-Apr-20	Plec, Trich (Para, other)	6.0					
			RG_LCUT_INV-8	27-Apr-20	Trich, Plec, Ephem	11					
			RG_LCUT_INV-9	27-Apr-20	Plec, Trich (Para, other)	8.4					
			RG_LCUT_INV-10	27-Apr-20	Plec, Trich (Para, other)	7.0					
			RG_LCUT_INV-1	13-Jul-20	Dipt (Chiron), Plec, Trich (Rhyac)	4.0	4.1	2.2	5.1	3.9	0.8
			RG_LCUT_INV-2	13-Jul-20	Dipt (Chiron), Trich (Rhyac), Plec	4.4					
			RG_LCUT_INV-3	13-Jul-20	Dipt (Chiron), Trich (Rhyac)	3.6					
			RG_LCUT_INV-4	13-Jul-20	Dipt (Chiron), Trich (Rhyac), Plec	3.3					
			RG_LCUT_INV-5	13-Jul-20	Dipt (Chiron), Plec, Trich (Rhyac)	3.0					
			RG_LCUT_INV-6	13-Jul-20	Dipt (Chiron), Trich (Rhyac), Plec	4.4					
			RG_LCUT_INV-7	13-Jul-20	Trich (Rhyac), Dipt (Chiron), Plec	5.1					
			RG_LCUT_INV-8	13-Jul-20	Dipt (Chiron), Trich (Rhyac), Plec	4.2					
			RG_LCUT_INV-9	13-Jul-20	Dipt (Chiron), Trich (Rhyac), Plec	2.2					
			RG_LCUT_INV-10	13-Jul-20	Dipt (Chiron), Plec, Trich (Rhyac)	4.3					
			RG_LCUT_INV-1	01-Sep-20	Trich (Rhyac), Plec	7.0	7.0	6.3	8.3	7.2	0.9
			RG_LCUT_INV-2	01-Sep-20	Trich (Rhyac), Ephem	8.3					
			RG_LCUT_INV-3	01-Sep-20	Trich (Rhyac)	6.6					
			RG_LCUT_INV-4	01-Sep-20	Trich (Rhyac, other)	8.0					
			RG_LCUT_INV-5	01-Sep-20	Trich, Ephem	6.3					
			RG_LCUT_INV-1	01-Dec-20	Plec, Dipt (Chiron), Trich (Rhyac)	5.4	5.8	5.1	6.9	5.8	0.7
			RG_LCUT_INV-2	01-Dec-20	Dipt (Chiron), Plec, Trich (Para)	5.9					
			RG_LCUT_INV-3	01-Dec-20	Plec, Dipt (Chiron), Trich (Para)	5.1					
			RG_LCUT_INV-4	01-Dec-20	Plec, Dipt (Chiron), Trich (Rhyac)	5.8					
			RG_LCUT_INV-5	01-Dec-20	Plec, Dipt (Chiron), Trich (Para)	6.9					
		RG_LILC3	RG_LILC3_INV-1	24-Feb-20	Plec, Dipt (Chiron)	5.8	9.5	5.8	12	9.2	1.6
			RG_LILC3_INV-2	24-Feb-20	Dipt (Chiron), Plec, Trich (Para), Ephem	8.2					
			RG_LILC3_INV-3	24-Feb-20	Plec, Trich (Para), Ephem	9.0					
			RG_LILC3_INV-4	24-Feb-20	Plec, Trich (Para), Ephem	9.7					
			RG_LILC3_INV-5	24-Feb-20	Trich (Para), Plec, Dipt (Chiron)	9.5					
			RG_LILC3_INV-6	24-Feb-20	Trich (Para), Plec, Dipt (Chiron)	8.9					
			RG_LILC3_INV-7	24-Feb-20	Plec, Trich (Para), Dipt (Chiron)	10					
			RG_LILC3_INV-8	24-Feb-20	Trich (Para), Plec, Dipt (Chiron)	9.4					
			RG_LILC3_INV-9	24-Feb-20	Plec, Trich (Para), Dipt (Chiron)	9.8					
			RG_LILC3_INV-10	24-Feb-20	Trich (Para), Plec, Dipt (Chiron)	12					
			RG_LILC3_INV-1	27-Apr-20	Trich (Para, Rhyac), Plec	11	14	11	17	14	1.9
			RG_LILC3_INV-2	27-Apr-20	Trich (Para), Plec, Ephem	14					
			RG_LILC3_INV-3	27-Apr-20	Plec, Trich (Para), Ephem	12					
			RG_LILC3_INV-4	27-Apr-20	Trich (Para), Plec, Ephem	15					
			RG_LILC3_INV-5	27-Apr-20	Trich (Para), Plec, Ephem	15					
			RG_LILC3_INV-6	27-Apr-20	Trich (Para), Plec, Ephem	17					
			RG_LILC3_INV-7	27-Apr-20	Trich (Para, other), Plec	11					
			RG_LILC3_INV-8	27-Apr-20	Trich (Para, Rhyac), Plec	15					
			RG_LILC3_INV-9	27-Apr-20	Trich (Para), Ephem, Plec	14					
			RG_LILC3_INV-10	27-Apr-20	Trich (Para, Rhyac), Plec	14					
			RG_LILC3_INV-1	15-Jul-20	Trich (Para, Rhyac), Dipt (Chiron)	6.7	7.2	6.0	10	7.4	1.3
			RG_LILC3_INV-2	15-Jul-20	Trich (Para, Rhyac)	7.1					
			RG_LILC3_INV-3	15-Jul-20	Trich (Para, Rhyac), Ephem	7.2					
			RG_LILC3_INV-4	15-Jul-20	Trich (Rhyac, Para), Plec	6.2					
			RG_LILC3_INV-5	15-Jul-20	Trich (Rhyac, Para), Plec	7.9					
			RG_LILC3_INV-6	15-Jul-20	Trich (Rhyac Para), Plec	7.7					
			RG_LILC3_INV-7	15-Jul-20	Trich (Para, Rhyac), Plec	9.6					
			RG_LILC3_INV-8	15-Jul-20	Dipt (Chiron), Trich (Para, Rhyac)	6.0					
			RG_LILC3_INV-9	15-Jul-20	Trich (Para, Rhyac), Plec	6.2					
			RG_LILC3_INV-10	15-Jul-20	Trich (Para, Rhyac), Plec	9.3					
			RG_LILC3_INV-1	27-Aug-20	Trich, Plec	6.9	12	6.9	13	11	2.5
			RG_LILC3_INV-2	27-Aug-20	Trich, Plec	12					
			RG_LILC3_INV-3	27-Aug-20	Trich, Plec	13					
			RG_LILC3_INV-4	27-Aug-20	Trich, Plec	12					
			RG_LILC3_INV-5	27-Aug-20	Trich, Plec	9.3					
			RG_LILC3_INV-1	01-Dec-20	Trich (Para), Plec, Dipt (Chiron)	6.3	8.7	6.3	12	8.5	2.2
			RG_LILC3_INV-2	01-Dec-20	Dipt (Chiron), Trich (Para), Plec	6.8					
			RG_LILC3_INV-3	01-Dec-20	Dipt (Chiron), Trich (Para, Rhyac)	8.7					
			RG_LILC3_INV-4	01-Dec-20	Trich (Para), Dipt (Chiron), Plec	8.9					
			RG_LILC3_INV-5	01-Dec-20	Trich (Para), Dipt (Chiron), Plec	12					
		RG_LISP24	RG_LISP24_INV-1	24-Feb-20	Plec, Ephem, Dipt (Chiron)	6.7	6.6	4.8	7.5	6.5	0.7
			RG_LISP24_INV-2	24-Feb-20	Plec, Trich (Para), Ephem, Dipt (Tipul)	6.2					
			RG_LISP24_INV-3	24-Feb-20	Plec, Ephem, Coleop	6.2					
			RG_LISP24_INV-4	24-Feb-20	Plec, Ephem, Trich (Para)	4.8					
			RG_LISP24_INV-5	24-Feb-20	Plec, Trich (Para, Rhyac, other)	6.3					
			RG_LISP24_INV-6	24-Feb-20	Trich (Para, Rhyac), Plec	6.4					
			RG_LISP24_INV-7	24-Feb-20	Plec, Trich (Para), Ephem	6.8					
			RG_LISP24_INV-8	24-Feb-20	Plec, Trich (Para), Dipt (Chiron)	7.3					
			RG_LISP24_INV-9	24-Feb-20	Plec, Trich (Para)	6.7					
			RG_LISP24_INV-10	24-Feb-20	Trich (Para), Plec, Ephem	7.5					

Notes: Abbreviation of taxa order was used. If a more specific level of taxonomy was noted for a sample, the family name or genus appears in brackets. Plec = Plecoptera (stonefly). Ephem = Ephemeroptera (mayfly). Trich = Trichoptera (caddisfly). Dipt = Diptera (true flies). Coleop = Coleoptera (beetles). Oligo = Oligochaeta (worms). Chiron = Chironomidae (non-biting midge). Tipul = Tipulidae (cranefly). Culic = Culicidae (mosquito). Rhyac = Rhyacophilidae. Para = Parapsyche.

[a] Benthic tissue samples at RG_LI24 in February 2020 could not be taken due to freezing of the site.

Table C.1: Selenium Concentrations in Benthic Invertebrate Composite-Taxa Samples Collected from Line Creek and Fording River, Line Creek LAEMP, 2020

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_LISP24	RG_LISP24_INV-1	29-Apr-20	Plec, Trich (Para), Ephem	6.6	6.7	5.0	8.9	6.8	1.2
			RG_LISP24_INV-2	29-Apr-20	Trich (Para, Rhyac), Plec	6.1					
			RG_LISP24_INV-3	29-Apr-20	Trich (Para), Ephem, Plec	5.3					
			RG_LISP24_INV-4	29-Apr-20	Trich (Para), Plec, Ephem	5.0					
			RG_LISP24_INV-5	29-Apr-20	Trich (Rhyac, Para), Plec	8.1					
			RG_LISP24_INV-6	29-Apr-20	Trich (Para, Rhyac), Plec	7.6					
			RG_LISP24_INV-7	29-Apr-20	Trich (Para), Ephem, Plec	6.7					
			RG_LISP24_INV-8	29-Apr-20	Trich (Para, Rhyac), Plec	6.0					
			RG_LISP24_INV-9	29-Apr-20	Trich (Para, Rhyac), Plec	7.2					
			RG_LISP24_INV-10	29-Apr-20	Trich (Para, Rhyac), Dipt (Tipul)	8.9					
			RG_LISP24_INV-1	15-Jul-20	Ephem, Trich (Para), Dipt (Chiron)	6.6	5.9	3.3	7.6	5.7	1.3
			RG_LISP24_INV-2	15-Jul-20	Dipt (Chiron), Ephem, Trich (Rhyac)	6.5					
			RG_LISP24_INV-3	15-Jul-20	Ephem, Trich (Para), Plec	7.6					
			RG_LISP24_INV-4	15-Jul-20	Trich (Para), Ephem, Plec	5.4					
			RG_LISP24_INV-5	15-Jul-20	Ephem, Plec, Dipt (Chiron)	6.0					
			RG_LISP24_INV-6	15-Jul-20	Ephem, Dipt (Chiron), Trich (Para)	7.1					
			RG_LISP24_INV-7	15-Jul-20	Ephem, Plec, Dipt (Chiron)	5.8					
			RG_LISP24_INV-8	15-Jul-20	Trich (Para), Plec, Ephem	3.3					
			RG_LISP24_INV-9	15-Jul-20	Ephem, Dipt (Chiron), Trich (Para)	4.4					
			RG_LISP24_INV-10	15-Jul-20	Ephem, Dipt (Chiron), Plec	4.5					
			RG_LISP24_INV-1	01-Sep-20	Trich (Rhyac), Ephem	6.7	9.1	6.7	12	9.2	2.0
			RG_LISP24_INV-2	01-Sep-20	Trich (Rhyac), Ephem	8.1					
			RG_LISP24_INV-3	01-Sep-20	Trich (Rhyac), Ephem	12					
			RG_LISP24_INV-4	01-Sep-20	Trich (Rhyac), Plec	10					
			RG_LISP24_INV-5	01-Sep-20	Trich (Rhyac)	9.1					
			RG_LISP24_INV-1	02-Dec-20	Plec, Ephem, Trich (Para)	7.5	7.2	7.0	11	7.9	1.7
			RG_LISP24_INV-2	02-Dec-20	Plec, Ephem, Trich (Para)	7.2					
			RG_LISP24_INV-3	02-Dec-20	Trich (Rhyac), Ephem, Plec	11					
			RG_LISP24_INV-4	02-Dec-20	Plec, Trich (Para), Ephem	7.0					
			RG_LISP24_INV-5	02-Dec-20	Plec, Ephem, Trich (Rhyac)	7.0					
		RG_LIDSL	RG_LIDSL_INV-1	25-Feb-20	Plec, Trich (Para), Dipt (Chiron)	5.2	5.3	4.0	6.8	5.5	0.9
			RG_LIDSL_INV-2	25-Feb-20	Trich (Para, Rhyac), Plec	6.3					
			RG_LIDSL_INV-3	25-Feb-20	Plec, Trich (Para), Dipt (Chiron)	5.1					
			RG_LIDSL_INV-4	25-Feb-20	Plec, Trich (Para, other)	6.4					
			RG_LIDSL_INV-5	25-Feb-20	Plec, Trich (Rhyac, Para)	5.4					
			RG_LIDSL_INV-6	25-Feb-20	Trich (Para), Plec	6.0					
			RG_LIDSL_INV-7	25-Feb-20	Trich (Rhyac), Plec	6.8					
			RG_LIDSL_INV-8	25-Feb-20	Plec, Trich (Para, Rhyac)	4.7					
			RG_LIDSL_INV-9	25-Feb-20	Trich (Rhyac), Plec	4.0					
			RG_LIDSL_INV-10	25-Feb-20	Plec, Dipt (Chiron), Ephem	4.6					
			RG_LIDSL_INV-1	29-Apr-20	Trich (Para, Rhyac), Plec	6.5	5.8	4.7	7.3	5.9	0.8
			RG_LIDSL_INV-2	29-Apr-20	Plec, Trich (Para, Rhyac)	7.3					
			RG_LIDSL_INV-3	29-Apr-20	Trich (Para, Rhyac), Ephem	4.7					
			RG_LIDSL_INV-4	29-Apr-20	Plec, Trich (Para), Ephem	5.4					
			RG_LIDSL_INV-5	29-Apr-20	Plec, Ephem, Trich (Para)	5.5					
			RG_LIDSL_INV-6	29-Apr-20	Plec, Ephem, Trich (Rhyac)	5.5					
			RG_LIDSL_INV-7	29-Apr-20	Plec, Trich (Para), Ephem	6.1					
			RG_LIDSL_INV-8	29-Apr-20	Plec, Ephem, Trich (Para)	5.4					
			RG_LIDSL_INV-9	29-Apr-20	Plec, Trich (Para, Rhyac)	6.4					
			RG_LIDSL_INV-10	29-Apr-20	Plec, Trich (Para), Ephem	6.4					
			RG_LIDSL_INV-1	13-Jul-20	Plec, Dipt (Chiron), Ephem	5.9	5.9	4.8	6.9	5.8	0.6
			RG_LIDSL_INV-2	13-Jul-20	Plec, Ephem, Trich (Para)	4.8					
			RG_LIDSL_INV-3	13-Jul-20	Ephem, Plec, Dipt (Chiron)	6.9					
			RG_LIDSL_INV-4	13-Jul-20	Plec, Trich (Para), Ephem	5.6					
			RG_LIDSL_INV-5	13-Jul-20	Plec, Ephem, Trich (Para)	5.9					
			RG_LIDSL_INV-6	13-Jul-20	Ephem, Plec, Dipt (Chiron)	5.8					
			RG_LIDSL_INV-7	13-Jul-20	Trich (Para), Ephem, Dipt (Chiron)	6.1					
			RG_LIDSL_INV-8	13-Jul-20	Ephem, Plec, Dipt (Chiron)	5.1					
			RG_LIDSL_INV-9	13-Jul-20	Ephem, Trich (Para), Plec	5.5					
			RG_LIDSL_INV-10	13-Jul-20	Ephem, Plec, Trich (Para)	6.0					
			RG_LIDSL_INV-1	25-Aug-20	Trich, Ephem	7.3	11	7.3	11	9.9	1.6
			RG_LIDSL_INV-2	25-Aug-20	Trich, Ephem	11					
			RG_LIDSL_INV-3	25-Aug-20	Trich, Ephem	11					
			RG_LIDSL_INV-4	25-Aug-20	Trich, Ephem	11					
			RG_LIDSL_INV-5	25-Aug-20	Trich, Ephem	9.3					
			RG_LIDSL_INV-1	01-Dec-20	Plec, Trich (Rhyac, Para)	6.8	5.7	3.7	6.8	5.5	1.1
			RG_LIDSL_INV-2	01-Dec-20	Plec, Trich (Para, Rhyac)	3.7					
			RG_LIDSL_INV-3	01-Dec-20	Plec, Trich (Para, Rhyac)	5.4					
			RG_LIDSL_INV-4	01-Dec-20	Trich (Para, Rhyac), Ephem	5.8					
			RG_LIDSL_INV-5	01-Dec-20	Trich (Para), Plec, Ephem	5.7					
		RG_LIDCOM	RG_LIDCOM_INV-1	24-Feb-20	Trich (Para), Plec, Coleop, Ephem	5.9	5.8	4.3	7.1	5.7	0.8
			RG_LIDCOM_INV-2	24-Feb-20	Plec, Ephem, Trich (Para, Rhyac), Coleop	5.7					
			RG_LIDCOM_INV-3	24-Feb-20	Trich (Para, Rhyac), Plec, Ephem	7.1					
			RG_LIDCOM_INV-4	24-Feb-20	Plec, Trich, Ephem	6.3					
			RG_LIDCOM_INV-5	24-Feb-20	Plec, Trich (Para, Rhyac), Dipt (Chiron)	5.0					
			RG_LIDCOM_INV-6	24-Feb-20	Plec, Trich, Ephem	6.2					
			RG_LIDCOM_INV-7	24-Feb-20	Plec, Trich, Ephem	5.9					
			RG_LIDCOM_INV-8	24-Feb-20	Plec, Trich, Ephem	4.3					
			RG_LIDCOM_INV-9	24-Feb-20	Plec, Trich, Ephem, Oligo	4.8					
			RG_LIDCOM_INV-10	24-Feb-20	Plec, Trich, Ephem, Oligo	5.4					

Notes: Abbreviation of taxa order was used. If a more specific level of taxonomy was noted for a sample, the family name or genus appears in brackets. Plec = Plecoptera (stonefly). Ephem = Ephemeroptera (mayfly). Trich = Trichoptera (caddisfly). Dipt = Diptera (true flies). Coleop = Coleoptera (beetles). Oligo = Oligochaeta (worms). Chiron = Chironomidae (non-biting midge). Tipul = Tipulidae (cranefly). Culic = Culicidae (mosquito). Rhyac = Rhyacophilidae. Para = Parapsyche.

[a] Benthic tissue samples at RG_LI24 in February 2020 could not be taken due to freezing of the site.

Table C.1: Selenium Concentrations in Benthic Invertebrate Composite-Taxa Samples Collected from Line Creek and Fording River, Line Creek LAEMP, 2020

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_LIDCOM	RG_LIDCOM_INV-1	30-Apr-20	Ephem, Trich (Para), Plec	5.8	6.1	4.9	8.7	6.6	1.4
			RG_LIDCOM_INV-2	30-Apr-20	Trich (Para), Plec, Ephem	4.9					
			RG_LIDCOM_INV-3	30-Apr-20	Ephem, Trich (Para, Rhyac)	7.6					
			RG_LIDCOM_INV-4	30-Apr-20	Ephem, Trich (Para), Plec	5.5					
			RG_LIDCOM_INV-5	30-Apr-20	Trich (Para), Ephem, Plec	7.8					
			RG_LIDCOM_INV-6	30-Apr-20	Trich (Para), Ephem, Plec	5.9					
			RG_LIDCOM_INV-7	30-Apr-20	Plec, Trich (Para), Ephem	5.1					
			RG_LIDCOM_INV-8	30-Apr-20	Trich (Para), Ephem, Plec	6.3					
			RG_LIDCOM_INV-9	30-Apr-20	Trich (Para), Plec, Ephem	8.7					
			RG_LIDCOM_INV-	30-Apr-20	Trich (Para), Ephem, Plec	8.4					
			RG_LIDCOM_INV-1	14-Jul-20	Ephem, Trich, Dipt (Chiron)	5.7	5.2	4.0	6.9	5.2	0.8
			RG_LIDCOM_INV-2	14-Jul-20	Trich (Para, other), Ephem	5.2					
			RG_LIDCOM_INV-3	14-Jul-20	Ephem, Trich (Para), Trich	5.2					
			RG_LIDCOM_INV-4	14-Jul-20	Trich, Ephem, Dipt (Chiron)	6.9					
			RG_LIDCOM_INV-5	14-Jul-20	Ephem, Trich, Dipt (Chiron)	4.0					
			RG_LIDCOM_INV-6	14-Jul-20	Plec, Trich (Rhyac, other)	5.9					
			RG_LIDCOM_INV-7	14-Jul-20	Ephem, Trich (Para, Rhyac)	4.8					
			RG_LIDCOM_INV-8	14-Jul-20	Trich (Para, other), Ephem	4.3					
			RG_LIDCOM_INV-9	14-Jul-20	Ephem, Dipt (Chiron), Trich	5.2					
			RG_LIDCOM_INV-	14-Jul-20	Plec, Ephem, Trich	4.9					
			RG_LIDCOM_INV-1	30-Aug-20	Trich	7.7	6.4	5.3	7.7	6.4	0.9
			RG_LIDCOM_INV-2	30-Aug-20	Trich	5.3					
			RG_LIDCOM_INV-3	30-Aug-20	Trich	5.7					
			RG_LIDCOM_INV-4	30-Aug-20	Trich	6.7					
			RG_LIDCOM_INV-5	30-Aug-20	Trich	6.4					
			RG_LIDCOM_INV-1	01-Dec-20	Plec, Ephem, Trich (Rhyac)	5.6	5.6	4.5	6.0	5.5	0.6
			RG_LIDCOM_INV-2	01-Dec-20	Plec, Trich (Para, Rhyac)	4.5					
			RG_LIDCOM_INV-3	01-Dec-20	Plec, Trich (Rhyac, Para)	6.0					
			RG_LIDCOM_INV-4	01-Dec-20	Plec, Ephem, Trich (Rhyac)	5.8					
			RG_LIDCOM_INV-5	01-Dec-20	Plec, Trich (Para), Ephem	5.4					
		RG_LI8	RG_LI8_INV-1	25-Feb-20	Plec, Coleop, Trich (Rhyac)	5.5	5.0	4.5	5.8	5.1	0.5
			RG_LI8_INV-2	25-Feb-20	Plec, Trich (Rhyac)	5.5					
			RG_LI8_INV-3	25-Feb-20	Plec, Ephem, Trich (Rhyac, Para)	5.4					
			RG_LI8_INV-4	25-Feb-20	Plec, Trich (Rhyac), Ephem	4.6					
			RG_LI8_INV-5	25-Feb-20	Plec, Trich (Rhyac)	4.7					
			RG_LI8_INV-6	25-Feb-20	Plec, Dipt (Chiron), Ephem, Trich (Rhyac)	5.2					
			RG_LI8_INV-7	25-Feb-20	Plec, Dipt (Chiron), Trich (Para, Rhyac), Ephem	4.5					
			RG_LI8_INV-8	25-Feb-20	Plec, Ephem, Trich (Rhyac)	4.8					
			RG_LI8_INV-9	25-Feb-20	Plec, Trich (Rhyac), Dipt (Chiron)	5.8					
			RG_LI8_INV-10	25-Feb-20	Plec, Trich (Rhyac), Dipt (Chiron)	4.5					
			RG_LI8_INV-1	30-Apr-20	Plec, Trich (Para), Ephem	5.8	6.9	4.8	8.5	6.7	1.4
			RG_LI8_INV-2	30-Apr-20	Plec, Trich (Rhyac, Para)	4.8					
			RG_LI8_INV-3	30-Apr-20	Plec, Trich (Rhyac), Ephem	7.3					
			RG_LI8_INV-4	30-Apr-20	Plec, Ephem, Trich (Rhyac)	4.9					
			RG_LI8_INV-5	30-Apr-20	Plec, Ephem, Trich (Para)	8.5					
			RG_LI8_INV-6	30-Apr-20	Trich (Rhyac), Plec, Ephem	8.3					
			RG_LI8_INV-7	30-Apr-20	Trich (Rhyac), Ephem, Plec	8.0					
			RG_LI8_INV-8	30-Apr-20	Plec, Trich (Rhyac, Para)	6.8					
			RG_LI8_INV-9	30-Apr-20	Trich (Rhyac), Plec, Ephem	7.0					
			RG_LI8_INV-10	30-Apr-20	Trich (Rhyac, Para), Plec	5.7					
			RG_LI8_INV-1	15-Jul-20	Plec, Ephem, Trich (Rhyac)	5.3	5.4	4.2	6.0	5.3	0.6
			RG_LI8_INV-2	15-Jul-20	Ephem, Plec, Trich	5.8					
			RG_LI8_INV-3	15-Jul-20	Plec, Ephem, Trich (Rhyac)	4.2					
			RG_LI8_INV-4	15-Jul-20	Ephem, Plec, Trich (Rhyac)	5.1					
			RG_LI8_INV-5	15-Jul-20	Plec, Ephem, Trich	5.5					
			RG_LI8_INV-6	15-Jul-20	Ephem, Trich (Para, other)	5.8					
			RG_LI8_INV-7	15-Jul-20	Ephem, Plec, Trich (Rhyac)	5.3					
			RG_LI8_INV-8	15-Jul-20	Ephem, Plec, Trich (Rhyac)	6.0					
			RG_LI8_INV-9	15-Jul-20	Ephem, Plec, Trich (Rhyac)	5.4					
			RG_LI8_INV-10	15-Jul-20	Ephem, Plec, Trich (Para)	4.5					
			RG_LI8_INV-1	29-Aug-20	Trich, Plec	9.4	9.7	8.9	13	10	1.6
			RG_LI8_INV-2	29-Aug-20	Trich, Plec	9.7					
			RG_LI8_INV-3	29-Aug-20	Trich, Plec	11					
			RG_LI8_INV-4	29-Aug-20	Trich	8.9					
			RG_LI8_INV-5	29-Aug-20	Trich	13					
			RG_LI8_INV-1	02-Dec-20	Trich (Rhyac), Ephem, Plec	8.3	7.5	6.4	8	7.5	0.8
			RG_LI8_INV-2	02-Dec-20	Plec, Ephem, Trich (Rhyac)	8.2					
			RG_LI8_INV-3	02-Dec-20	Plec, Trich (Rhyac, Para)	6.4					
			RG_LI8_INV-4	02-Dec-20	Ephem, Plec, Trich (Para)	7.5					
			RG_LI8_INV-5	02-Dec-20	Trich (Rhyac, Para), Plec	7.0					
Fording River	Mine-exposed	RG_FRUL	RG_FRUL_INV-1	25-Feb-20	Plec, Ephem	9.3	8.2	6.0	9.6	7.8	1.3
			RG_FRUL_INV-2	25-Feb-20	Plec, Ephem	6.0					
			RG_FRUL_INV-3	25-Feb-20	Ephem, Plec, Dipt	7.0					
			RG_FRUL_INV-4	25-Feb-20	Plec, Ephem	8.2					
			RG_FRUL_INV-5	25-Feb-20	Plec, Ephem	6.8					
			RG_FRUL_INV-6	25-Feb-20	Plec, Ephem	9.6					
			RG_FRUL_INV-7	25-Feb-20	Plec, Ephem	6.0					
			RG_FRUL_INV-8	25-Feb-20	Plec, Ephem	8.2					
			RG_FRUL_INV-9	25-Feb-20	Plec, Ephem	8.3					
			RG_FRUL_INV-10	25-Feb-20	Plec, Ephem, Trich (Rhyac)	8.3					

Notes: Abbreviation of taxa order was used. If a more specific level of taxonomy was noted for a sample, the family name or genus appears in brackets. Plec = Plecoptera (stonefly). Ephem = Ephemeroptera (mayfly). Trich = Trichoptera (caddisfly). Dipt = Diptera (true flies). Coleop = Coleoptera (beetles). Oligo = Oligochaeta (worms). Chiron = Chironomidae (non-biting midge). Tipul = Tipulidae (cranefly). Culic = Culicidae (mosquito). Rhyac = Rhyacophilidae. Para = Parapsyche.

[a] Benthic tissue samples at RG_LI24 in February 2020 could not be taken due to freezing of the site.

Table C.1: Selenium Concentrations in Benthic Invertebrate Composite-Taxa Samples Collected from Line Creek and Fording River, Line Creek LAEMP, 2020

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
Fording River	Mine-exposed	RG_FRUL	RG_FRUL_INV-1	29-Apr-20	Plec, Ephem, Dipt (Tipul)	7.3	6.6	5.4	10	6.9	1.4
			RG_FRUL_INV-2	29-Apr-20	Plec, Ephem, Trich	6.5					
			RG_FRUL_INV-3	29-Apr-20	Plec, Ephem	7.6					
			RG_FRUL_INV-4	29-Apr-20	Plec, Ephem	5.4					
			RG_FRUL_INV-5	29-Apr-20	Plec, Ephem, Dipt (Tipul)	7.9					
			RG_FRUL_INV-6	29-Apr-20	Plec, Ephem, Dipt (Chiron)	5.8					
			RG_FRUL_INV-7	29-Apr-20	Plec, Ephem, Trich	6.4					
			RG_FRUL_INV-8	29-Apr-20	Plec, Ephem, Dipt (Tipul)	10					
			RG_FRUL_INV-9	29-Apr-20	Plec, Ephem	5.7					
			RG_FRUL_INV-10	29-Apr-20	Plec, Ephem, Trich (Rhyac)	6.7					
			RG_FRUL_INV-1	16-Jul-20	Ephem, Plec, Trich (Rhyac)	13	11	9.1	13	11	1.6
			RG_FRUL_INV-2	16-Jul-20	Plec, Ephem, Trich (Rhyac)	12					
			RG_FRUL_INV-3	16-Jul-20	Ephem, Plec	9.1					
			RG_FRUL_INV-4	16-Jul-20	Plec, Dipt (Tipul), Ephem	9.5					
			RG_FRUL_INV-5	16-Jul-20	Plec, Ephem	9.4					
			RG_FRUL_INV-6	16-Jul-20	Plec, Ephem	9.1					
			RG_FRUL_INV-7	16-Jul-20	Plec, Ephem, Dipt (Tipul)	10					
			RG_FRUL_INV-8	16-Jul-20	Plec, Dipt (Tipul), Ephem	12					
			RG_FRUL_INV-9	16-Jul-20	Plec, Ephem, Trich (Rhyac)	11					
			RG_FRUL_INV-10	16-Jul-20	Plec, Ephem, Dipt (Tipul)	13					
			RG_FRUL_INV-1	29-Aug-20	Plec, Dipt (Tipul)	10	11	7.9	13	11	2.0
			RG_FRUL_INV-2	29-Aug-20	Plec, Ephem	13					
			RG_FRUL_INV-3	29-Aug-20	Plec, Ephem, Trich	7.9					
			RG_FRUL_INV-4	29-Aug-20	Plec, Dipt (Tipul)	11					
			RG_FRUL_INV-5	29-Aug-20	Plec, Ephem	12					
			RG_FRUL_INV-1	30-Nov-20	Plec, Ephem, Dipt (Tipul)	7.7	8.2	7.7	13	10	2.4
			RG_FRUL_INV-2	30-Nov-20	Plec, Ephem, Dipt (Tipul)	8.2					
			RG_FRUL_INV-3	30-Nov-20	Plec, Ephem, Dipt (Tipul)	7.8					
			RG_FRUL_INV-4	30-Nov-20	Plec, Ephem	13					
			RG_FRUL_INV-5	30-Nov-20	Plec, Ephem, Dipt (Tipul)	11					
		RG-FO23	RG_FO23_INV-1	25-Feb-20	Plec, Ephem	5.7	5.3	2.8	6.5	5.1	1.1
			RG_FO23_INV-2	25-Feb-20	Plec, Ephem	5.3					
			RG_FO23_INV-3	25-Feb-20	Plec, Ephem, Coleop	6.3					
			RG_FO23_INV-4	25-Feb-20	Plec, Ephem	2.8					
			RG_FO23_INV-5	25-Feb-20	Plec, Ephem	4.1					
			RG_FO23_INV-6	25-Feb-20	Plec, Ephem	5.2					
			RG_FO23_INV-7	25-Feb-20	Plec, Ephem	4.6					
			RG_FO23_INV-8	25-Feb-20	Plec, Ephem	6.0					
			RG_FO23_INV-9	25-Feb-20	Plec, Ephem	4.5					
			RG_FO23_INV-10	25-Feb-20	Plec, Ephem	6.5					
			RG_FO23_INV-1	27-Apr-20	Plec, Trich (Rhyac), Dipt (Tipul)	7.2	8.1	6.0	11	8.0	1.6
			RG_FO23_INV-2	27-Apr-20	Plec, Ephem, Dipt (Tipul)	8.9					
			RG_FO23_INV-3	27-Apr-20	Plec, Ephem, Trich (Para)	6.8					
			RG_FO23_INV-4	27-Apr-20	Plec, Ephem, Dipt (Tipul)	7.8					
			RG_FO23_INV-5	27-Apr-20	Plec, Ephem, Dipt (Chiron)	6.2					
			RG_FO23_INV-6	27-Apr-20	Plec, Dipt (Chiron), Ephem	8.4					
			RG_FO23_INV-7	27-Apr-20	Plec, Ephem, Dipt (Tipul)	9.6					
			RG_FO23_INV-8	27-Apr-20	Plec, Ephem, Dipt (Tipul)	11					
			RG_FO23_INV-9	27-Apr-20	Plec, Ephem, Dipt (Tipul)	6.0					
			RG_FO23_INV-10	27-Apr-20	Plec, Trich (Rhyac), Dipt (Chiron)	8.4					
			RG_FO23_INV-1	16-Jul-20	Plec, Dipt (Tipul)	9.7	8.7	4.3	10	7.8	1.9
			RG_FO23_INV-2	16-Jul-20	Plec, Dipt (Tipul), Ephem	8.6					
			RG_FO23_INV-3	16-Jul-20	Ephem, Plec, Trich (Rhyac)	8.9					
			RG_FO23_INV-4	16-Jul-20	Plec, Ephem, Dipt (Tipul)	5.9					
			RG_FO23_INV-5	16-Jul-20	Plec, Dipt (Tipul), Ephem	8.8					
			RG_FO23_INV-6	16-Jul-20	Plec, Ephem, Trich (Rhyac)	9.8					
			RG_FO23_INV-7	16-Jul-20	Plec, Ephem, Dipt (Tipul)	6.8					
			RG_FO23_INV-8	16-Jul-20	Plec, Dipt (Tipul)	6					
			RG_FO23_INV-9	16-Jul-20	Ephem, Plec, Dipt (Tipul)	4.3					
			RG_FO23_INV-10	16-Jul-20	Plec, Ephem, Dipt (Tipul)	9.3					
			RG_FO23_INV-1	28-Aug-20	Dipt (Tipul), Plec	6.9	6.9	5.5	10	7.5	1.7
			RG_FO23_INV-2	28-Aug-20	Plec, Ephem	10					
			RG_FO23_INV-3	28-Aug-20	Plec, Ephem	6.8					
			RG_FO23_INV-4	28-Aug-20	Dipt (Tipul), Plec	8.3					
			RG_FO23_INV-5	28-Aug-20	Plec, Ephem	5.5					
			RG_FO23_INV-1	02-Dec-20	Ephem, Plec, Trich (Rhyac)	6.8	6.8	6.5	8.1	7.2	0.8
			RG_FO23_INV-2	02-Dec-20	Trich (Rhyac), Ephem, Plec	8.1					
			RG_FO23_INV-3	02-Dec-20	Plec, Ephem, Dipt (Chiron)	6.5					
			RG_FO23_INV-4	02-Dec-20	Plec, Ephem, Dipt (Tipul)	6.7					
			RG_FO23_INV-5	02-Dec-20	Plec, Ephem, Trich (Rhyac)	8.0					

Notes: Abbreviation of taxa order was used. If a more specific level of taxonomy was noted for a sample, the family name or genus appears in brackets. Plec = Plecoptera (stonefly). Ephem = Ephemeroptera (mayfly). Trich = Trichoptera (caddisfly). Dipt = Diptera (true flies). Coleop = Coleoptera (beetles). Oligo = Oligochaeta (worms). Chiron = Chironomidae (non-biting midge). Tipul = Tipulidae (cranefly). Culic = Culicidae (mosquito). Rhyac = Rhyacophilidae. Para = Parapsyche.

[a] Benthic tissue samples at RG_LI24 in February 2020 could not be taken due to freezing of the site.

Table C.2: ANOVA Table for the Asymmetric BACI Model Comparing Benthic Invertebrate Selenium During the Before (B), AWTF Operational (AWTF), Initial Operation (IO), Shut Down (SD), Restart (RS) and AWTF with AOP Operational (AOP) Period for the RG_LILC3 Area Relative to the Reference (RG_LI24 and RG_SLINE) Areas

ANOVA Model					
Term	DF	SS[a]	MS[b]	F-Ratio	P-Value
Period	5	1.5	0.31	50	<0.001
CI	1	10	10	1,609	<0.001
Period×CI	5	4.1	0.81	130	<0.001
Time(Period)	16	2.0	0.13	20	<0.001
Time(Period)×CI	16	1.4	0.086	14	<0.001
Error	454	-			

Contrasts (P-value and Magnitude of Difference)[c]				
Period 1	**Period 2**		**P-value**	**MOD**
B	AOP (2020_2)		ns	-
	AOP (2020_4)		ns	-
	AOP (2020_7)		ns	-
	AOP (2020_9)		ns	-
	AOP (2020_12)		ns	-
AWTF (2016_9)	AOP (2020_2)		<0.001	-10 SD
	AOP (2020_4)		<0.001	-8.2 SD
	AOP (2020_7)		<0.001	-10 SD
	AOP (2020_9)		<0.001	-9.5 SD
	AOP (2020_12)		<0.001	-10.7 SD
AWTF (2017_4)	AOP (2020_2)		<0.001	-10 SD
	AOP (2020_4)		<0.001	-8.1 SD
	AOP (2020_7)		<0.001	-10 SD
	AOP (2020_9)		<0.001	-9.4 SD
	AOP (2020_12)		<0.001	-10 SD
AWTF (2017_9)	AOP (2020_2)		<0.001	-7.2 SD
	AOP (2020_4)		<0.001	-4.8 SD
	AOP (2020_7)		<0.001	-7.1 SD
	AOP (2020_9)		<0.001	-6.1 SD
	AOP (2020_12)		<0.001	-7.4 SD

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

Contrast P-value < 0.1/20 and in an increasing direction

Contrast P-value < 0.1/20 and in a decreasing direction

Notes: "-" = not relevant. Selenium results from RG_LI24 collected on May 3rd, 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 C.3: ANOVA Table for the Asymmetric BACI Model Comparing Benthic Invertebrate Selenium During the Before (B), AWTF Operational (AWTF), Initial Operation (IO), Shut Down (SD), Restart (RS) and AWTF with AOP Operational (AOP) Period for the RG_LISP24 Area Relative to the Reference (RG_LI24 and RG_SLINE) Areas

ANOVA Model					
Term	DF	SS[a]	MS[b]	F-Ratio	P-Value
Period	3	0.65	0.22	31	<0.001
CI	1	1.7	1.7	247	<0.001
Period×CI	3	1.1	0.35	50	<0.001
Time(Period)	10	1.5	0.15	22	<0.001
Time(Period)×CI	10	0.6	0.059	8	<0.001
Error	319	-			

Contrasts (P-value and Magnitude of Difference)[c]				
Period 1	**Period 2**		**P-value**	**MOD**
AWTF (2017_9)	AOP (2020_2)		<0.001	-6.5 SD
	AOP (2020_4)		<0.001	-6.2 SD
	AOP (2020_7)		<0.001	-6.0 SD
	AOP (2020_9)		<0.001	-4.5 SD
	AOP (2020_12)		<0.001	-5.2 SD

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. Selenium results from RG_LI24 collected on May 3rd, 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 C.4: ANOVA Table for the Asymmetric BACI Model Comparing Benthic Invertebrate Selenium During the Before (B), AWTF Operational (AWTF), Initial Operation (IO), Shut Down (SD), Restart (RS) and AWTF with AOP Operational (AOP) Period for the RG_LIDSL Area Relative to the Reference (RG_LI24 and RG_SLINE) Areas

ANOVA Model					
Term	DF	SS[a]	MS[b]	F-Ratio	P-Value
Period	5	0.48	0.10	15	<0.001
CI	1	1.1	1.1	174	<0.001
Period×CI	5	1.9	0.39	60	<0.001
Time(Period)	15	1.9	0.13	20	<0.001
Time(Period)×CI	15	0.8	0.053	8	<0.001
Error	445	-			

Contrasts (P-value and Magnitude of Difference)[c]				
Period 1	**Period 2**		**P-value**	**MOD**
B	AOP (2020_2)		0.003	-3.9 SD
	AOP (2020_4)		ns	-
	AOP (2020_7)		ns	-
	AOP (2020_9)		ns	-
	AOP (2020_12)		ns	-
AWTF (2016_9)	AOP (2020_2)		<0.001	-8.9 SD
	AOP (2020_4)		<0.001	-8.3 SD
	AOP (2020_7)		<0.001	-7.3 SD
	AOP (2020_9)		<0.001	-5.4 SD
	AOP (2020_12)		<0.001	-8.6 SD
AWTF (2017_4)	AOP (2020_2)		<0.001	-6.4 SD
	AOP (2020_4)		<0.001	-5.8 SD
	AOP (2020_7)		<0.001	-4.8 SD
	AOP (2020_9)		<0.001	-2.9 SD
	AOP (2020_12)		<0.001	-6.2 SD
AWTF (2017_9)	AOP (2020_2)		<0.001	-6.8 SD
	AOP (2020_4)		<0.001	-6.3 SD
	AOP (2020_7)		<0.001	-5.2 SD
	AOP (2020_9)		<0.001	-3.3 SD
	AOP (2020_12)		<0.001	-6.6 SD

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

Contrast P-value < 0.1/20 and in an increasing direction

Contrast P-value < 0.1/20 and in a decreasing direction

Notes: "-" = not relevant. Selenium results from RG_LI24 collected on May 3rd, 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 C.5: ANOVA Table for the Asymmetric BACI Model Comparing Benthic Invertebrate Selenium During the Before (B), AWTF Operational (AWTF), Initial Operation (IO), Shut Down (SD), Restart (RS) and AWTF with AOP Operational (AOP) Period for the RG_LIDCOM Area Relative to the Reference (RG_LI24 and RG_SLINE) Areas

ANOVA Model					
Term	DF	SS[a]	MS[b]	F-Ratio	P-Value
Period	3	0.35	0.12	17	<0.001
CI	1	1.0	1.0	139	<0.001
Period×CI	3	0.3	0.10	14	<0.001
Time(Period)	10	1.4	0.14	20	<0.001
Time(Period)×CI	10	0.8	0.083	12	<0.001
Error	319	-			

Contrasts (P-value and Magnitude of Difference)[c]				
Period 1	**Period 2**		**P-value**	**MOD**
AWTF (2017_9)	AOP (2020_2)		<0.001	-4.4 SD
	AOP (2020_4)		<0.001	-3.5 SD
	AOP (2020_7)		<0.001	-3.6 SD
	AOP (2020_9)		<0.001	-3.5 SD
	AOP (2020_12)		<0.001	-4.3 SD

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

Contrast P-value < 0.1/5 and in an increasing direction

Contrast P-value < 0.1/5 and in a decreasing direction

Notes: "-" = not relevant. Selenium results from RG_LI24 collected on May 3rd, 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 C.6: ANOVA Table for the Asymmetric BACI Model Comparing Benthic Invertebrate Selenium During the Before (B), AWTF Operational (AWTF), Initial Operation (IO), Shut Down (SD), Restart (RS) and AWTF with AOP Operational (AOP) Period for the RG_LI8 Area Relative to the Reference (RG_LI24 and RG_SLINE) Areas

ANOVA Model					
Term	DF	SS[a]	MS[b]	F-Ratio	P-Value
Period	5	0.65	0.13	22	<0.001
CI	1	1.5	1.5	264	<0.001
Period×CI	5	1.3	0.27	46	<0.001
Time(Period)	18	2.5	0.14	24	<0.001
Time(Period)×CI	18	0.7	0.040	7	<0.001
Error	453	-			

Contrasts (P-value and Magnitude of Difference)[c]				
Period 1	**Period 2**		**P-value**	**MOD**
B	AOP (2020_2)		0.001	-4.3 SD
	AOP (2020_4)		ns	-
	AOP (2020_7)		ns	-
	AOP (2020_9)		ns	-
	AOP (2020_12)		ns	-
AWTF (2016_9)	AOP (2020_2)		<0.001	-8.0 SD
	AOP (2020_4)		<0.001	-6.4 SD
	AOP (2020_7)		<0.001	-6.4 SD
	AOP (2020_9)		ns	-
	AOP (2020_12)		<0.001	-5.5 SD
AWTF (2017_4)	AOP (2020_2)		<0.001	-5.9 SD
	AOP (2020_4)		<0.001	-4.3 SD
	AOP (2020_7)		<0.001	-4.3 SD
	AOP (2020_9)		ns	-
	AOP (2020_12)		<0.001	-3.4 SD
AWTF (2017_9)	AOP (2020_2)		<0.001	-6.6 SD
	AOP (2020_4)		<0.001	-4.9 SD
	AOP (2020_7)		<0.001	-5.0 SD
	AOP (2020_9)		0.001	-2.2 SD
	AOP (2020_12)		<0.001	-4.1 SD

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

Contrast P-value < 0.1/20 and in an increasing direction

Contrast P-value < 0.1/20 and in a decreasing direction

Notes: "-" = not relevant. Selenium results from RG_LI24 collected on May 3rd, 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 C.7: ANOVA Table for the Asymmetric BACI Model Comparing Benthic Invertebrate Selenium During the Before (B), AWTF Operational (AWTF), Initial Operation (IO), Shut Down (SD), Restart (RS) and AWTF with AOP Operational (AOP) Period for the RG_FO23 Area Relative to the Reference (RG_LI24 and RG_SLINE) Areas

ANOVA Model					
Term	DF	SS[a]	MS[b]	F-Ratio	P-Value
Period	4	0.34	0.09	12	<0.001
CI	1	2.5	2.5	334	<0.001
Period×CI	4	0.5	0.12	16	<0.001
Time(Period)	13	1.5	0.12	16	<0.001
Time(Period)×CI	13	1.1	0.082	11	<0.001
Error	347	-			

Contrasts (P-value and Magnitude of Difference)[c]				
Period 1	**Period 2**		**P-value**	**MOD**
B	AOP (2020_2)		ns	-
	AOP (2020_4)		ns	-
	AOP (2020_7)		ns	-
	AOP (2020_9)		ns	-
	AOP (2020_12)		ns	-
AWTF (2016_9)	AOP (2020_2)		0.001	-4.3 SD
	AOP (2020_4)		ns	-
	AOP (2020_7)		ns	-
	AOP (2020_9)		ns	-
	AOP (2020_12)		ns	-
AWTF (2017_4)	AOP (2020_2)		<0.001	-4.1 SD
	AOP (2020_4)		0.004	-1.7 SD
	AOP (2020_7)		ns	-
	AOP (2020_9)		ns	-
	AOP (2020_12)		0.005	-2.0 SD
AWTF (2017_9)	AOP (2020_2)		<0.001	-4.6 SD
	AOP (2020_4)		<0.001	-2.1 SD
	AOP (2020_7)		ns	-
	AOP (2020_9)		0.001	-2.3 SD
	AOP (2020_12)		<0.001	-2.4 SD

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

Contrast P-value < 0.1/20 and in an increasing direction

Contrast P-value < 0.1/20 and in a decreasing direction

Notes: "-" = not relevant. Selenium results from RG_LI24 collected on May 3rd, 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 C.8: ANOVA Table for the Asymmetric BACI Model Comparing Benthic Invertebrate Selenium During the Before (B), AWTF Operational (AWTF), Initial Operation (IO), Shut Down (SD), Restart (RS) and AWTF with AOP Operational (AOP) Period for the RG_LCUT Area Relative to the Reference (RG_LI24 and RG_SLINE) Areas

ANOVA Model					
Term	DF	SS[a]	MS[b]	F-Ratio	P-Value
Period	3	0.47	0.16	20	<0.001
CI	1	0.050	0.050	6.3	0.012
Period×CI	3	0.43	0.14	18	<0.001
Time(Period)	15	2.4	0.16	20	<0.001
Time(Period)×CI	15	1.8	0.12	16	<0.001
Error	426	-			

Contrasts (P-value and Magnitude of Difference)[c]				
Period 1	**Period 2**		**P-value**	**MOD**
AWTF (2016_9)	AOP (2020_2)		ns	-
	AOP (2020_4)		ns	-
	AOP (2020_7)		0.002	-4.1 SD
	AOP (2020_9)		ns	-
	AOP (2020_12)		ns	-
AWTF (2017_4)	AOP (2020_2)		ns	-
	AOP (2020_4)		ns	-
	AOP (2020_7)		<0.001	-3.9 SD
	AOP (2020_9)		ns	-
	AOP (2020_12)		<0.001	-2.7 SD
AWTF (2017_9)	AOP (2020_2)		ns	-
	AOP (2020_4)		ns	-
	AOP (2020_7)		<0.001	-2.7 SD
	AOP (2020_9)		ns	-
	AOP (2020_12)		ns	-

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

Contrast P-value < 0.1/15 and in an increasing direction.

Contrast P-value < 0.1/15 and in a decreasing direction.

Notes: "-" = not relevant. Selenium results from RG_LI24 collected on May 3rd, 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 C.9: ANOVA Table for the Asymmetric BACI Model Comparing Benthic Invertebrate Selenium During the Before (B), AWTF Operational (AWTF), Initial Operation (IO), Shut Down (SD), Restart (RS) and AWTF with AOP Operational (AOP) Period for the RG_FRUL Area Relative to the Reference (RG_LI24 and RG_SLINE) Areas

ANOVA Model					
Term	DF	SS[a]	MS[b]	F-Ratio	P-Value
Period	4	0.39	0.10	14	<0.001
CI	1	3.7	3.7	538	<0.001
Period×CI	4	0.1	0.02	2.8	0.026
Time(Period)	11	1.5	0.13	19	<0.001
Time(Period)×CI	11	1.0	0.090	13	<0.001
Error	334	-			

Contrasts (P-value and Magnitude of Difference)[c]				
Period 1	**Period 2**		**P-value**	**MOD**
B	AOP (2020_2)		ns	-
	AOP (2020_4)		ns	-
	AOP (2020_7)		ns	-
	AOP (2020_9)		ns	-
	AOP (2020_12)		ns	-
AWTF (2017_4)	AOP (2020_2)		0.001	-2.1 SD
	AOP (2020_4)		<0.001	-2.6 SD
	AOP (2020_7)		ns	-
	AOP (2020_9)		ns	-
	AOP (2020_12)		ns	-
AWTF (2017_9)	AOP (2020_2)		0.001	-2.1 SD
	AOP (2020_4)		<0.001	-2.6 SD
	AOP (2020_7)		ns	-
	AOP (2020_9)		ns	-
	AOP (2020_12)		ns	-

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

Contrast P-value < 0.1/15 and in an increasing direction.

Contrast P-value < 0.1/15 and in a decreasing direction.

Notes: "-" = not relevant. Selenium results from RG_LI24 collected on May 3rd, 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 C.10: ANOVA Table for the Asymmetric BACI Model Comparing Benthic Invertebrate Selenium Concentrations at RG_LILC3 Within the 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	0.31	50	<0.001
CI	1	10	10	1,609	<0.001
Period×CI	5	4.1	0.81	130	<0.001
Time(Period)	16	2.0	0.13	20	<0.001
Time(Period)×CI	16	1.4	0.086	14	<0.001
Error	454	-			

Within 2020 AOP Differences (P-value and Magnitude of Difference)[c]				
Period 1	**Period 2**		**P-value**	**MOD**
2020_2	2020_4		<0.001	2.4 SD
	2020_7		ns	-
	2020_9		ns	-
	2020_12		ns	-
2020_4	2020_7		<0.001	-2.3 SD
	2020_9		ns	-
	2020_12		<0.001	-2.6 SD
2020_7	2020_9		ns	-
	2020_12		ns	-
2020_9	2020_12		ns	-

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

Contrast P-value < 0.1/10 and in an increasing direction

Contrast P-value < 0.1/10 and in a decreasing direction

Notes: "-" = not relevant. Selenium results from RG_LI24 collected on May 3rd, 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 C.11: ANOVA Table for the Asymmetric BACI Model Comparing Benthic Invertebrate Selenium Concentrations at RG_LISP24 Within the 2020 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	3	0.65	0.22	31	<0.001
CI	1	1.7	1.7	247	<0.001
Period×CI	3	1.1	0.35	50	<0.001
Time(Period)	10	1.5	0.15	22	<0.001
Time(Period)×CI	10	0.6	0.059	8	<0.001
Error	319	-			

Within 2020 AOP Differences (P-value and Magnitude of Difference)[c]				
Period 1	**Period 2**		**P-value**	**MOD**
2020_2	2020_4		ns	-
	2020_7		ns	-
	2020_9		0.005	2.0 SD
	2020_12		ns	-
2020_4	2020_7		ns	-
	2020_9		0.009	1.8 SD
	2020_12		ns	-
2020_7	2020_9		ns	-
	2020_12		ns	-
2020_9	2020_12		ns	-

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

Contrast P-value < 0.1/10 and in an increasing direction.

Contrast P-value < 0.1/10 and in a decreasing direction.

Notes: "-" = not relevant. Selenium results from RG_LI24 collected on May 3rd, 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 C.12: ANOVA Table for the Asymmetric BACI Model Comparing Benthic Invertebrate Selenium Concentrations at RG_LIDSL Within the 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	0.48	0.10	15	<0.001
CI	1	1.1	1.1	174	<0.001
Period×CI	5	1.9	0.39	60	<0.001
Time(Period)	15	1.9	0.13	20	<0.001
Time(Period)×CI	15	0.8	0.053	8	<0.001
Error	445	-			

Within 2020 AOP Differences (P-value and Magnitude of Difference)[c]				
Period 1	**Period 2**		**P-value**	**MOD**
2020_2	2020_4		ns	-
	2020_7		0.006	1.6 SD
	2020_9		<0.001	3.6 SD
	2020_12		ns	-
2020_4	2020_7		ns	-
	2020_9		<0.001	3.0 SD
	2020_12		ns	-
2020_7	2020_9		0.004	1.9 SD
	2020_12		ns	-
2020_9	2020_12		<0.001	-3.3 SD

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

Contrast P-value < 0.1/10 and in an increasing direction

Contrast P-value < 0.1/10 and in a decreasing direction

Notes: "-" = not relevant. Selenium results from RG_LI24 collected on May 3rd, 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 C.13: ANOVA Table for the Asymmetric BACI Model Comparing Benthic Invertebrate Selenium Concentrations at RG_LIDCOM Within the 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	3	0.35	0.12	17	<0.001
CI	1	1.0	1.0	139	<0.001
Period×CI	3	0.3	0.10	14	<0.001
Time(Period)	10	1.4	0.14	20	<0.001
Time(Period)×CI	10	0.8	0.083	12	<0.001
Error	319	-			

Within 2020 AOP Differences (P-value and Magnitude of Difference)[c]				
Period 1	**Period 2**		**P-value**	**MOD**
2020_2	2020_4		ns	-
	2020_7		ns	-
	2020_9		ns	-
	2020_12		ns	-
2020_4	2020_7		ns	-
	2020_9		ns	-
	2020_12		ns	-
2020_7	2020_9		ns	-
	2020_12		ns	-
2020_9	2020_12		ns	-

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

Contrast P-value < 0.1/10 and in an increasing direction

Contrast P-value < 0.1/10 and in a decreasing direction

Notes: "-" = not relevant. Selenium results from RG_LI24 collected on May 3rd, 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 C.14: ANOVA Table for the Asymmetric BACI Model Comparing Benthic Invertebrate Selenium Concentrations at RG_LI8 Within the 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	0.65	0.13	22	<0.001
CI	1	1.5	1.5	264	<0.001
Period×CI	5	1.3	0.27	46	<0.001
Time(Period)	18	2.5	0.14	24	<0.001
Time(Period)×CI	18	0.7	0.040	7	<0.001
Error	453	-			

Within 2020 AOP Differences (P-value and Magnitude of Difference)[c]				
Period 1	**Period 2**		**P-value**	**MOD**
2020_2	2020_4		0.005	1.7 SD
	2020_7		0.007	1.6 SD
	2020_9		<0.001	4.4 SD
	2020_12		<0.001	2.5 SD
2020_4	2020_7		ns	-
	2020_9		<0.001	2.8 SD
	2020_12		ns	-
2020_7	2020_9		<0.001	2.8 SD
	2020_12		ns	-
2020_9	2020_12		ns	-

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

Contrast P-value < 0.1/10 and in an increasing direction

Contrast P-value < 0.1/10 and in a decreasing direction

Notes: "-" = not relevant. Selenium results from RG_LI24 collected on May 3rd, 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 C.15: ANOVA Table for the Asymmetric BACI Model Comparing Benthic Invertebrate Selenium Concentrations at RG_FO23 Within the 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	4	0.34	0.09	12	<0.001
CI	1	2.5	2.5	334	<0.001
Period×CI	4	0.5	0.12	16	<0.001
Time(Period)	13	1.5	0.12	16	<0.001
Time(Period)×CI	13	1.1	0.082	11	<0.001
Error	347	-			

Within 2020 AOP Differences (P-value and Magnitude of Difference)[c]				
Period 1	**Period 2**		**P-value**	**MOD**
2020_2	2020_4		<0.001	2.4 SD
	2020_7		<0.001	3.3 SD
	2020_9		0.002	2.3 SD
	2020_12		0.003	2.1 SD
2020_4	2020_7		ns	-
	2020_9		ns	-
	2020_12		ns	-
2020_7	2020_9		ns	-
	2020_12		ns	-
2020_9	2020_12		ns	-

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

Contrast P-value < 0.1/10 and in an increasing direction

Contrast P-value < 0.1/10 and in a decreasing direction

Notes: "-" = not relevant. Selenium results from RG_LI24 collected on May 3rd, 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 C.16: ANOVA Table for the Asymmetric BACI Model Comparing Benthic Invertebrate Selenium Concentrations at RG_LCUT Within the 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	3	0.47	0.16	20	<0.001
CI	1	0.050	0.050	6	0.012
Period×CI	3	0.43	0.14	18	<0.001
Time(Period)	15	2.4	0.16	20	<0.001
Time(Period)×CI	15	1.8	0.12	16	<0.001
Error	426	-			

Within 2020 AOP Differences (P-value and Magnitude of Difference)[c]				
Period 1	**Period 2**		**P-value**	**MOD**
2020_2	2020_4		ns	-
	2020_7		<0.001	-2.1 SD
	2020_9		ns	-
	2020_12		ns	-
2020_4	2020_7		<0.001	-2.7 SD
	2020_9		ns	-
	2020_12		ns	-
2020_7	2020_9		<0.001	2.3 SD
	2020_12		ns	-
2020_9	2020_12		ns	-

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

Contrast P-value < 0.1/10 and in an increasing direction

Contrast P-value < 0.1/10 and in a decreasing direction

Notes: "-" = not relevant. Selenium results from RG_LI24 collected on May 3rd, 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 C.17: ANOVA Table for the Asymmetric BACI Model Comparing Benthic Invertebrate Selenium Concentrations at RG_FRUL Within the 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	4	0.39	0.10	14	<0.001
CI	1	3.7	3.7	538	<0.001
Period×CI	4	0.1	0.02	2.8	0.026
Time(Period)	11	1.5	0.13	19	<0.001
Time(Period)×CI	11	1.0	0.090	13	<0.001
Error	334	-			

Within 2020 AOP Differences (P-value and Magnitude of Difference)[c]				
Period 1	**Period 2**		**P-value**	**MOD**
2020_2	2020_4		ns	-
	2020_7		<0.001	3 SD
	2020_9		0.005	2 SD
	2020_12		ns	-
2020_4	2020_7		<0.001	3.5 SD
	2020_9		<0.001	2.5 SD
	2020_12		0.008	1.8 SD
2020_7	2020_9		ns	-
	2020_12		ns	-
2020_9	2020_12		ns	-

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

Contrast P-value < 0.1/10 and in an increasing direction.

Contrast P-value < 0.1/10 and in a decreasing direction.

Notes: "-" = not relevant. Selenium results from RG_LI24 collected on May 3rd, 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 C.18: ANOVA Table for the Asymmetric BACI Model Comparing Benthic Invertebrate Selenium During the Before (B), AWTF Operational (AWTF), Initial Operation (IO), Shut Down (SD), Restart (RS) and AWTF with AOP Operational (AOP) Period at RG_FO23 (Downstream of Line Creek) Relative to RG_FRUL (Upstream of Line Creek)

ANOVA Model					
Term	DF	SS[a]	MS[b]	F-Ratio	P-Value
Period	4	0.23	0.06	12	<0.001
CI	1	0.19	0.19	40	<0.001
Period×CI	4	0.094	0.024	4.9	<0.001
Time(Period)	12	1.0	0.087	18	<0.001
Time(Period)×CI	12	0.27	0.023	4.8	<0.001
Error	268	-			

Contrasts (P-value and Magnitude of Difference)[c]				
Period 1	**Period 2**		**P-value**	**MOD**
B	AOP (2020_2)		ns	-
	AOP (2020_4)		ns	-
	AOP (2020_7)		ns	-
	AOP (2020_9)		ns	-
	AOP (2020_12)		ns	-
AWTF (2017_4)	AOP (2020_2)		<0.001	-2.6 SD
	AOP (2020_4)		ns	-
	AOP (2020_7)		0.002	-2.0 SD
	AOP (2020_9)		0.006	-2.1 SD
	AOP (2020_12)		ns	-
AWTF (2017_9)	AOP (2020_2)		<0.001	-3.2 SD
	AOP (2020_4)		ns	-
	AOP (2020_7)		<0.001	-2.6 SD
	AOP (2020_9)		<0.001	-2.8 SD
	AOP (2020_12)		ns	-

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

Contrast P-value < 0.1/15 and in an increasing direction

Contrast P-value < 0.1/15 and in a decreasing direction

Notes: "-" = not relevant.

[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

Table C.19: ANOVA Table for the Asymmetric BACI Model Comparing Benthic Invertebrate Selenium Concentrations at RG_FO23 (Downstream of Line Creek) Within the AOP Operational Period Relative to RG_FRUL (Upstream of Line Creek)

ANOVA Model					
Term	DF	SS[a]	MS[b]	F-Ratio	P-Value
Period	4	0.23	0.06	12	<0.001
CI	1	0.19	0.19	40	<0.001
Period×CI	4	0.094	0.024	4.9	<0.001
Time(Period)	12	1.0	0.087	18	<0.001
Time(Period)×CI	12	0.27	0.023	4.8	<0.001
Error	268	-			

Within 2020 AOP Differences (P-value and Magnitude of Difference)[c]				
Period 1	**Period 2**		**P-value**	**MOD**
2020_2	2020_4		<0.001	3.7 SD
	2020_7		ns	-
	2020_9		ns	-
	2020_12		ns	-
2020_4	2020_7		<0.001	-3.1 SD
	2020_9		<0.001	-3.2 SD
	2020_12		0.001	-2.6 SD
2020_7	2020_9		ns	-
	2020_12		ns	-
2020_9	2020_12		ns	-

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

Contrast P-value < 0.1/10 and in an increasing direction.

Contrast P-value < 0.1/10 and in a decreasing direction.

Notes: "-" = not relevant.

[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 C.20: Temporal Changes in Water Chemistry Analytes at Stations in the Line Creek LAEMP, 2012 to 2020

Parameter	Status	Station	Annual Variation[a]		Q1. Is there a positive or negative change in concentrations since the base year (b) of monitoring? Magnitude of Difference (MOD)[b]									Q2. Is the 2020 annual mean greater or less than all annual historical means (2012 to 2019) and the previous year (2019)?[c]										
			DF	P-Value	2012	2013	2014	2015	2016	2017	2018	2019	2020	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020 vs. 2012 to 2019	2019 vs. 2020
Total Selenium	Reference	LC_LC1 no outlier[d]	8	<0.001	b	7.5	**15**	**32**	**40**	**49**	**52**	**48**	**40**	D	CD	C	B	AB	A	A	A	AB	-	-
		LC_LC1 with outlier	8	0.014	b	-13	-7.1	6	14	21	23	21	14	AB	B	AB	AB	AB	AB	A	AB	AB	-	-

P-value < 0.05 (annual variation)
> 25% Increase in concentration
> 50% Increase in concentration
> 75% Increase in concentration
> 100% Increase in concentration
***Bold** Significant increase or decrease from base year (b)

Notes: DF = degrees of freedom. "-" = not applicable.

[a] The presence of annual variation was determined by a significant Year term (α = 0.05) using an ANOVA with factors Year and Month.

[b] Magnitude of Difference (MOD) was calculated as the concentrations in each year minus the concentration in the first year divided by the concentration in the fist year × 100.

[c] Significance between each year determined using all pairwise comparisons with Tukey correction.

[d] One outlier with a value of 0.031 mg/L in May 2012 was removed from the analysis.

Table C.21: Concentrations of Selenium Species Measured in Water Samples from Line Creek and Fording River, January to December, 2020

Waterbody		Teck Water Station Code	Sample Date	Selenium Species (µg/L)									
				Selenate	Selenite	Dimethylselenoxide	Methylseleninic Acid	Selenocyanate	Selenomethionine	Selenosulphate	Methaneseinoic Acid	Unknown Species	Sum of Species
Line Creek	Reference	LC_LC1 (RG_LI24)	14-Apr-20	1.93	<0.05	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	1.93
			28-Apr-20	1.44	<0.05	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	1.44
			6-Jul-20	1.77	<0.05	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	1.77
			14-Jul-20	1.36	<0.05	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	1.36
			31-Aug-20	2.16	<0.05	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	2.16
			5-Oct-20	2.72	<0.05	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	2.72
			30-Nov-20	2.68	0.0310	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.71
		LC_SLC (RG_SLINE)	20-Jan-20	1.50	<0.05	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	1.50
			28-Jan-20	1.68	<0.05	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	1.68
			26-Feb-20	1.50	<0.05	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	1.50
			7-Apr-20	1.39	<0.05	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	1.39
			28-Apr-20	0.505	<0.05	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	0.505
			6-Jul-20	0.785	<0.05	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	0.785
			13-Jul-20	0.678	<0.05	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	0.678
			14-Jul-20	0.706	<0.05	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	0.706
			31-Aug-20	0.892	<0.05	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	0.892
			5-Oct-20	1.37	<0.05	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	1.37
			30-Nov-20	1.33	0.0250	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.36
	Mine-exposed	LC_LCUSWLC (RG_LCUT)	6-Jan-20	56.9	0.0990	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	57.0
			13-Jan-20	60.2	0.0970	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	60.3
			20-Jan-20	58.4	0.130	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	58.5
			27-Jan-20	63.2	0.109	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	63.3
			4-Feb-20	55.9	0.0770	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	56.0
			10-Feb-20	56.1	0.0710	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	56.2
			18-Feb-20	62.5	0.114	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	62.6
			24-Feb-20	58.9	0.0880	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	59.0
			26-Feb-20	268	0.191	0.0160	0.0290	<0.04	<0.01	<0.06	<0.01	<0.06	268
			2-Mar-20	60.5	0.127	<0.01	<0.01	<0.04	<0.01	<0.01	<0.01	<0.06	60.6
			9-Mar-20	63.0	0.0970	<0.01	<0.01	<0.04	<0.01	<0.01	<0.01	<0.06	63.1
			16-Mar-20	51.5	0.162	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	51.7
			23-Mar-20	50.1	0.135	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	50.2
			27-Mar-20	56.4	0.104	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	56.5
			30-Mar-20	45.6	0.110	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	45.7
			6-Apr-20	52.7	0.127	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	52.8
			14-Apr-20	42.2	0.137	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	42.3
			20-Apr-20	41.7	0.127	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	41.8
			27-Apr-20	54.6	0.101	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	54.7
			4-May-20	32.0	0.0840	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	32.1
			11-May-20	27.9	0.0730	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	28.0
			19-May-20	29.5	0.0780	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	29.6
			25-May-20	21.9	0.0940	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	22.0
			2-Jun-20	14.6	0.128	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	14.7
			8-Jun-20	14.4	0.0800	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	14.5
			15-Jun-20	15.0	0.0740	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	15.1
			22-Jun-20	22.5	0.0770	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	22.6
			29-Jun-20	21.8	0.0790	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	21.9
			6-Jul-20	22.2	0.0710	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	22.3
			13-Jul-20	26.8	0.0725	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	26.8
			20-Jul-20	28.3	0.0730	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	28.4
			27-Jul-20	29.7	0.0730	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	29.8
			4-Aug-20	35.5	0.0740	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	35.6
			10-Aug-20	37.5	0.0720	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	37.6
			18-Aug-20	45.7	0.0670	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	45.8
			24-Aug-20	42.2	0.0690	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	42.3
			30-Aug-20	32.0	0.0790	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	32.1
			1-Sep-20	50.6	0.0895	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	50.7
			8-Sep-20	50.7	0.0880	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	50.8
			15-Sep-20	51.5	0.0930	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	51.6
			21-Sep-20	51.5	0.0840	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	51.6
			28-Sep-20	49.2	0.0880	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	49.3
			5-Oct-20	55.0	0.0890	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	55.1
			13-Oct-20	52.7	0.0820	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	52.8
			19-Oct-20	52.6	0.0820	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	52.7
			28-Oct-20	49.1	0.0740	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	49.2
			5-Nov-20	54.5	0.0790	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	54.6
			10-Nov-20	53.5	0.0680	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	53.6
			17-Nov-20	52.6	0.0760	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	52.7
			23-Nov-20	50.2	0.0700	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	50.3
			1-Dec-20	54.0	0.0845	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	54.0
			7-Dec-20	51.3	0.0830	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	51.4
			14-Dec-20	54.3	0.0750	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	54.4
			21-Dec-20	40.1	0.465	0.0340	<0.01	<0.01	<0.01	<0.01	0.232	<0.01	40.8
		LC_LC3 (RG_LILC3)	6-Jan-20	37.6	0.536	0.0450	<0.01	<0.04	<0.01	<0.06	0.221	<0.06	38.4
			13-Jan-20	42.9	0.518	0.0430	<0.01	<0.04	<0.01	<0.06	0.169	<0.06	43.6
			20-Jan-20	38.1	0.571	0.0360	<0.01	<0.04	<0.01	<0.06	0.200	<0.06	38.9
			28-Jan-20	24.1	0.455	0.0290	<0.01	<0.04	<0.01	<0.06	0.124	<0.06	24.7
			4-Feb-20	52.8	0.693	0.0280	0.0250	<0.04	<0.01	<0.06	0.138	<0.06	53.7
			10-Feb-20	38.7	0.400	0.0260	<0.01	<0.04	<0.01	<0.06	0.136	<0.06	39.3
			18-Feb-20	42.0	0.447	0.0350	<0.01	<0.04	<0.01	<0.06	0.122	<0.06	42.6
			24-Feb-20	42.3	0.437	0.0275	0.0120	<0.04	<0.01	<0.06	0.0750	<0.06	42.9
			2-Mar-20	39.3	0.482	0.0240	0.0110	<0.04	<0.01	<0.06	0.104	<0.06	39.9

Notes: The sum of species was calculated using zero for values reported as < LRL. Effluent from West Line Creek was diverted to the AWTF during AWTF/AOP forward flow (Oct 29th 2018 to Dec 29th 2018) and AWTF/AOP operation (Dec 30 2018 to present), therefore water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT. Water quality results from LC_LCUSWLC and RG_LCUT were combined during this period for data interpretation. "-" indicates no data available.

Table C.21: Concentrations of Selenium Species Measured in Water Samples from Line Creek and Fording River, January to December, 2020

Waterbody		Teck Water Station Code	Sample Date	Selenium Species (µg/L)									
				Selenate	Selenite	Dimethylselenoxide	Methylseleninic Acid	Selenocyanate	Selenomethionine	Selenosulphate	Methaneselnoic Acid	Unknown Species	Sum of Species
Line Creek	Mine-exposed	LC_LC3 (RG_LILC3)	9-Mar-20	45.0	1.17	0.0480	0.0380	<0.04	<0.01	<0.01	0.196	<0.06	46.5
			16-Mar-20	42.7	0.493	0.0240	<0.01	<0.04	<0.01	<0.06	0.120	<0.06	43.3
			23-Mar-20	41.5	0.554	0.0370	<0.01	<0.04	<0.01	<0.06	0.176	<0.06	42.3
			30-Mar-20	39.3	0.482	0.0330	<0.01	<0.04	<0.01	<0.06	0.173	<0.06	40.0
			6-Apr-20	44.8	0.320	0.0140	0.0220	<0.04	<0.01	<0.06	0.0710	<0.06	45.2
			14-Apr-20	37.3	0.537	<0.01	0.0770	<0.04	<0.01	<0.06	0.118	<0.06	38.0
			20-Apr-20	38.5	0.457	0.0270	<0.01	<0.04	<0.01	<0.06	0.127	<0.06	39.1
			27-Apr-20	49.8	0.238	<0.01	0.0285	<0.04	<0.01	<0.06	0.0420	<0.06	50.1
			5-May-20	31.5	0.206	<0.01	<0.01	<0.04	<0.01	<0.06	0.0350	<0.06	31.7
			12-May-20	31.6	0.200	<0.01	<0.01	<0.04	<0.01	<0.06	0.0410	<0.06	31.8
			19-May-20	39.7	0.193	<0.01	0.0170	<0.04	<0.01	<0.06	0.0270	<0.06	39.9
			26-May-20	30.7	0.182	<0.01	<0.01	<0.04	<0.01	<0.06	0.0280	<0.06	30.9
			2-Jun-20	28.7	0.157	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	28.9
			8-Jun-20	24.2	0.104	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	24.3
			15-Jun-20	26.4	0.0940	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	26.5
			22-Jun-20	30.8	0.100	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	30.9
			29-Jun-20	23.3	0.0840	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	23.4
			6-Jul-20	26.7	0.115	<0.01	<0.01	<0.04	<0.01	<0.06	0.0120	<0.06	26.8
			13-Jul-20	33.0	0.0930	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	33.1
			15-Jul-20	34.3	0.0730	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	34.4
			20-Jul-20	37.1	0.124	<0.01	0.0200	<0.04	<0.01	<0.06	0.0140	<0.06	37.3
			27-Jul-20	30.1	0.154	<0.01	<0.01	<0.04	<0.01	<0.06	0.0250	<0.06	30.3
			4-Aug-20	33.1	0.200	0.0210	<0.01	<0.04	<0.01	<0.06	0.0430	<0.06	33.4
			10-Aug-20	34.0	0.176	0.0150	<0.01	<0.04	<0.01	<0.06	0.0390	<0.06	34.2
			18-Aug-20	42.9	0.255	<0.01	<0.01	<0.04	<0.01	<0.06	0.0630	<0.06	43.2
			24-Aug-20	36.0	0.316	<0.01	<0.01	<0.04	<0.01	<0.06	0.0650	<0.06	36.4
			27-Aug-20	25.2	0.195	0.0110	0.0160	<0.04	<0.01	<0.06	0.0250	<0.06	25.4
			1-Sep-20	47.0	0.270	0.0190	<0.01	<0.04	<0.01	<0.06	0.0740	<0.06	47.4
			8-Sep-20	40.1	0.285	0.0250	<0.01	<0.04	<0.01	<0.06	0.0830	<0.06	40.5
			15-Sep-20	40.3	0.381	0.0280	<0.01	<0.04	<0.01	<0.06	0.0840	<0.06	40.8
			21-Sep-20	90.4	0.117	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	90.5
			28-Sep-20	42.6	0.299	0.0250	0.0150	<0.04	<0.01	<0.06	0.0710	<0.06	43.0
			5-Oct-20	43.2	0.290	0.0250	0.0110	<0.04	<0.01	<0.06	0.108	<0.06	43.6
			13-Oct-20	49.0	0.377	0.0280	<0.01	<0.04	<0.01	<0.06	0.0910	<0.06	49.5
			20-Oct-20	41.8	0.483	0.0310	<0.01	<0.04	<0.01	<0.06	0.196	<0.06	42.5
			27-Oct-20	37.7	0.499	0.0260	<0.01	<0.01	<0.01	<0.01	0.190	<0.01	38.4
			3-Nov-20	39.4	0.654	0.0370	<0.01	<0.01	<0.01	<0.01	0.240	<0.01	40.3
			10-Nov-20	44.1	0.624	<0.01	<0.01	<0.01	<0.01	<0.01	0.194	<0.01	44.9
			17-Nov-20	41.6	0.485	0.0270	<0.01	<0.01	<0.01	<0.01	0.164	<0.01	42.3
			23-Nov-20	39.8	0.408	<0.01	0.0120	<0.01	<0.01	<0.01	0.152	<0.01	40.4
			1-Dec-20	41.2	0.636	0.0110	<0.01	<0.01	<0.01	<0.01	0.150	<0.01	41.9
			7-Dec-20	38.1	0.395	<0.01	<0.01	<0.01	<0.01	<0.01	0.155	<0.01	38.7
			14-Dec-20	41.5	0.475	0.0410	<0.01	<0.01	<0.01	<0.01	0.222	<0.01	42.2
			21-Dec-20	57.3	0.0840	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	57.4
		WL_DCP_SP24 (RG_LISP24)	24-Feb-20	35.0	0.319	0.0170	0.0160	<0.04	<0.01	<0.06	0.0300	<0.06	35.4
			29-Apr-20	33.3	0.195	<0.01	0.0110	<0.04	<0.01	<0.06	0.0260	<0.06	33.5
			15-Jul-20	28.6	0.0640	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	28.7
			1-Sep-20	31.4	0.206	0.0130	0.0130	<0.04	<0.01	<0.06	0.0210	<0.06	31.7
			2-Dec-20	32.0	0.475	<0.01	0.0130	<0.01	<0.01	<0.01	0.0860	<0.01	32.6
		LC_LCDSSLCC (Compliance) (RG_LIDSL)	6-Jan-20	34.5	0.340	0.0150	0.0180	<0.04	<0.01	<0.06	0.0390	<0.06	34.9
			13-Jan-20	36.9	0.372	<0.01	0.0180	<0.04	<0.01	<0.06	0.0340	<0.06	37.3
			20-Jan-20	36.5	0.350	<0.01	0.0140	<0.04	<0.01	<0.06	0.0280	<0.06	36.9
			28-Jan-20	43.7	0.372	0.0120	0.0140	<0.04	<0.01	<0.06	0.0390	<0.06	44.1
			4-Feb-20	40.5	0.364	0.0135	0.0175	<0.04	<0.01	<0.06	0.0420	<0.06	40.9
			18-Feb-20	39.9	0.243	0.0110	0.0140	<0.04	<0.01	<0.06	0.0180	<0.06	40.2
			24-Feb-20	36.7	0.213	0.0120	0.0140	<0.04	<0.01	<0.06	0.0120	<0.06	37.0
			2-Mar-20	38.4	0.231	<0.01	<0.01	<0.04	<0.01	<0.06	0.0140	<0.06	38.6
			9-Mar-20	42.3	0.349	<0.01	<0.01	<0.04	<0.01	<0.01	0.0510	<0.06	42.7
			16-Mar-20	40.5	0.286	0.0120	0.0140	<0.04	<0.01	<0.06	0.0350	<0.06	40.8
			23-Mar-20	40.6	0.327	0.0120	0.0160	<0.04	<0.01	<0.06	0.0410	<0.06	41.0
			30-Mar-20	38.4	0.313	0.0120	0.0110	<0.04	<0.01	<0.06	0.0490	<0.06	38.8
			6-Apr-20	41.0	0.202	<0.01	0.0130	<0.04	<0.01	<0.06	0.0240	<0.06	41.2
			14-Apr-20	36.0	0.305	<0.01	0.0330	<0.04	<0.01	<0.06	0.0340	<0.06	36.4
			20-Apr-20	32.1	0.253	0.0130	0.0180	<0.04	<0.01	<0.06	0.0270	<0.06	32.4
			27-Apr-20	33.7	0.146	<0.01	0.0130	<0.04	<0.01	<0.06	<0.01	<0.06	33.9
			29-Apr-20	32.6	0.164	<0.01	<0.01	<0.04	<0.01	<0.06	0.0240	<0.06	32.8
			5-May-20	24.3	0.126	<0.01	<0.01	<0.04	<0.01	<0.06	0.0160	<0.06	24.4
			12-May-20	23.0	0.127	<0.01	<0.01	<0.04	<0.01	<0.06	0.0160	<0.06	23.1
			19-May-20	20.4	0.0930	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	20.5
			26-May-20	17.3	0.0770	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	17.4
			2-Jun-20	15.3	0.0810	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	15.4
			8-Jun-20	15.1	0.0610	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	15.2
			15-Jun-20	15.8	0.0700	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	15.9
			22-Jun-20	18.1	0.0590	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	18.2
			29-Jun-20	19.6	0.149	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	19.7
			6-Jul-20	19.7	0.0790	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	19.8
			13-Jul-20	23.3	0.0680	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	23.4
			20-Jul-20	26.6	0.0910	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	26.7
			27-Jul-20	24.5	0.0920	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	24.6
			4-Aug-20	26.9	0.115	<0.01	0.0140	<0.04	<0.01	<0.06	0.0120	<0.06	27.0
			10-Aug-20	28.2	0.127	<0.01	0.0110	<0.04	<0.01	<0.06	<0.01	<0.06	28.3
			18-Aug-20	34.5	0.150	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	34.7
			24-Aug-20	30.8	0.167	<0.01	0.0140	<0.04	<0.01	<0.06	<0.01	<0.06	31.0
			1-Sep-20	34.9	0.161	<0.01	0.0140	<0.04	<0.01	<0.06	0.0170	<0.06	35.1
			8-Sep-20	34.8	0.175	<0.01	0.0120	<0.04	<0.01	<0.06	0.0130	<0.06	35.0
			15-Sep-20	35.1	0.193	<0.01	0.0130	<0.04	<0.01	<0.06	0.0150	<0.06	35.3
			21-Sep-20	54.6	0.117	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	54.7
			28-Sep-20	35.0	0.156	0.0120	<0.01	<0.04	<0.01	<0.06	0.0150	<0.06	35.2

Notes: The sum of species was calculated using zero for values reported as < LRL. Effluent from West Line Creek was diverted to the AWTF during AWTF/AOP forward flow (Oct 29th 2018 to Dec 29th 2018) and AWTF/AOP operation (Dec 30 2018 to present), therefore water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT. Water quality results from LC_LCUSWLC and RG_LCUT were combined during this period for data interpretation. "-" indicates no data available.

Table C.21: Concentrations of Selenium Species Measured in Water Samples from Line Creek and Fording River, January to December, 2020

Waterbody		Teck Water Station Code	Sample Date	Selenium Species (µg/L)									
				Selenate	Selenite	Dimethylselenoxide	Methylseleninic Acid	Selenocyanate	Selenomethionine	Selenosulphate	Methaneseinoic Acid	Unknown Species	Sum of Species
Line Creek	Mine-exposed	LC_LCDSSLCC (Compliance) (RG_LIDSL)	7-Oct-20	36.1	0.185	<0.01	0.0120	<0.04	<0.01	<0.06	<0.01	<0.06	36.3
			13-Oct-20	40.5	0.209	<0.01	<0.01	<0.04	<0.01	<0.06	0.0170	<0.06	40.7
			20-Oct-20	34.6	0.270	<0.01	0.0120	<0.04	<0.01	<0.06	0.0390	<0.06	34.9
			27-Oct-20	32.5	0.290	<0.01	0.0250	<0.01	<0.01	<0.01	0.0480	<0.01	32.9
			3-Nov-20	33.1	0.333	0.0120	0.0130	<0.01	<0.01	<0.01	0.0520	<0.01	33.5
			10-Nov-20	32.9	0.307	<0.01	0.0110	<0.01	<0.01	<0.01	0.0400	<0.01	33.3
			17-Nov-20	34.6	0.301	<0.01	<0.01	<0.01	<0.01	<0.01	0.0290	<0.01	34.9
			23-Nov-20	34.0	0.285	<0.01	0.0150	<0.01	<0.01	<0.01	0.0400	<0.01	34.3
			1-Dec-20	34.5	0.342	<0.01	0.0120	<0.01	<0.01	<0.01	0.0440	<0.01	34.9
			7-Dec-20	33.3	0.273	<0.01	<0.01	<0.01	<0.01	<0.01	0.0240	<0.01	33.6
			14-Dec-20	37.2	0.264	0.0140	0.0150	<0.01	<0.01	<0.01	0.0410	<0.01	37.5
			21-Dec-20	37.1	0.318	0.0190	0.0110	<0.01	<0.01	<0.01	0.0470	<0.01	37.5
		LC_LCC (RG_LIDCOM)	24-Feb-20	32.5	0.140	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	32.6
			30-Apr-20	28.2	0.142	<0.01	<0.01	<0.04	<0.01	<0.06	0.0140	<0.06	28.4
			14-Jul-20	20.9	0.0570	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	21.0
			26-Aug-20	29.2	0.138	<0.01	0.0150	<0.04	<0.01	<0.06	<0.01	<0.06	29.4
			30-Aug-20	22.8	0.144	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	22.9
			1-Dec-20	27.5	0.212	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	27.7
		LC_LC4 (RG_LI8)	6-Jan-20	25.7	0.0710	<0.01	<0.01	<0.04	<0.01	<0.06	0.0110	<0.06	25.8
			13-Jan-20	28.6	<0.05	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	28.6
			20-Jan-20	26.4	0.0710	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	26.5
			4-Feb-20	27.5	0.0640	<0.01	<0.01	<0.04	<0.01	<0.06	0.0160	<0.06	27.6
			10-Feb-20	24.0	<0.05	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	24.0
			18-Feb-20	28.9	<0.05	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	28.9
			24-Feb-20	26.1	<0.05	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	26.1
			25-Feb-20	19.9	0.0660	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	20.0
			2-Mar-20	27.6	0.0580	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	27.7
			9-Mar-20	28.2	<0.05	<0.01	<0.01	<0.04	<0.01	<0.01	0.0130	<0.06	28.2
			16-Mar-20	30.0	0.0610	<0.01	<0.01	<0.04	<0.01	<0.06	0.0110	<0.06	30.1
			23-Mar-20	30.9	0.0850	<0.01	<0.01	<0.04	<0.01	<0.06	0.0150	<0.06	31.0
			30-Mar-20	30.0	0.0710	<0.01	<0.01	<0.04	<0.01	<0.06	0.0190	<0.06	30.1
			6-Apr-20	29.1	0.0550	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	29.2
			14-Apr-20	29.5	0.199	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	29.7
			20-Apr-20	29.7	0.125	<0.01	0.0140	<0.04	<0.01	<0.06	<0.01	<0.06	29.8
			27-Apr-20	29.3	0.124	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	29.4
			30-Apr-20	23.2	0.129	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	23.3
			4-May-20	20.6	0.0850	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	20.7
			11-May-20	18.6	0.0670	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	18.7
			19-May-20	14.4	0.103	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	14.5
			25-May-20	14.5	0.0750	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	14.6
			1-Jun-20	13.0	0.0760	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	13.1
			8-Jun-20	12.7	<0.05	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	12.7
			15-Jun-20	13.3	0.0550	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	13.4
			22-Jun-20	15.2	0.0550	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	15.3
			29-Jun-20	16.5	0.0580	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	16.6
			6-Jul-20	16.6	0.0620	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	16.7
			13-Jul-20	18.9	<0.05	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	18.9
			15-Jul-20	23.5	<0.05	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	23.5
			20-Jul-20	21.9	<0.05	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	21.9
			27-Jul-20	19.9	0.0600	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	20.0
			4-Aug-20	21.5	0.0690	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	21.6
			10-Aug-20	22.9	0.0610	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	23.0
			18-Aug-20	28.2	0.0990	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	28.3
			24-Aug-20	23.7	0.0830	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	23.8
			30-Aug-20	27.2	0.0800	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	27.3
			1-Sep-20	29.2	0.0730	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	29.3
			8-Sep-20	27.3	0.0740	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	27.4
			15-Sep-20	27.1	0.0590	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	27.2
			21-Sep-20	39.5	<0.05	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	39.5
			28-Sep-20	27.1	0.0510	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	27.2
			5-Oct-20	30.3	0.121	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	30.4
			13-Oct-20	32.0	0.0650	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	32.1
			19-Oct-20	27.5	0.0720	<0.01	<0.01	<0.04	<0.01	<0.06	0.0130	<0.06	27.6
			27-Oct-20	25.5	0.0720	<0.01	<0.01	<0.01	<0.01	<0.01	0.0150	<0.01	25.6
			5-Nov-20	19.7	0.114	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	19.8
			10-Nov-20	25.9	0.108	<0.01	<0.01	<0.01	<0.01	<0.01	0.0120	<0.01	26.0
			17-Nov-20	27.2	0.0610	<0.01	<0.01	<0.01	<0.01	<0.01	0.0160	<0.01	27.3
			23-Nov-20	26.2	0.105	<0.01	<0.01	<0.01	<0.01	<0.01	0.0150	<0.01	26.3
			1-Dec-20	26.6	0.100	<0.01	<0.01	<0.01	<0.01	<0.01	0.0160	<0.01	26.7
			2-Dec-20	24.5	0.122	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	24.6
			7-Dec-20	25.9	0.0810	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	26.0
			14-Dec-20	28.9	0.0710	<0.01	<0.01	<0.01	<0.01	0.0130	0.0130	<0.01	29.0
			21-Dec-20	28.8	0.0830	<0.01	<0.01	<0.01	<0.01	<0.01	0.0120	<0.01	28.9
Fording River		LC_LC6 (RG_FRUL)	25-Feb-20	39.6	0.229	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	39.8
			29-Apr-20	42.1	0.260	<0.01	0.0180	<0.04	<0.01	<0.06	<0.01	<0.06	42.4
			16-Jul-20	29.1	0.215	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	29.3
			29-Aug-20	44.7	0.336	0.0160	0.0230	<0.04	<0.01	<0.06	<0.01	<0.06	45.1
			30-Nov-20	47.3	0.164	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	47.5
		LC_LC5 (RG_FO23)	6-Jan-20	36.7	0.198	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	36.9
			28-Jan-20	40.8	0.222	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	41.0
			24-Feb-20	39.7	0.189	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	39.9
			25-Feb-20	32.4	0.175	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	32.6
			6-Apr-20	39.9	0.196	<0.01	0.0110	<0.04	<0.01	<0.06	<0.01	<0.06	40.1
			27-Apr-20	31.4	0.212	<0.01	0.0150	<0.04	<0.01	<0.06	<0.01	<0.06	31.6
			6-Jul-20	24.9	0.158	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	25.1
			16-Jul-20	27.5	0.189	<0.01	<0.01	<0.04	<0.01	<0.06	<0.01	<0.06	27.7
			30-Aug-20	33.1	0.241	<0.01	0.0140	<0.04	<0.01	<0.06	<0.01	<0.06	33.4
			5-Oct-20	41.7	0.218	<0.01	0.0160	<0.04	<0.01	<0.06	<0.01	<0.06	41.9
			44167	33.7	0.147	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	33.8

Notes: The sum of species was calculated using zero for values reported as < LRL. Effluent from West Line Creek was diverted to the AWTF during AWTF/AOP forward flow (Oct 29th 2018 to Dec 29th 2018) and AWTF/AOP operation (Dec 30 2018 to present), therefore water quality measured routinely upstream of West Line Creek (LC_LCUSWLC) was most representative of water quality slightly further downstream at RG_LCUT. Water quality results from LC_LCUSWLC and RG_LCUT were combined during this period for data interpretation. "-" indicates no data available.

APPENDIX D - OTHER POTENTIAL EFFECTS OF AWTF OPERATION

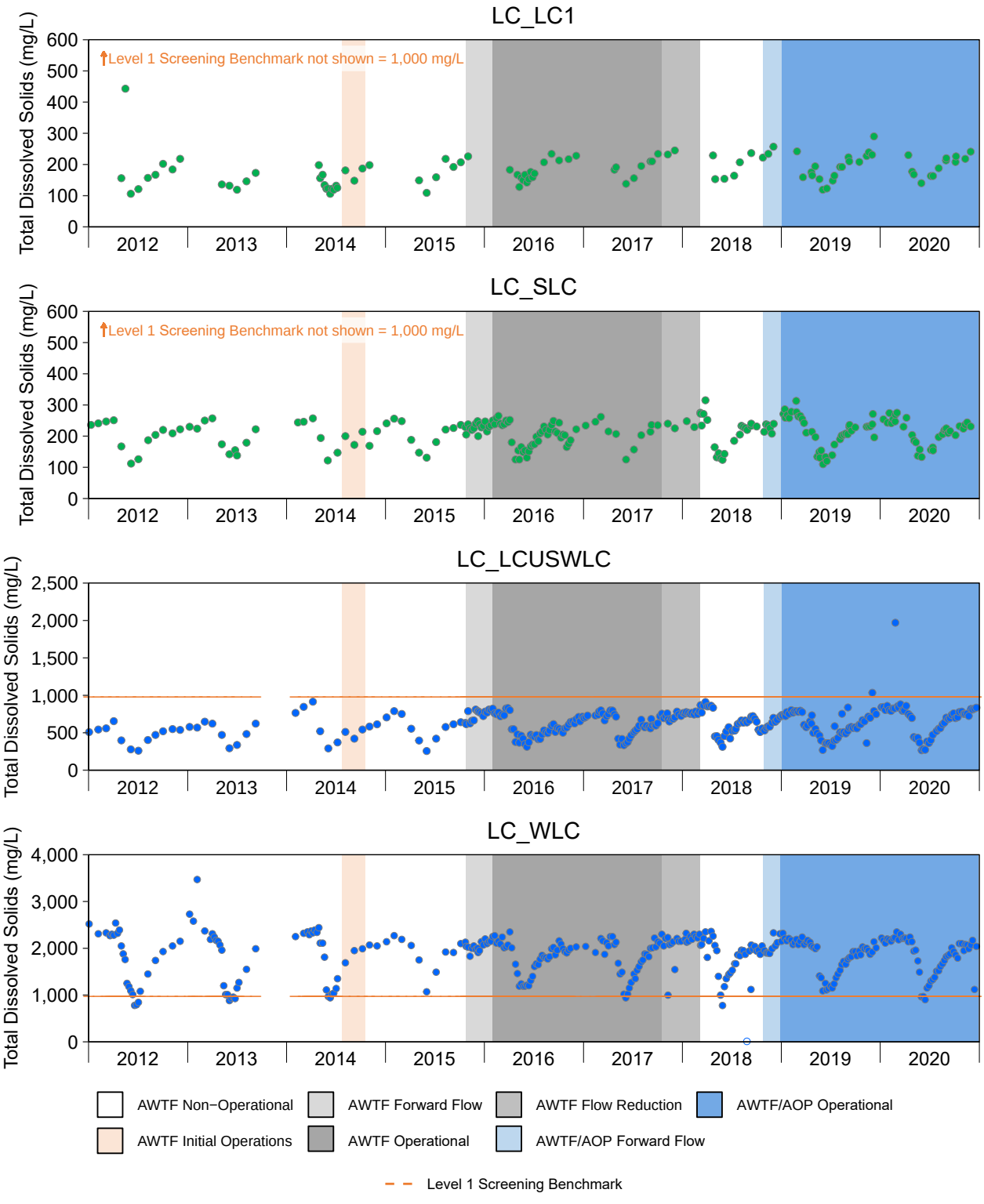

Figure D.1: Time Series Plots for Total Dissolved Solids Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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).

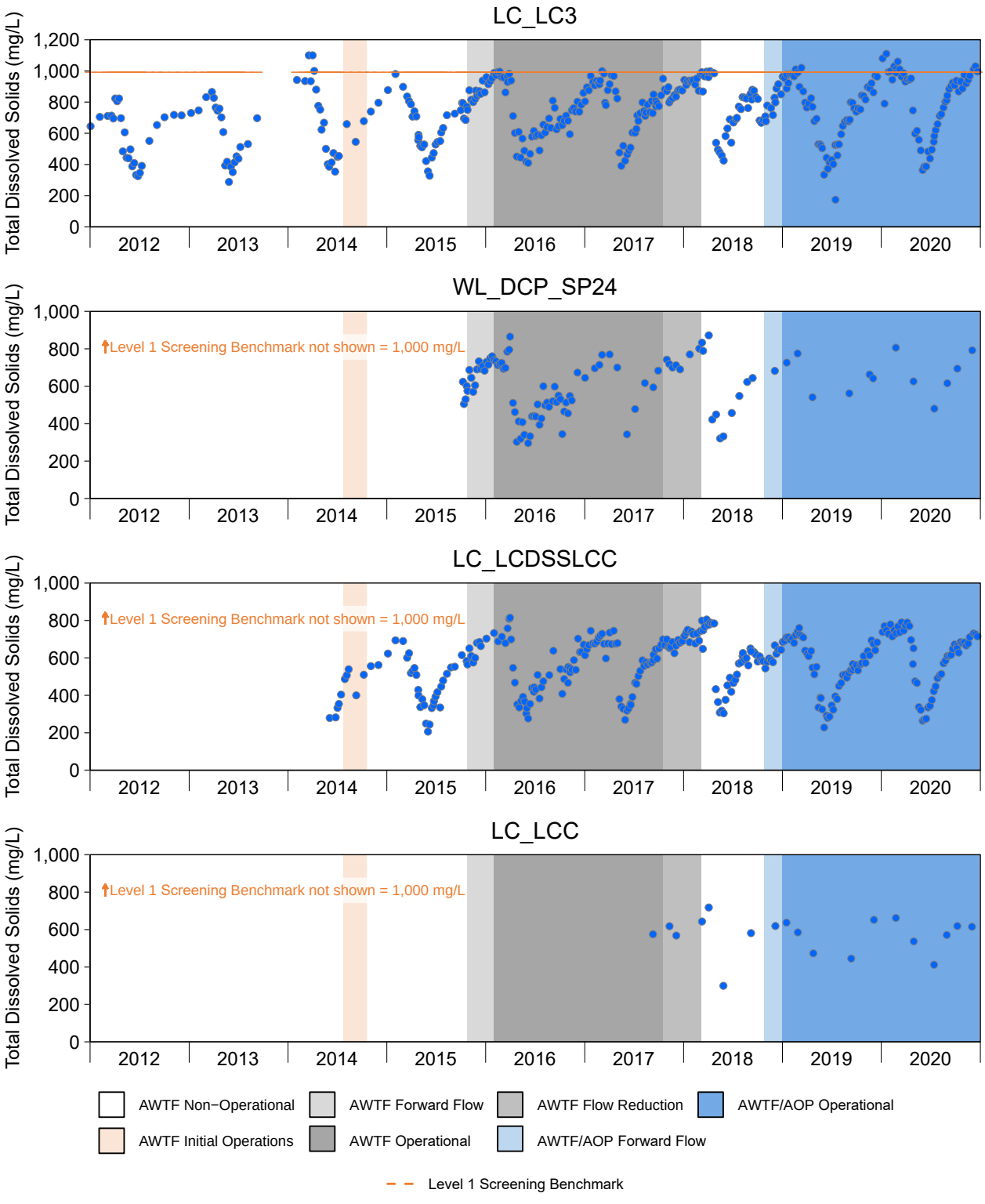

Figure D.1: Time Series Plots for Total Dissolved Solids Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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).

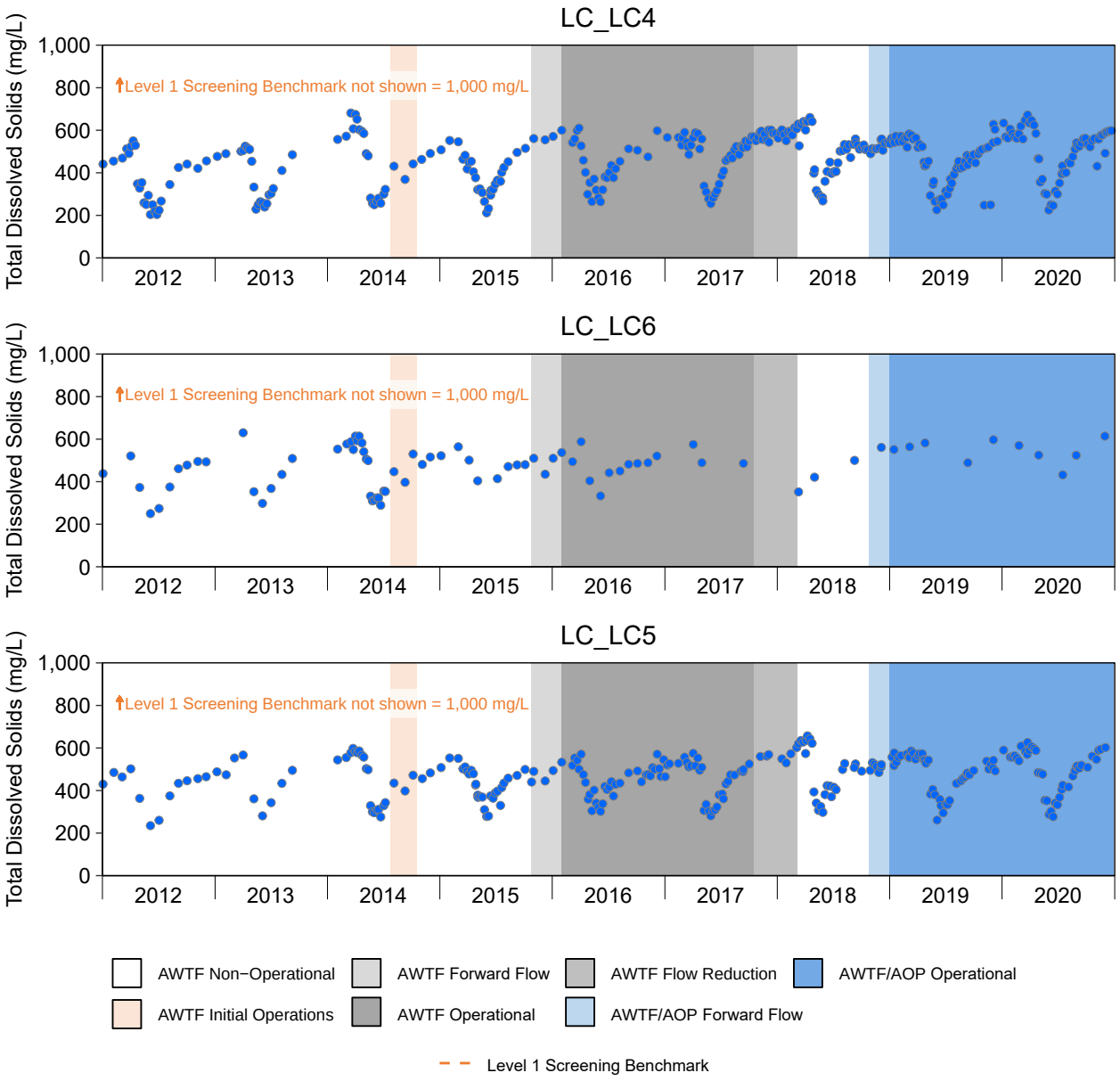

Figure D.1: Time Series Plots for Total Dissolved Solids Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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).

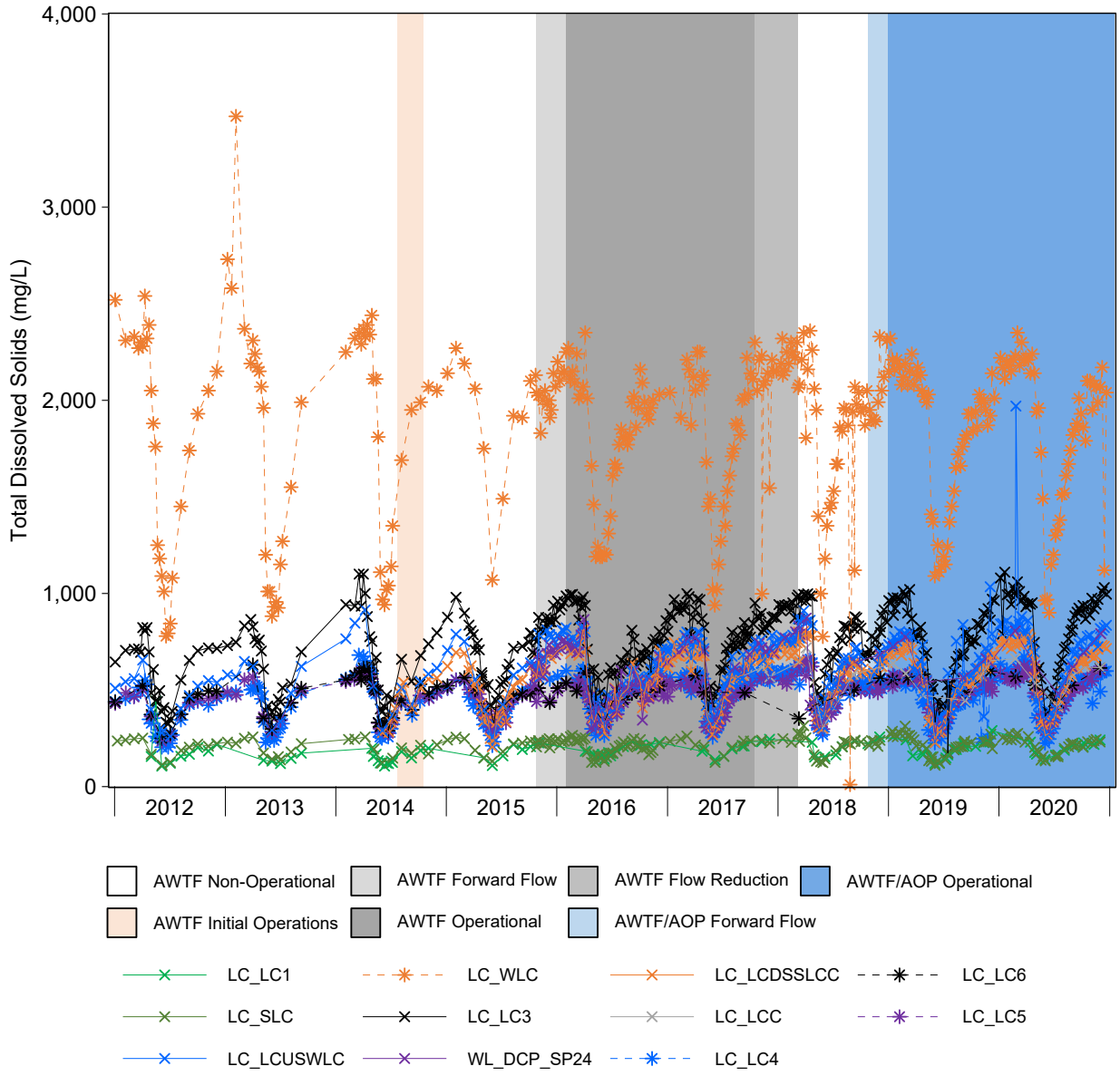

Figure D.2: Time Series Plots for Aqueous Total Dissolved Solids Concentrations from the Line Creek LAEMP Sampling Stations, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted at the LRL (LRLs were 10 mg/L). West Line Creek (WLC) Active Water Treatment Facility (AWTF) operational timelines pertain only to mine-exposed monitoring areas located downstream of the AWTF discharge. 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 September 2017.

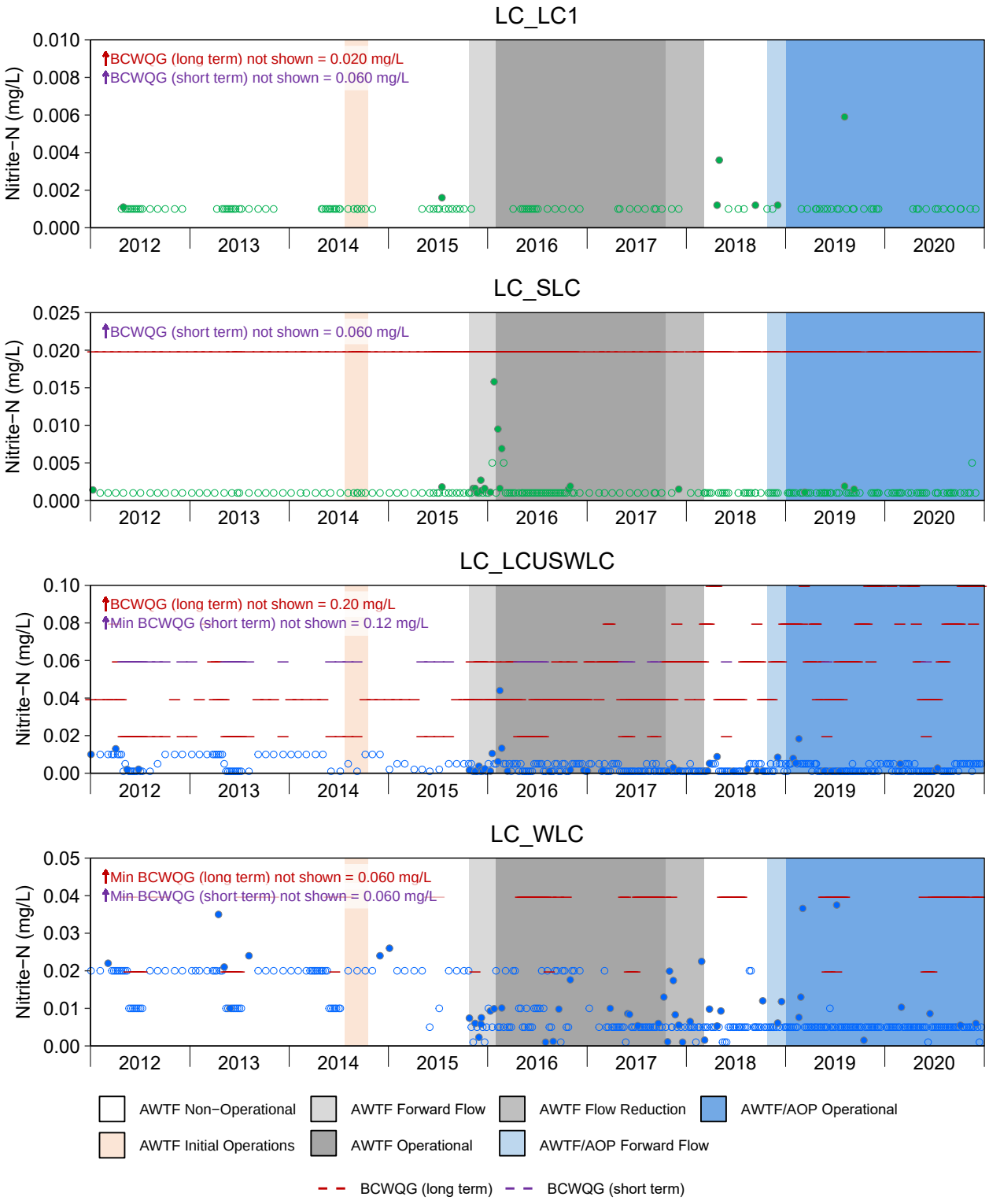

Figure D.3: Time Series Plots for Nitrite−N Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water chloride concentrations and the varying guidelines are shown as coloured dashes. Where guideline values exceed the range of the y-axis, the minimum value of the guidelines that exceeds the range of the y-axis is listed.

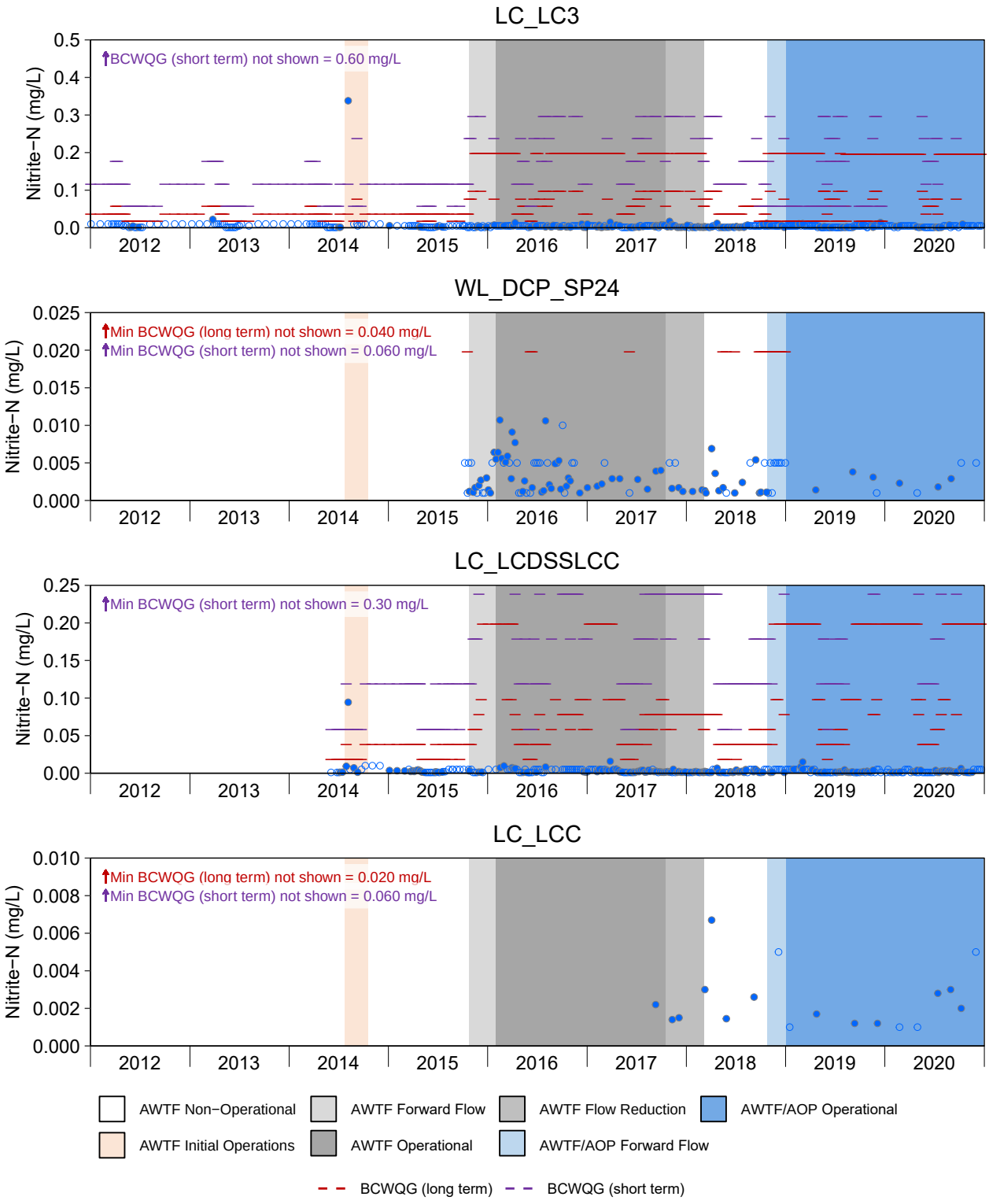

Figure D.3: Time Series Plots for Nitrite−N Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water chloride concentrations and the varying guidelines are shown as coloured dashes. Where guideline values exceed the range of the y-axis, the minimum value of the guidelines that exceeds the range of the y-axis is listed.

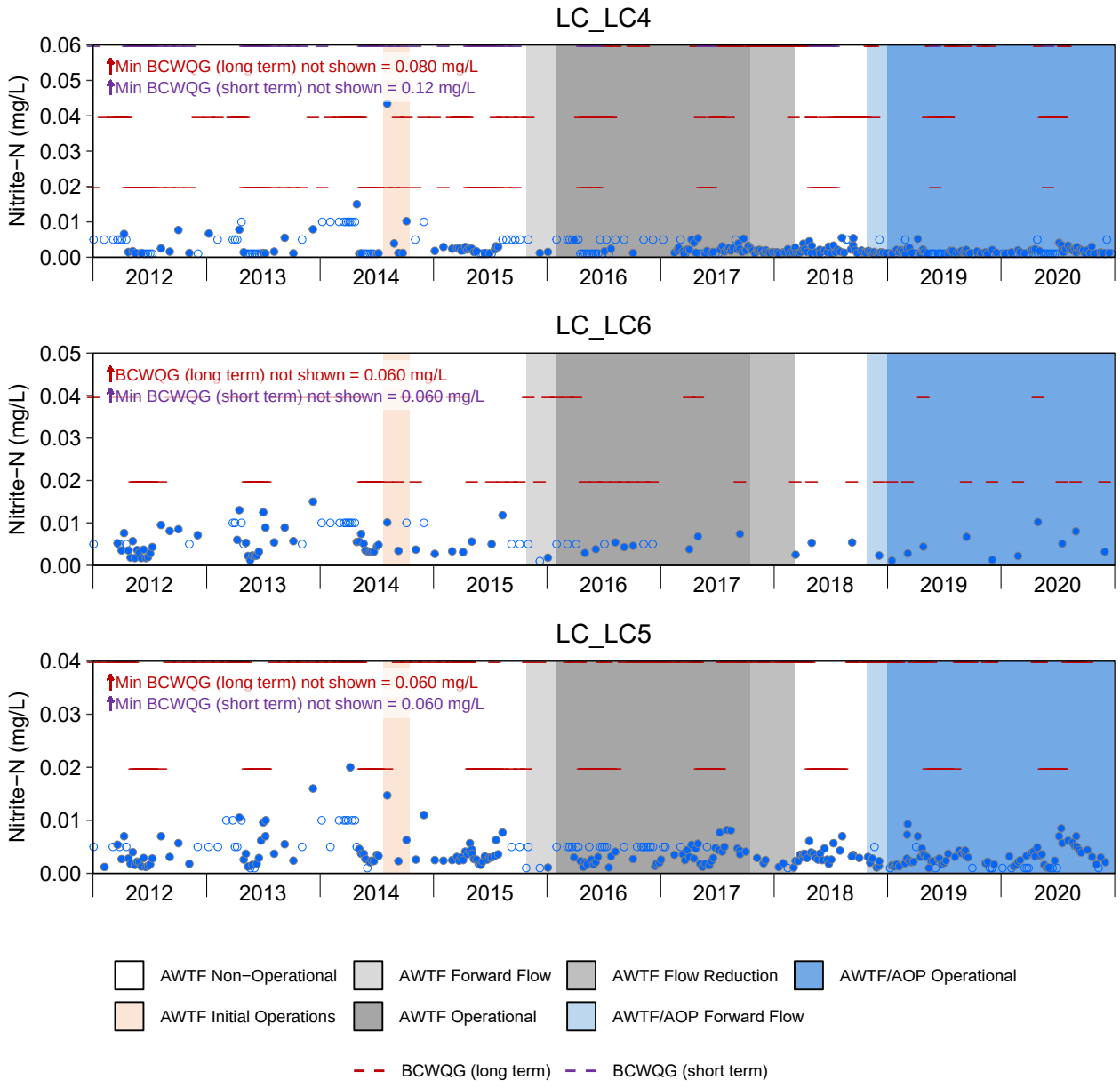

Figure D.3: Time Series Plots for Nitrite−N Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water chloride concentrations and the varying guidelines are shown as coloured dashes. Where guideline values exceed the range of the y-axis, the minimum value of the guidelines that exceeds the range of the y-axis is listed.

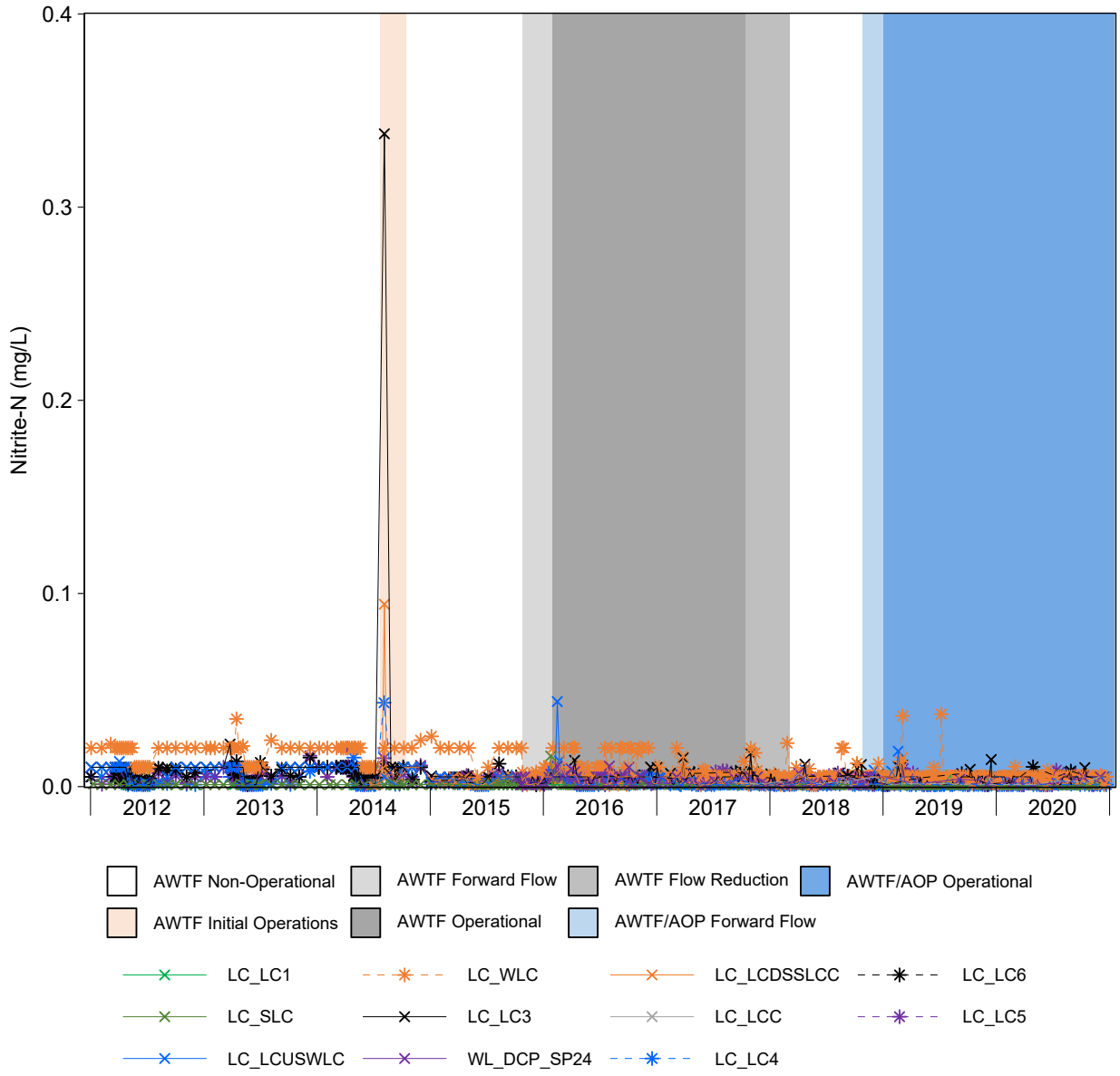

Figure D.4: Time Series Plots for Aqueous Nitrite-N Concentrations from the Line Creek LAEMP Sampling Stations, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted at the LRL (LRLs between 0.0010 and 0.020 mg/L). West Line Creek (WLC) Active Water Treatment Facility (AWTF) operational timelines pertain only to mine-exposed monitoring areas located downstream of the AWTF discharge. 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 September 2017.

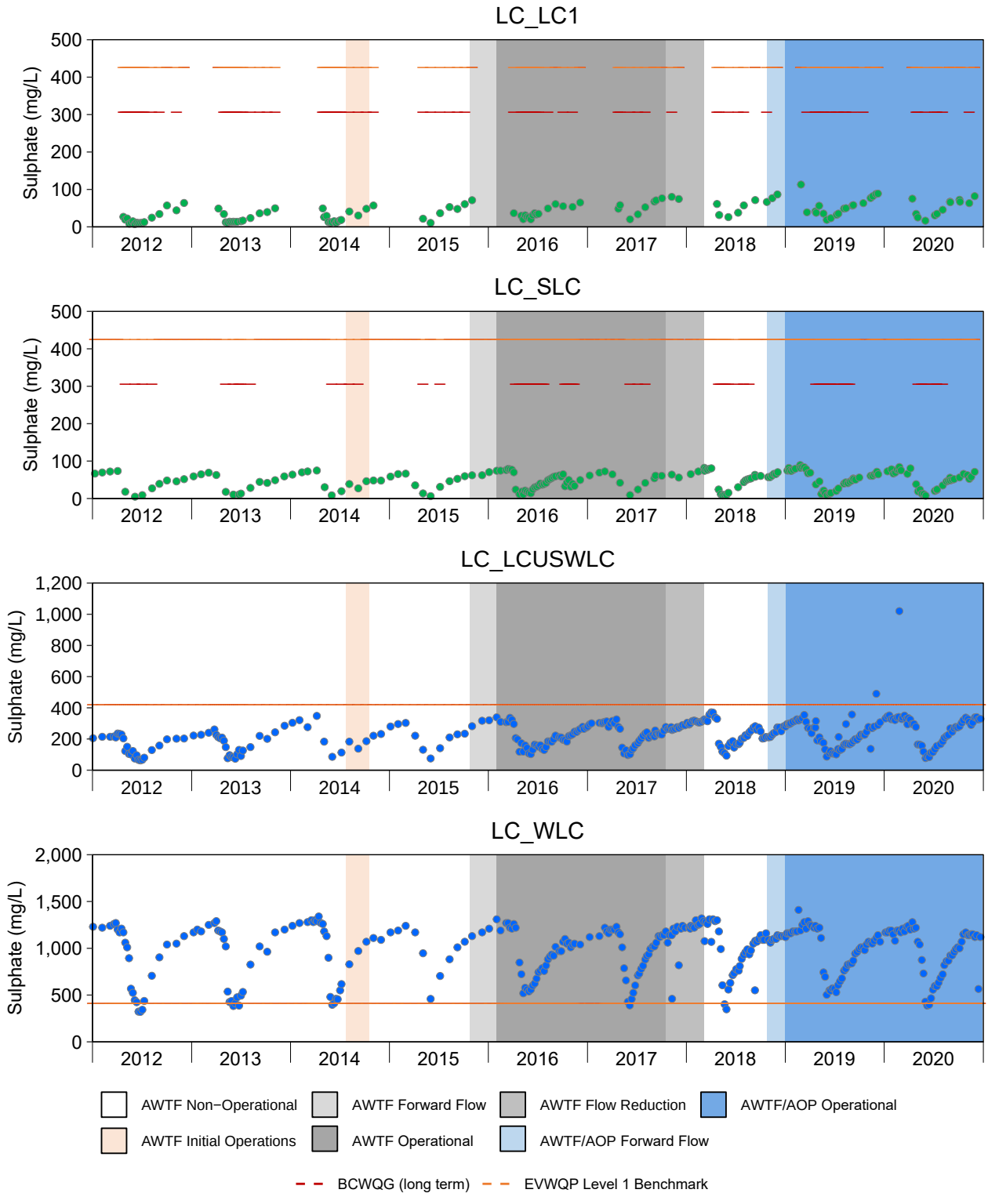

Figure D.5: Time Series Plots for Sulphate Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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). 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 September 2017.

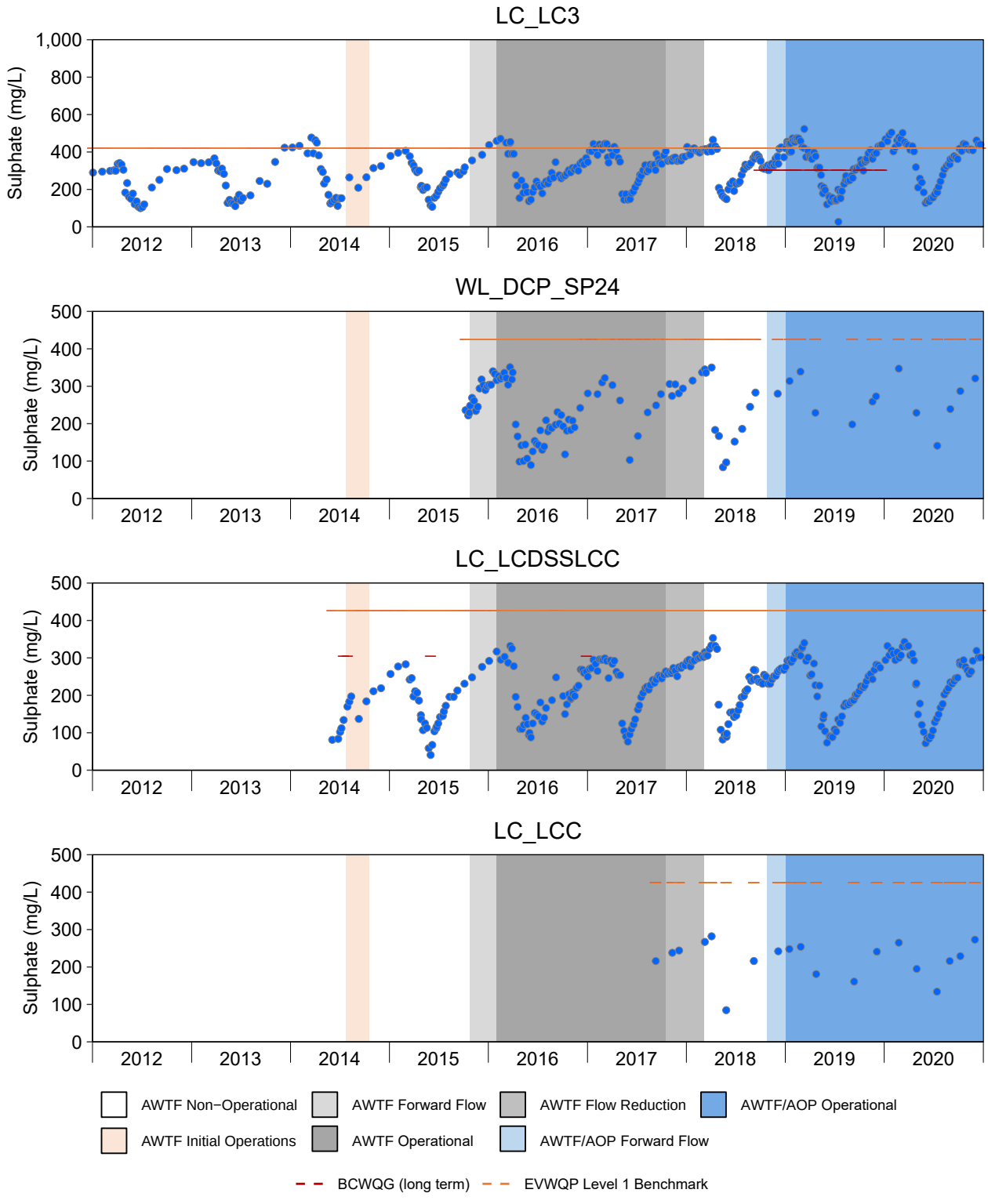

Figure D.5: Time Series Plots for Sulphate Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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). The EVWQP Level 1 Benchmark is shown in plots where the EVWQP Level 1 Benchmark and the BCWQG are equal.

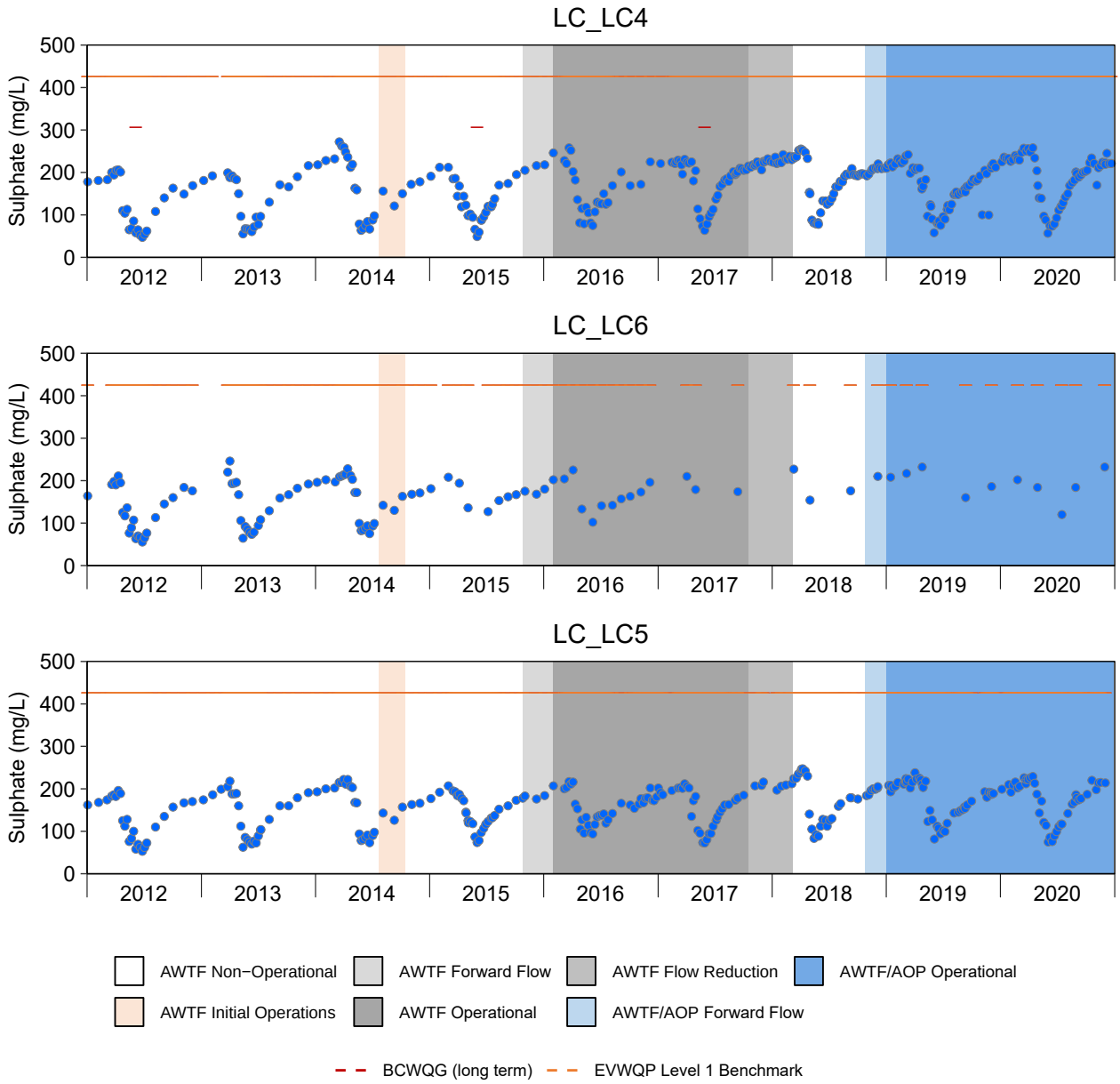

Figure D.5: Time Series Plots for Sulphate Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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). The EVWQP Level 1 Benchmark is shown in plots where the EVWQP Level 1 Benchmark and the BCWQG are equal.

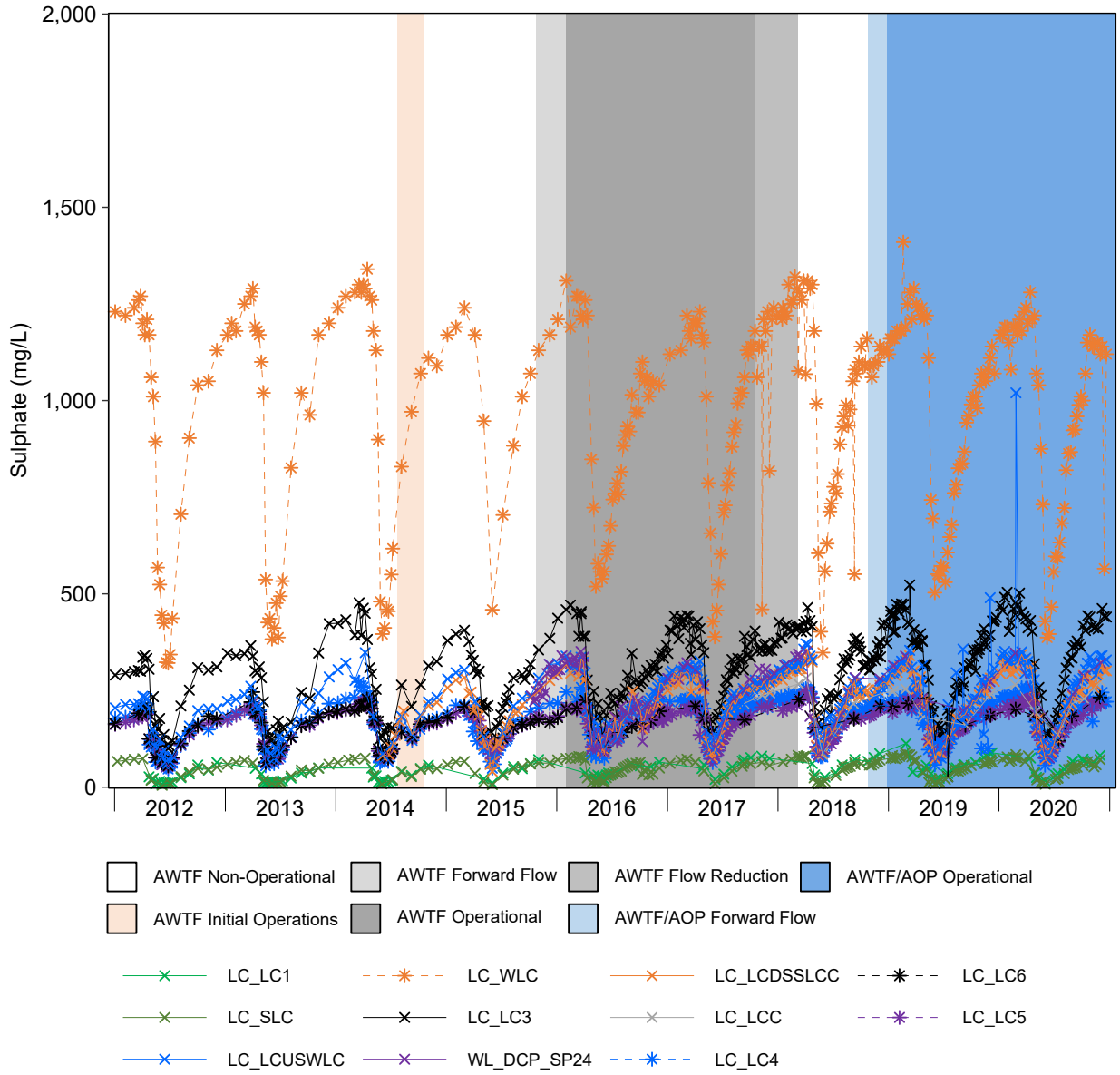

Figure D.6: Time Series Plots for Aqueous Sulphate Concentrations from the Line Creek LAEMP Sampling Stations, 2012 to 2020

Notes: All concentrations reported by the laboratory were detectable. West Line Creek (WLC) Active Water Treatment Facility (AWTF) operational timelines pertain only to mine-exposed monitoring areas located downstream of the AWTF discharge. 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 September 2017.

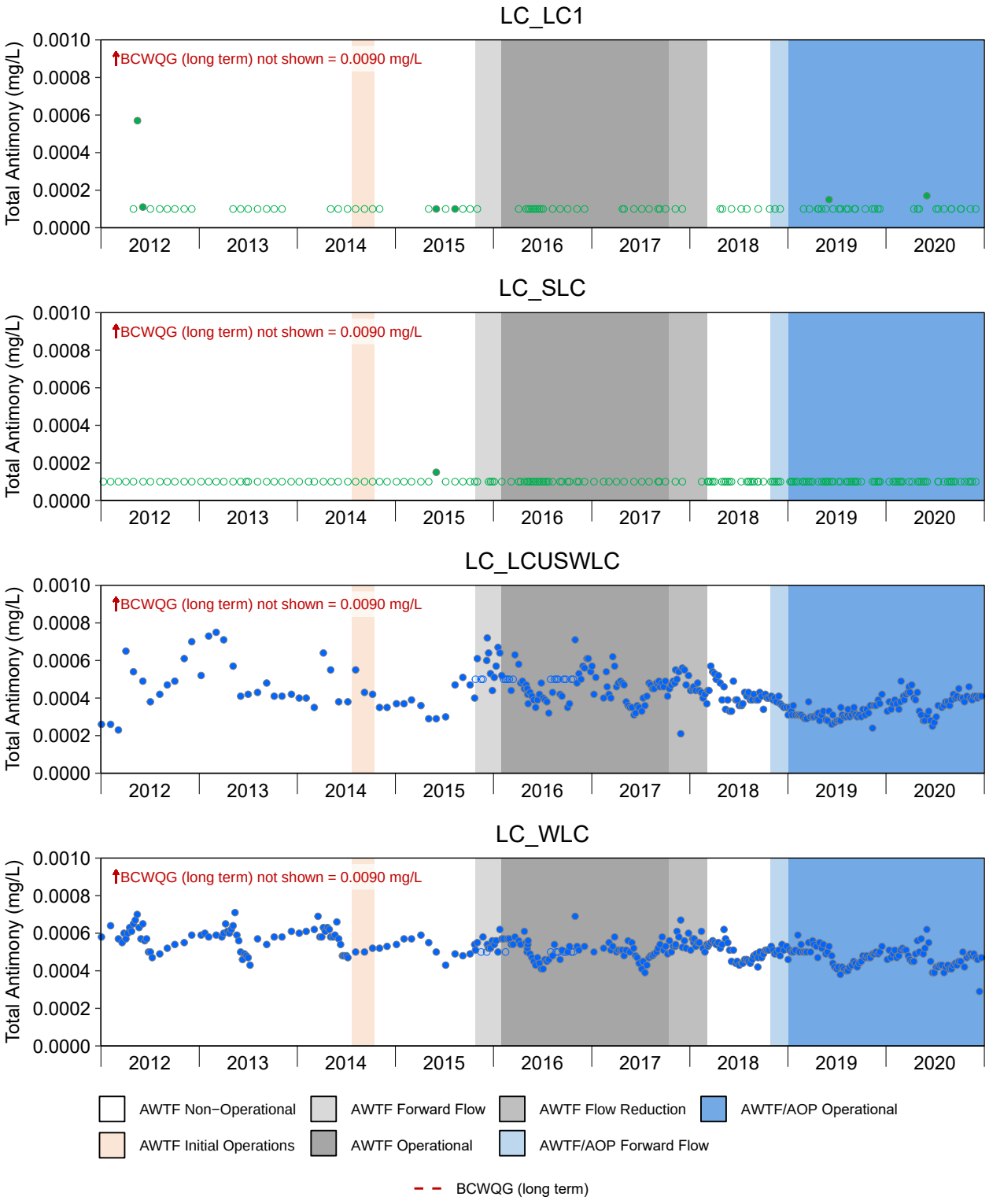

Figure D.7: Time Series Plots for Total Antimony Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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). 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.

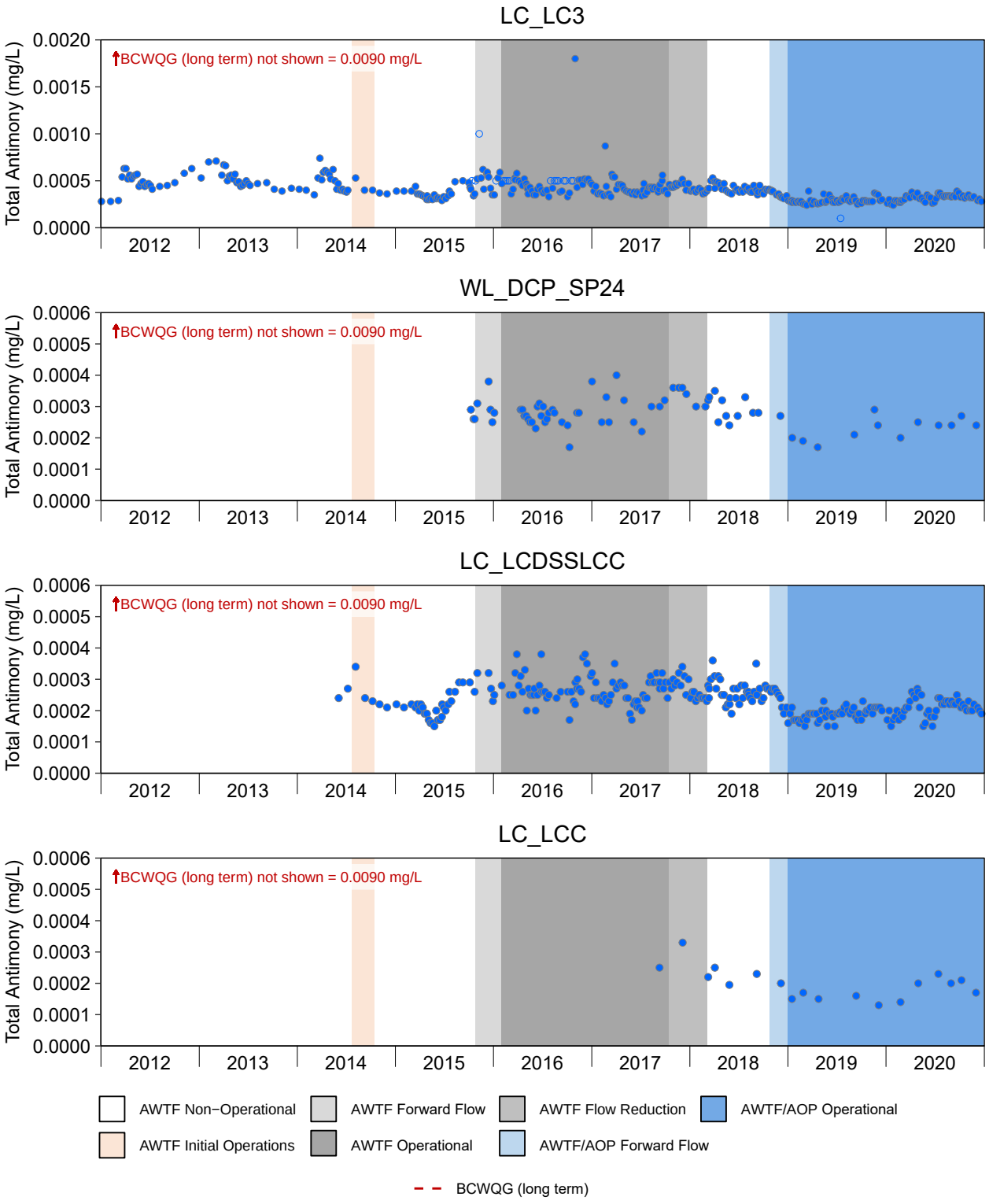

Figure D.7: Time Series Plots for Total Antimony Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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).

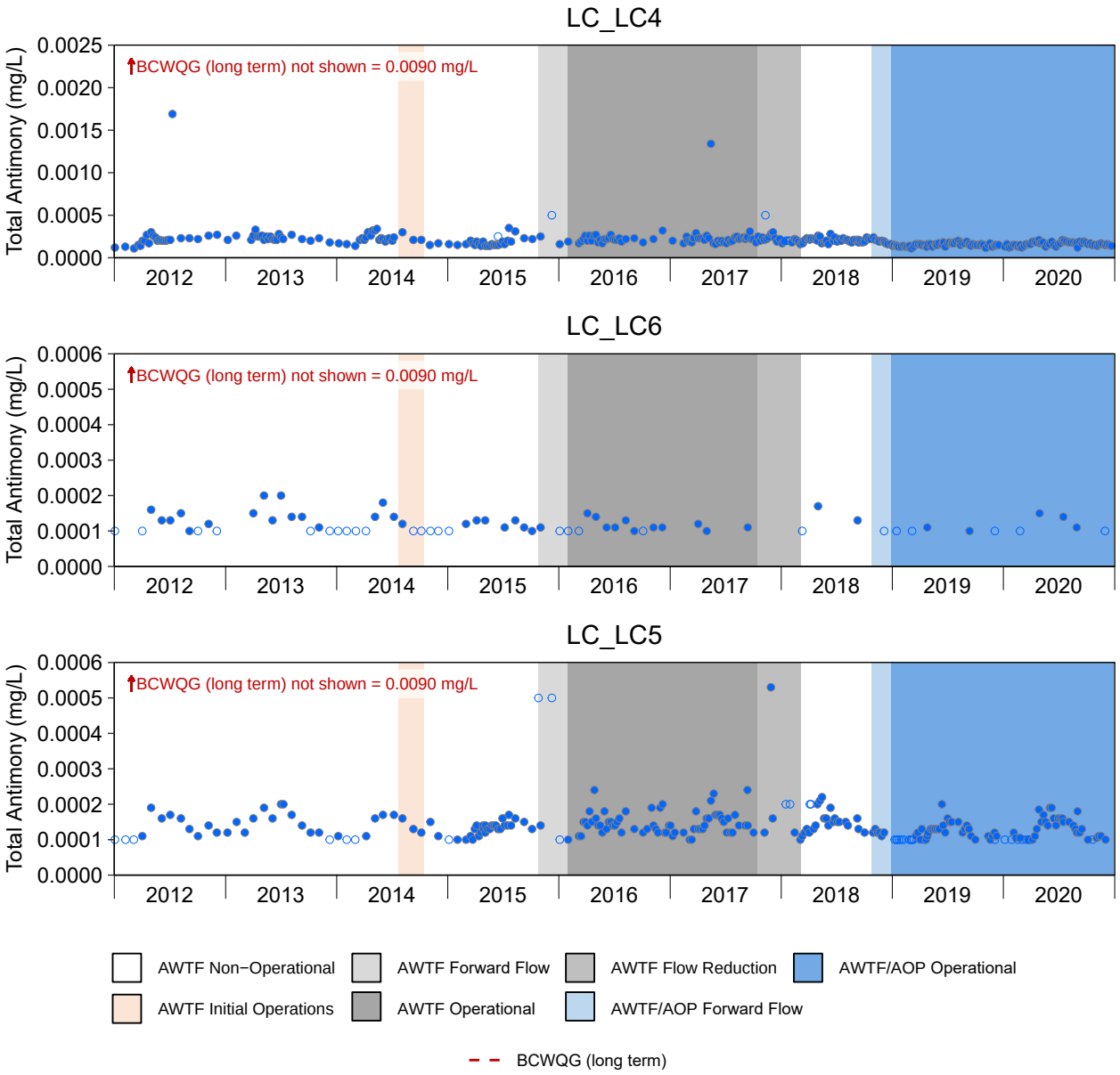

Figure D.7: Time Series Plots for Total Antimony Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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).

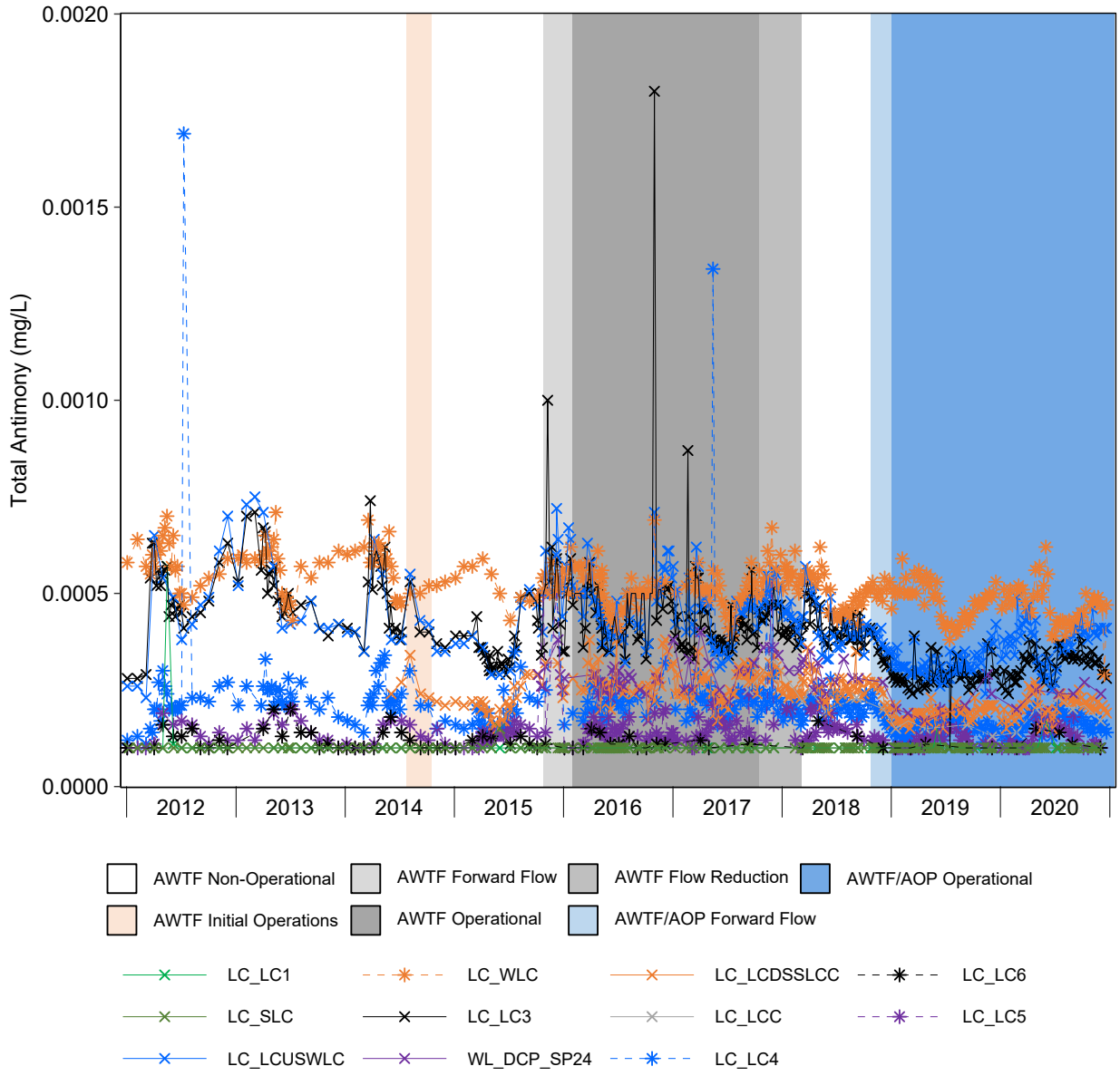

Figure D.8: Time Series Plots for Aqueous Total Antimony Concentrations from the Line Creek LAEMP Sampling Stations, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted at the LRL (LRLs between 0.00010 and 0.0010 mg/L). West Line Creek (WLC) Active Water Treatment Facility (AWTF) operational timelines pertain only to mine-exposed monitoring areas located downstream of the AWTF discharge. 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 September 2017.

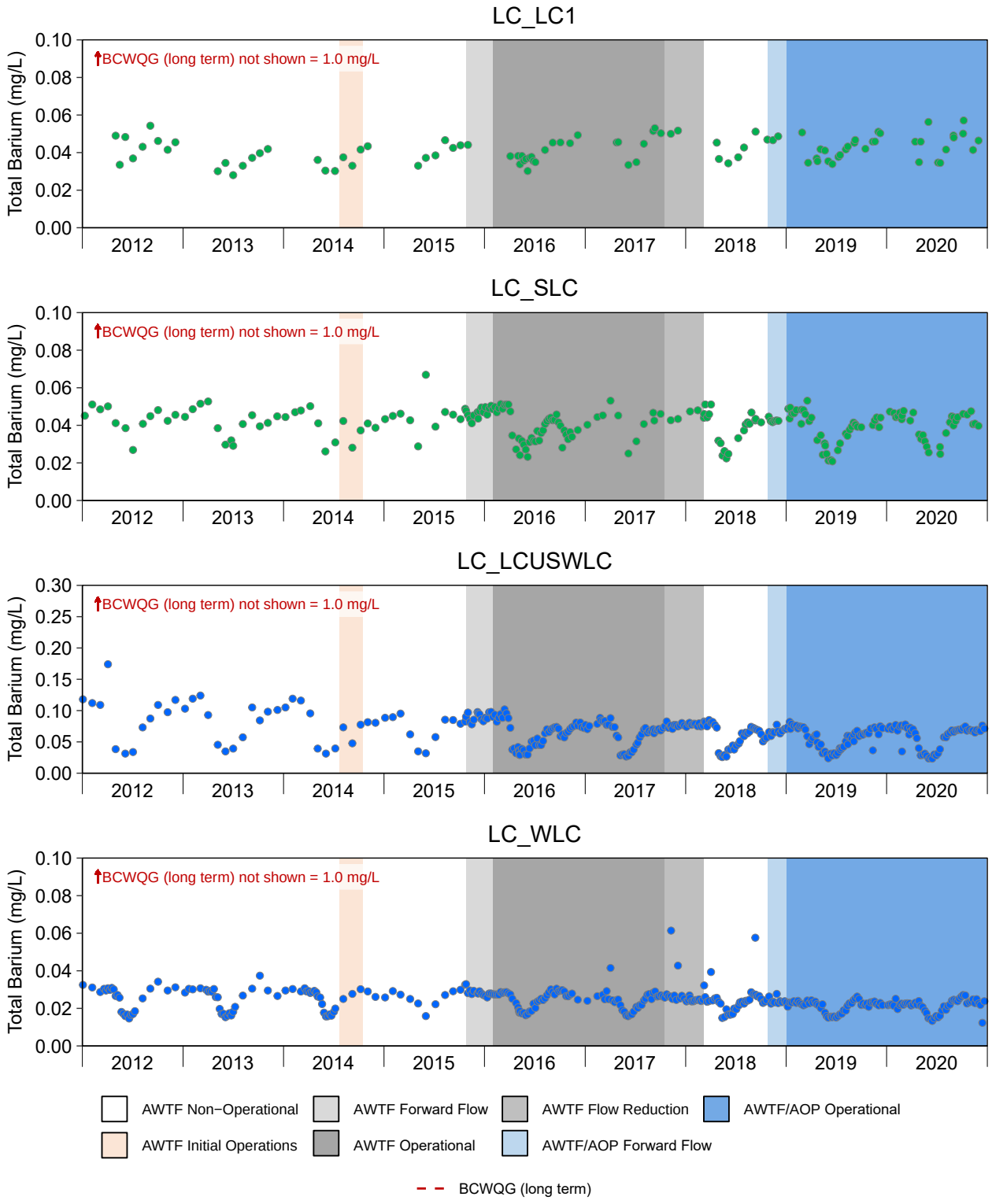

Figure D.9: Time Series Plots for Total Barium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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). 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.

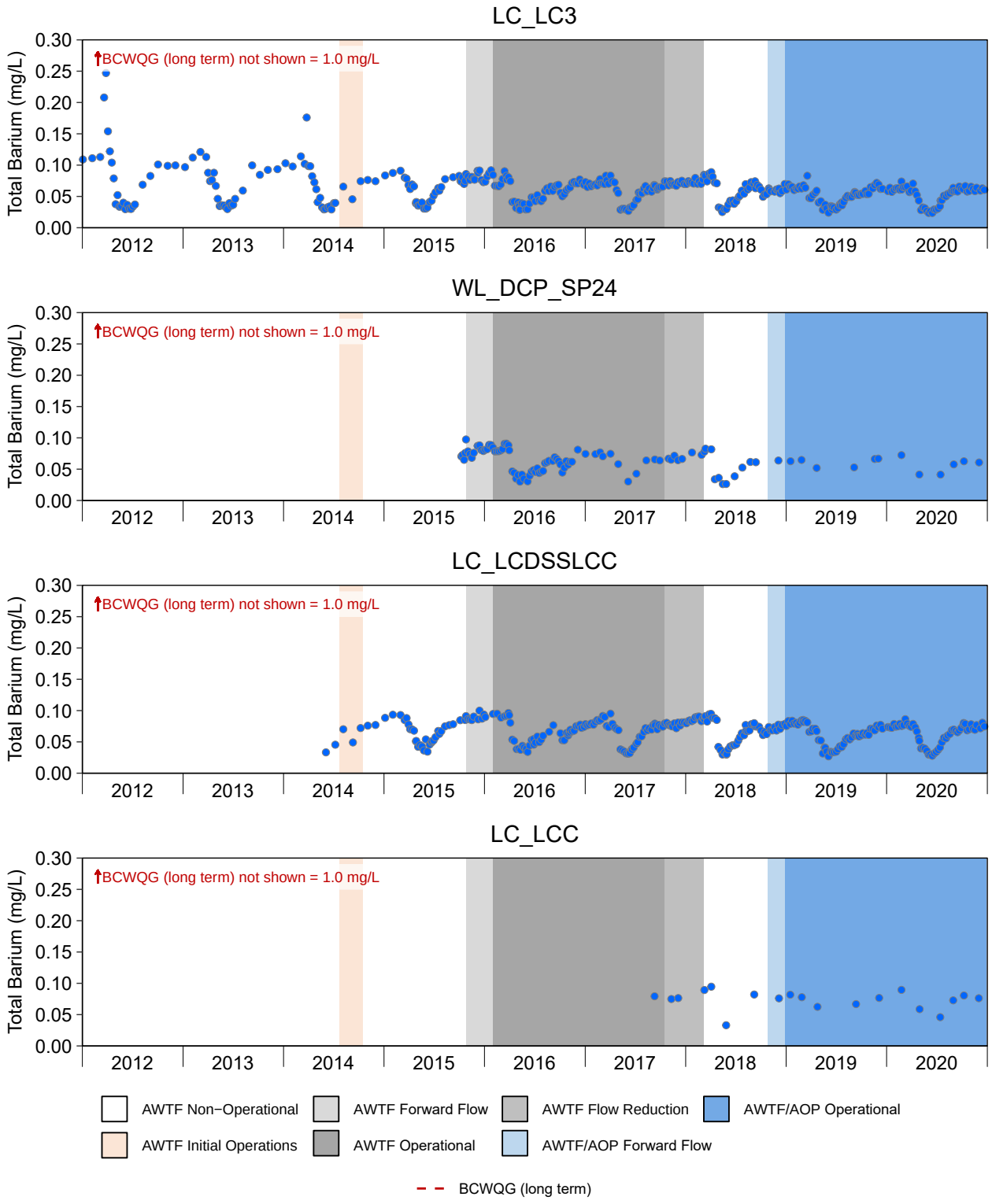

Figure D.9: Time Series Plots for Total Barium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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).

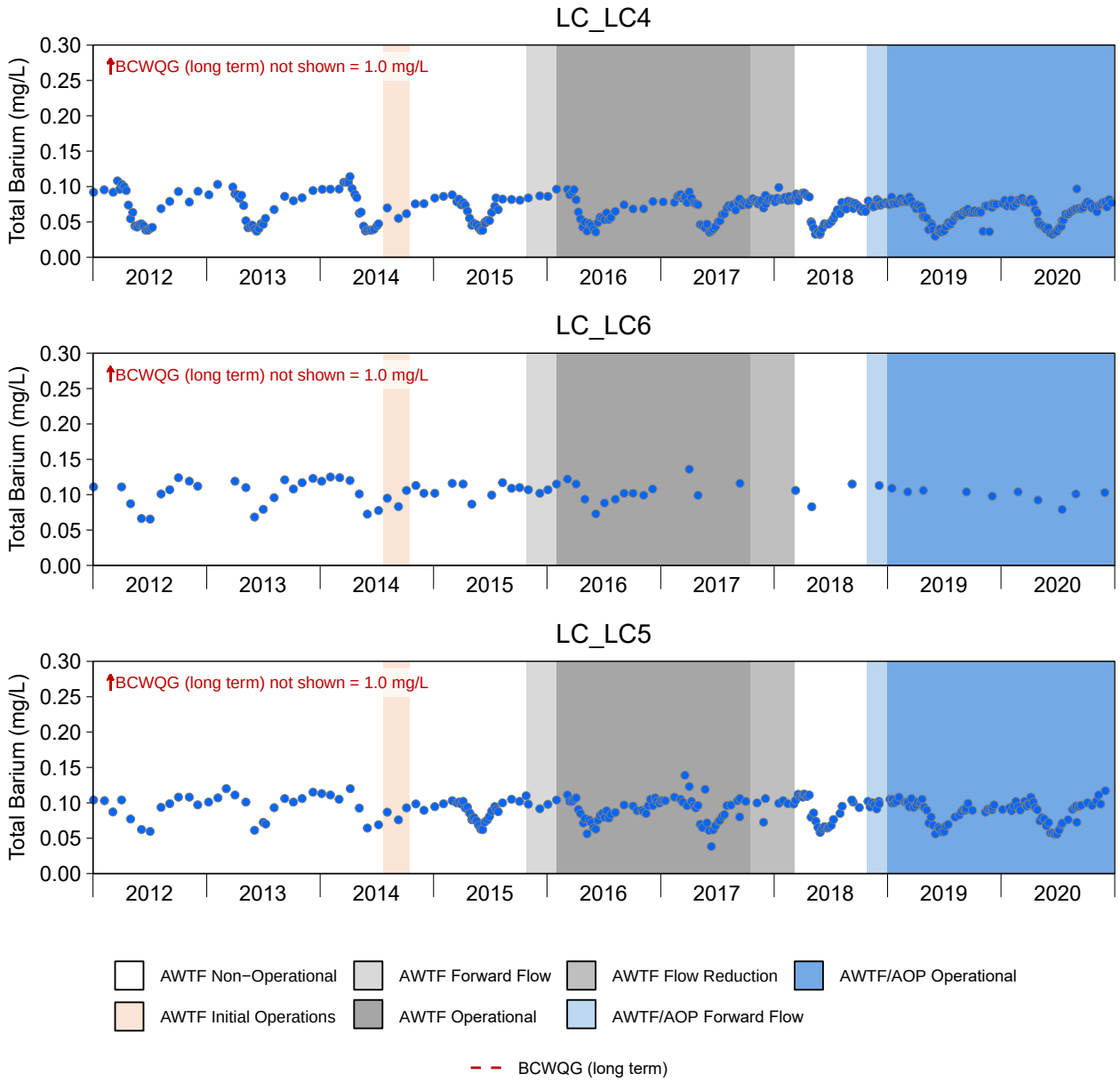

Figure D.9: Time Series Plots for Total Barium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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).

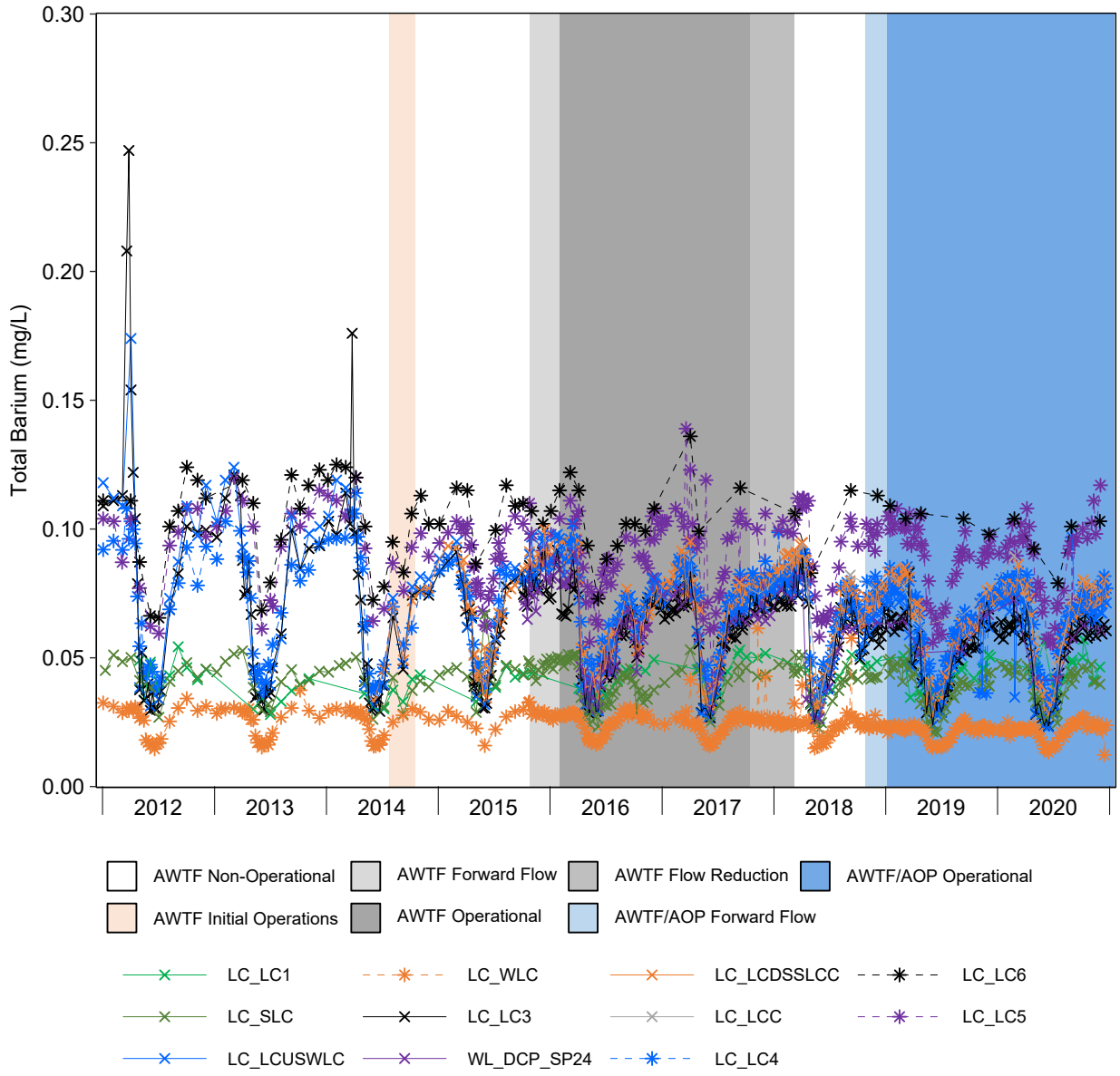

Figure D.10: Time Series Plots for Aqueous Total Barium Concentrations from the Line Creek LAEMP Sampling Stations, 2012 to 2020

Notes: All concentrations reported by the laboratory were detectable. West Line Creek (WLC) Active Water Treatment Facility (AWTF) operational timelines pertain only to mine-exposed monitoring areas located downstream of the AWTF discharge. 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 September 2017.

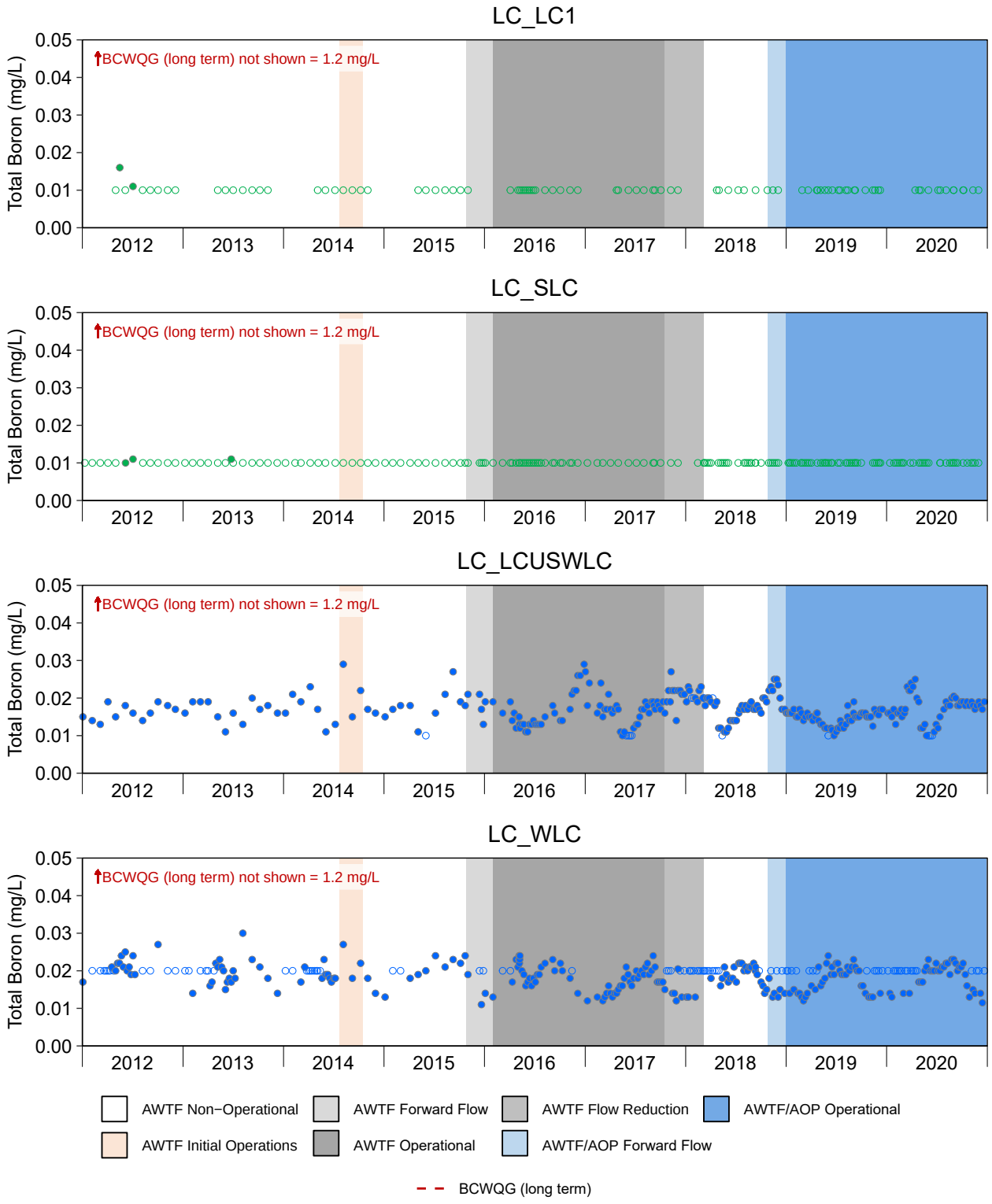

Figure D.11: Time Series Plots for Total Boron Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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). 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.

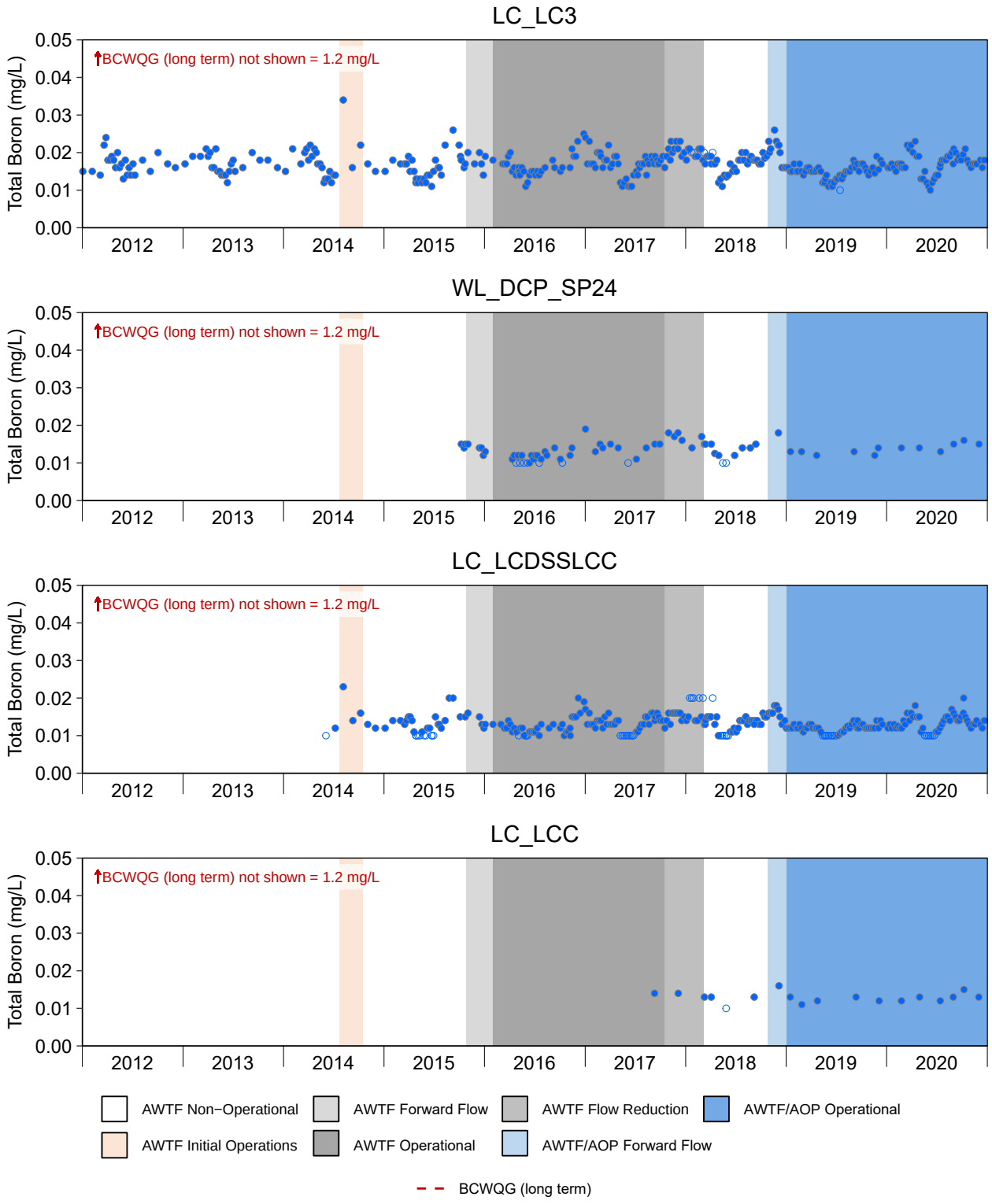

Figure D.11: Time Series Plots for Total Boron Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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).

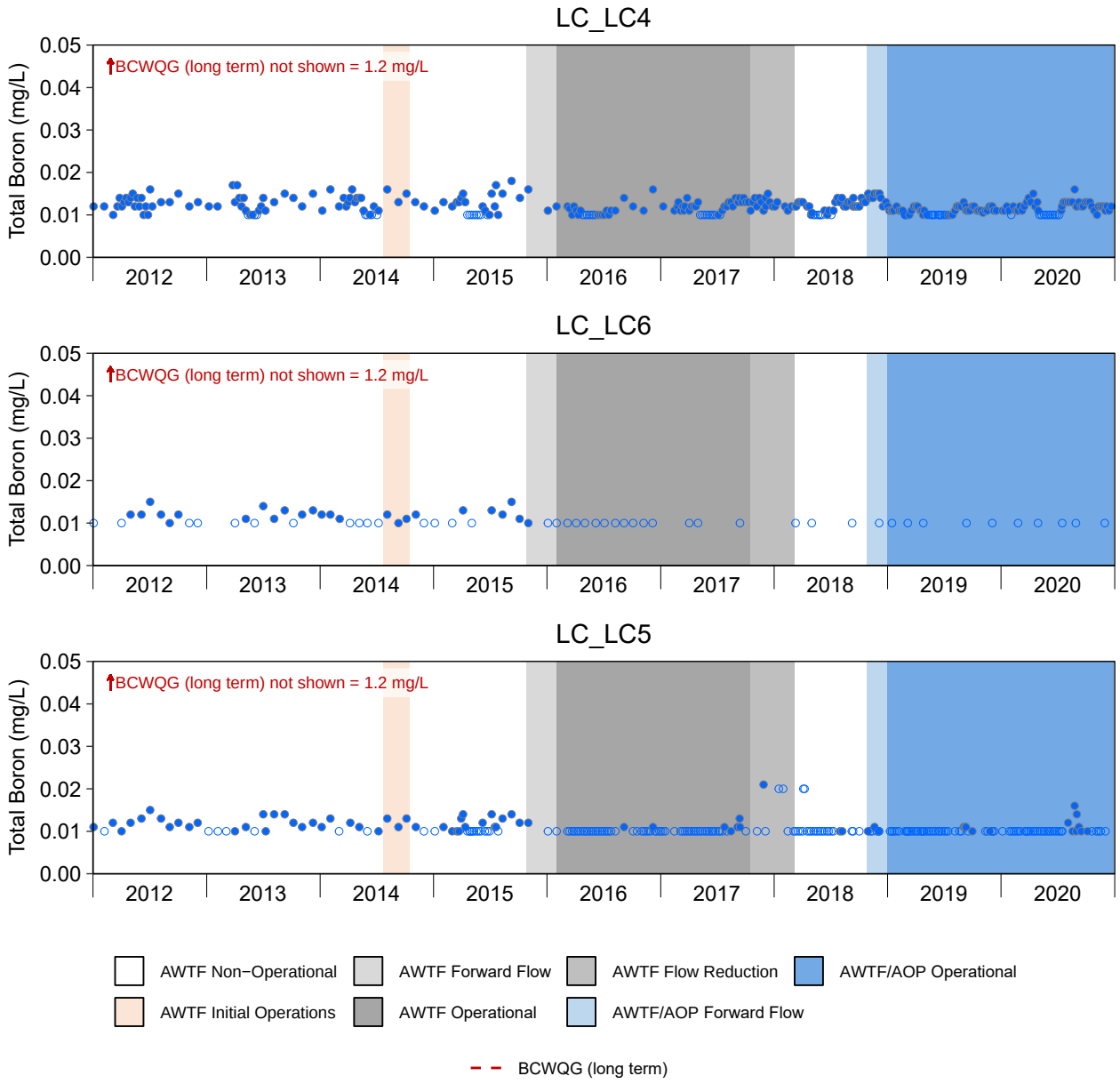

Figure D.11: Time Series Plots for Total Boron Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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).

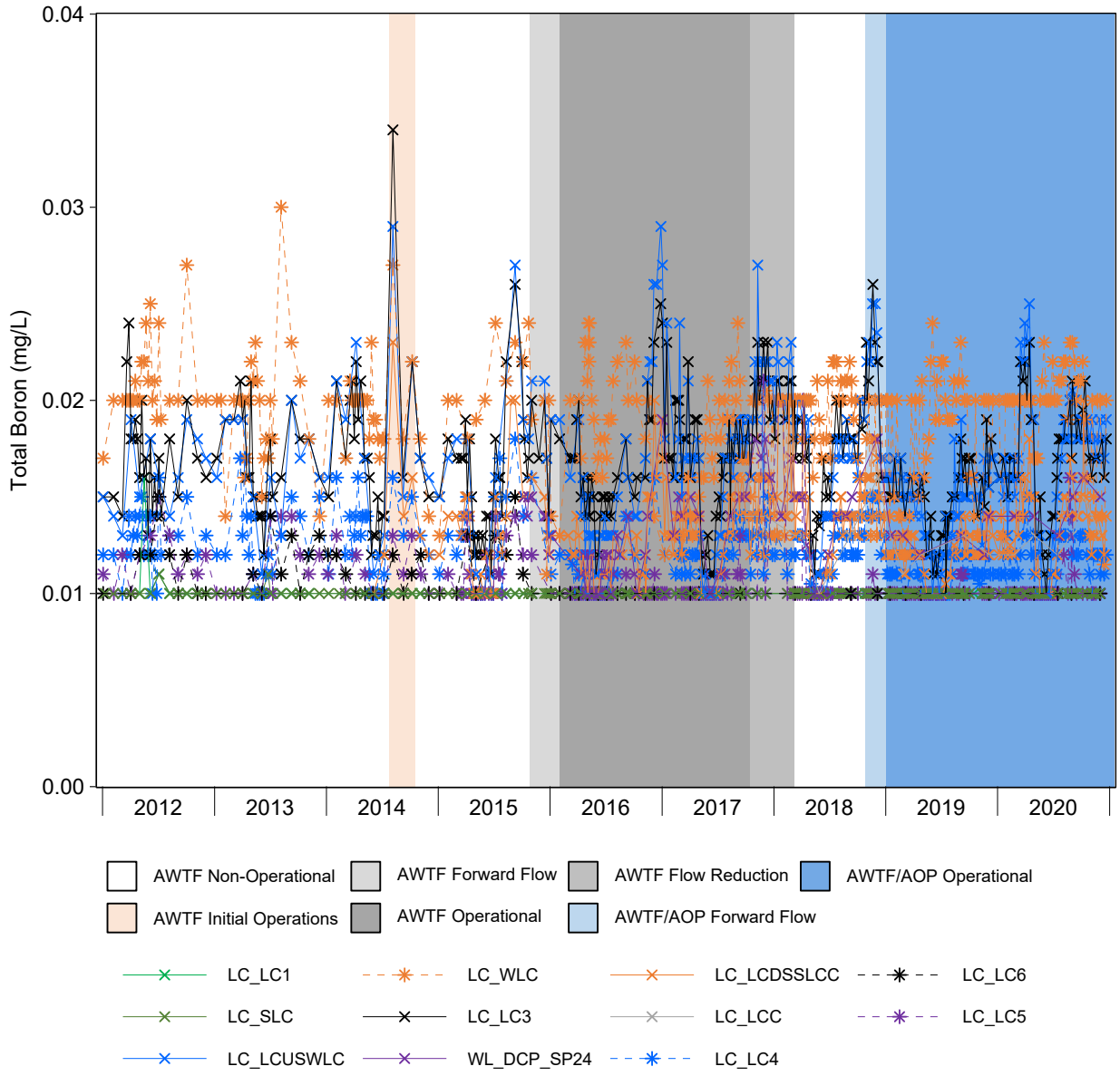

Figure D.12: Time Series Plots for Aqueous Total Boron Concentrations from the Line Creek LAEMP Sampling Stations, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted at the LRL (LRLs between 0.010 and 0.020 mg/L). West Line Creek (WLC) Active Water Treatment Facility (AWTF) operational timelines pertain only to mine-exposed monitoring areas located downstream of the AWTF discharge. 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 September 2017.

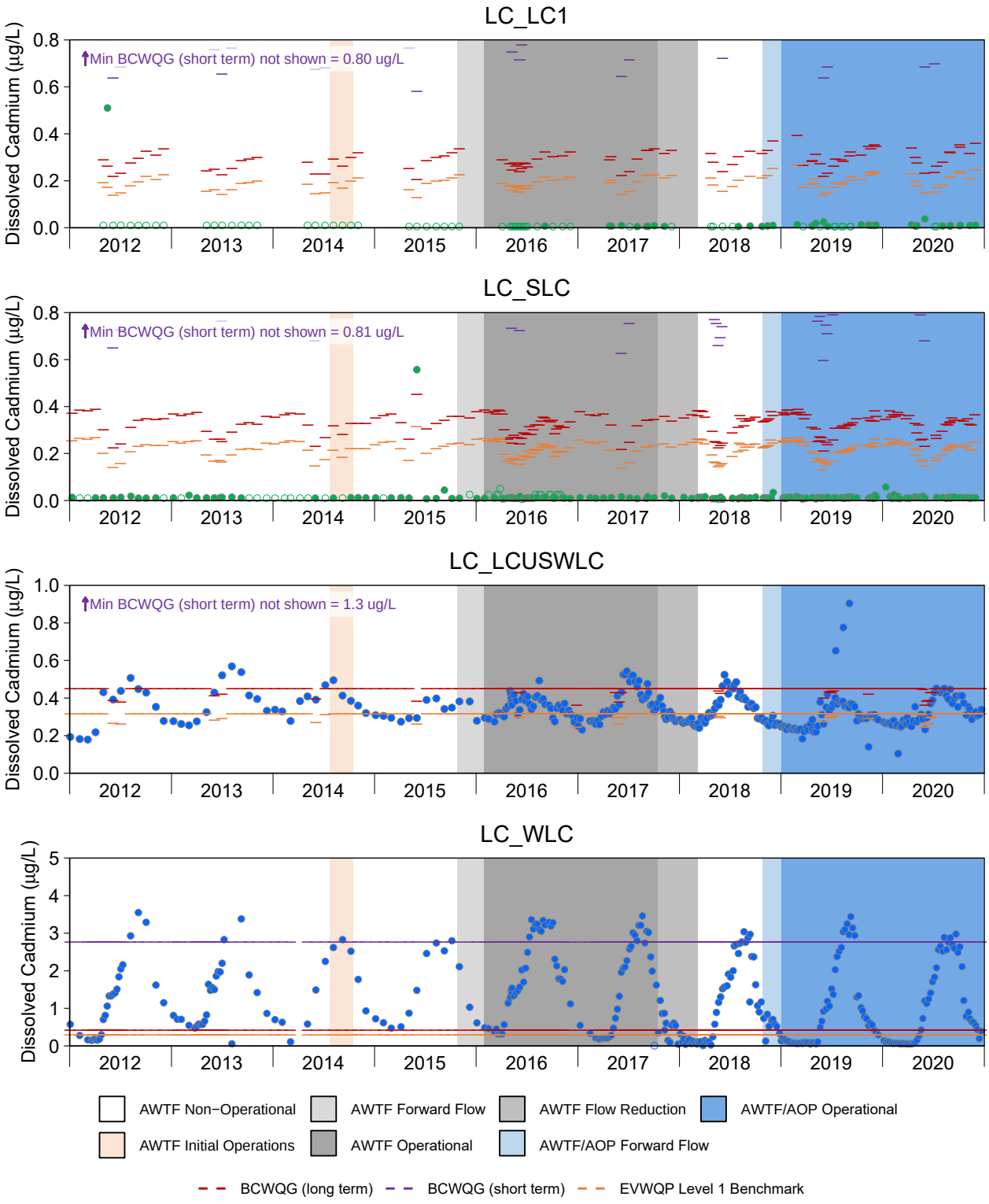

Figure D.13: Time Series Plots for Dissolved Cadmium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. 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). 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.

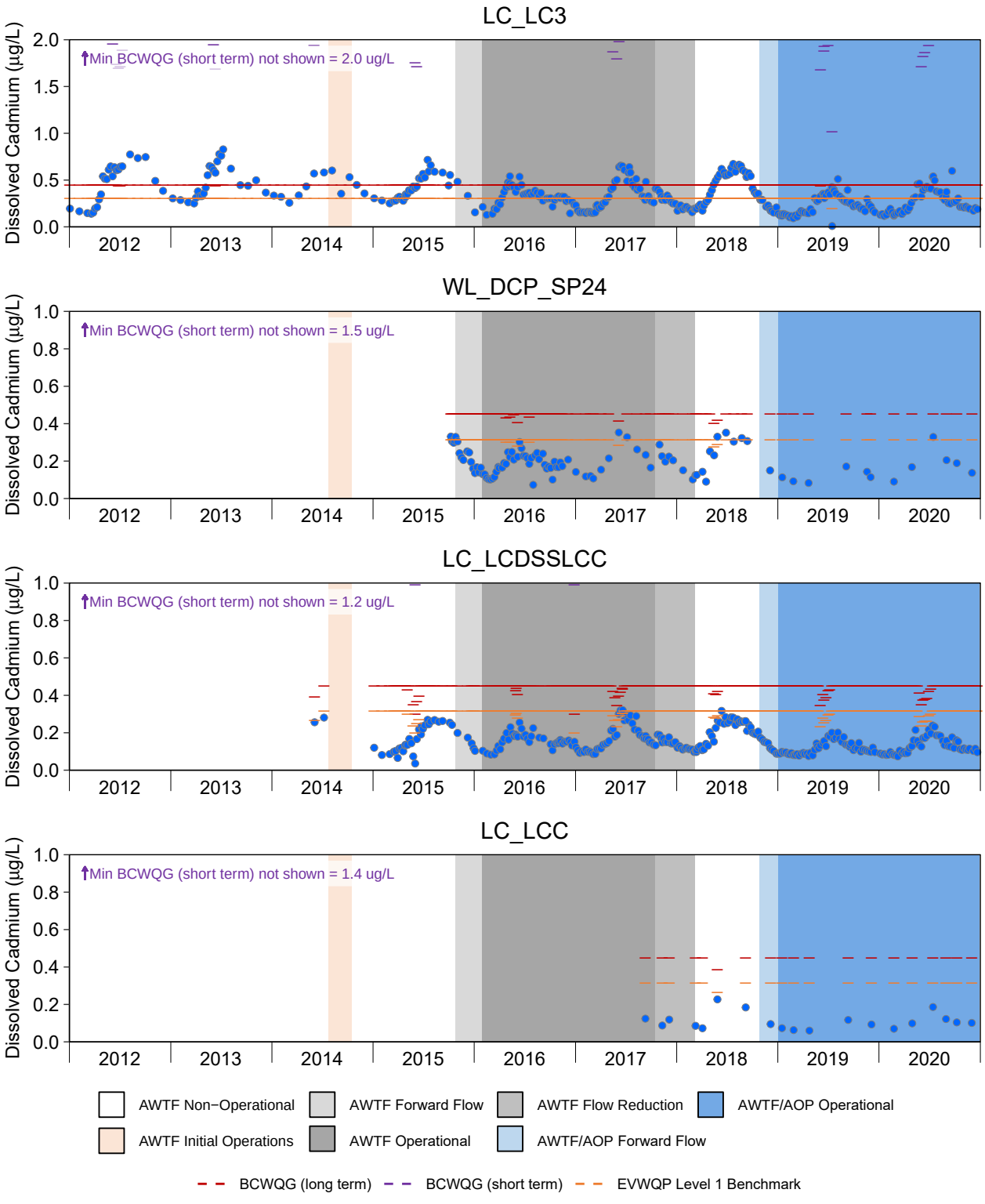

Figure D.13: Time Series Plots for Dissolved Cadmium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. 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).

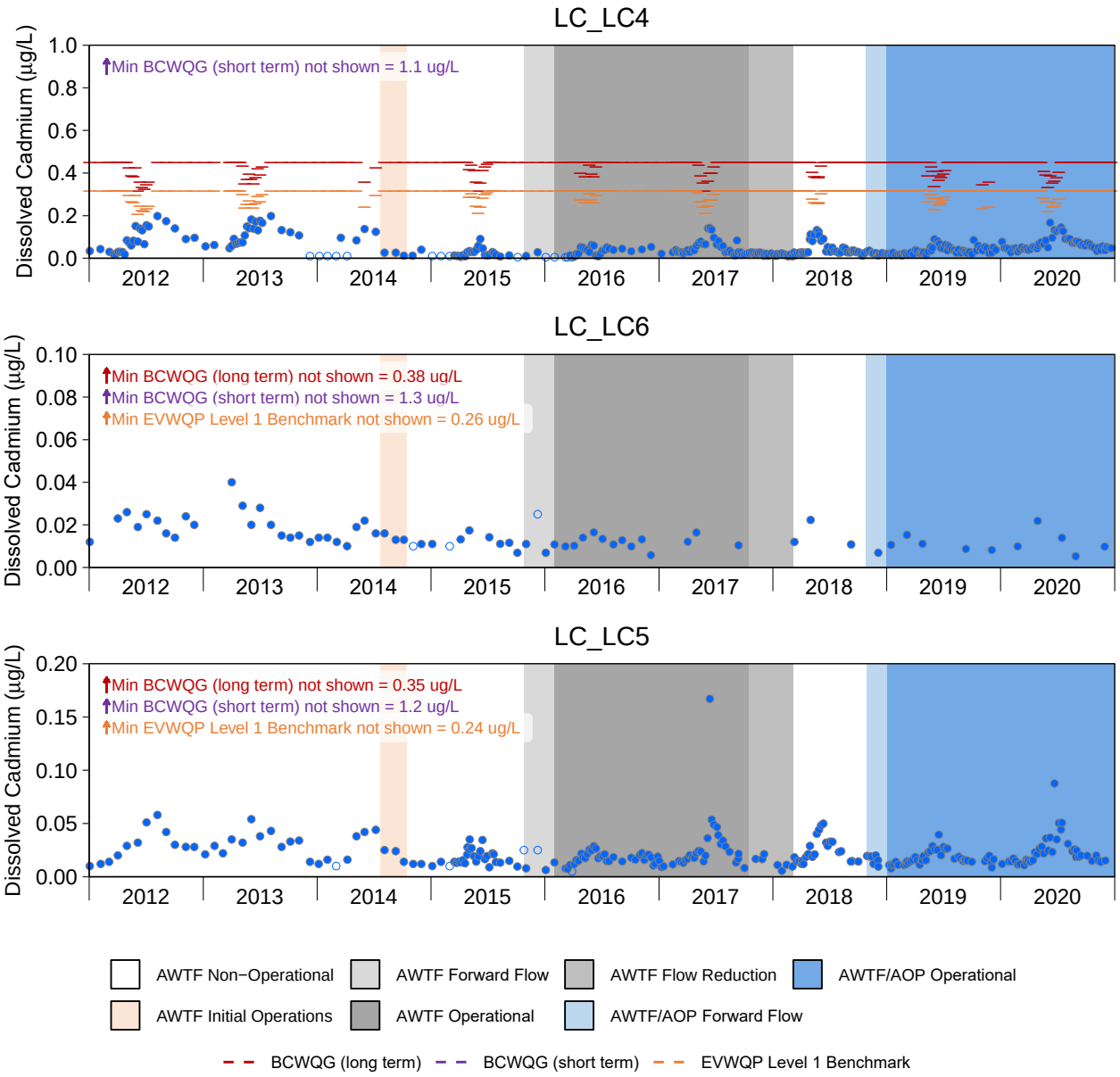

Figure D.13: Time Series Plots for Dissolved Cadmium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. 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).

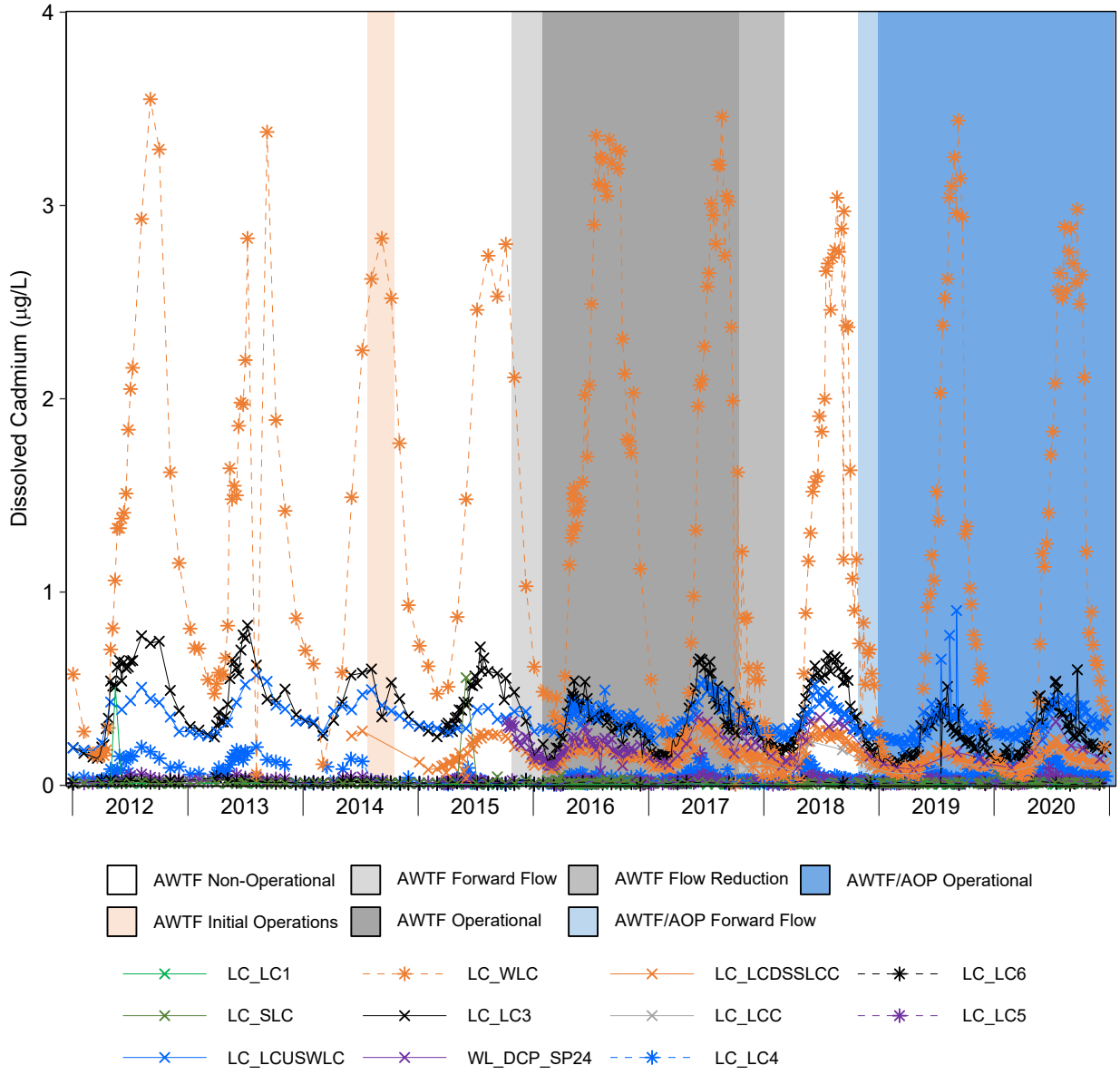

Figure D.14: Time Series Plots for Aqueous Dissolved Cadmium Concentrations from the Line Creek LAEMP Sampling Stations, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted at the LRL (LRLs between 0.0050 and 0.050 mg/L). West Line Creek (WLC) Active Water Treatment Facility (AWTF) operational timelines pertain only to mine-exposed monitoring areas located downstream of the AWTF discharge. 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 September 2017.

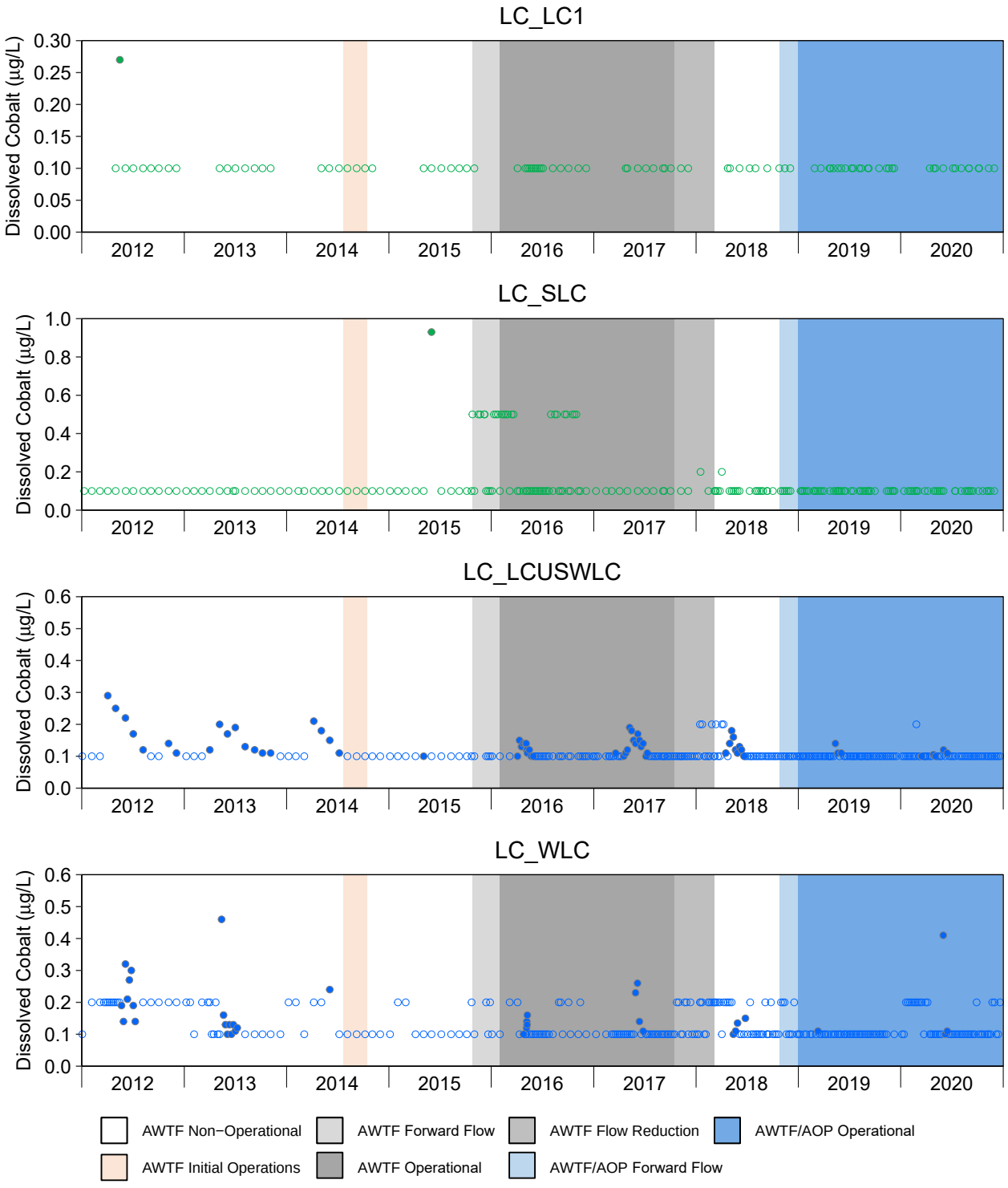

Figure D.15: Time Series Plots for Dissolved Cobalt Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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). 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.

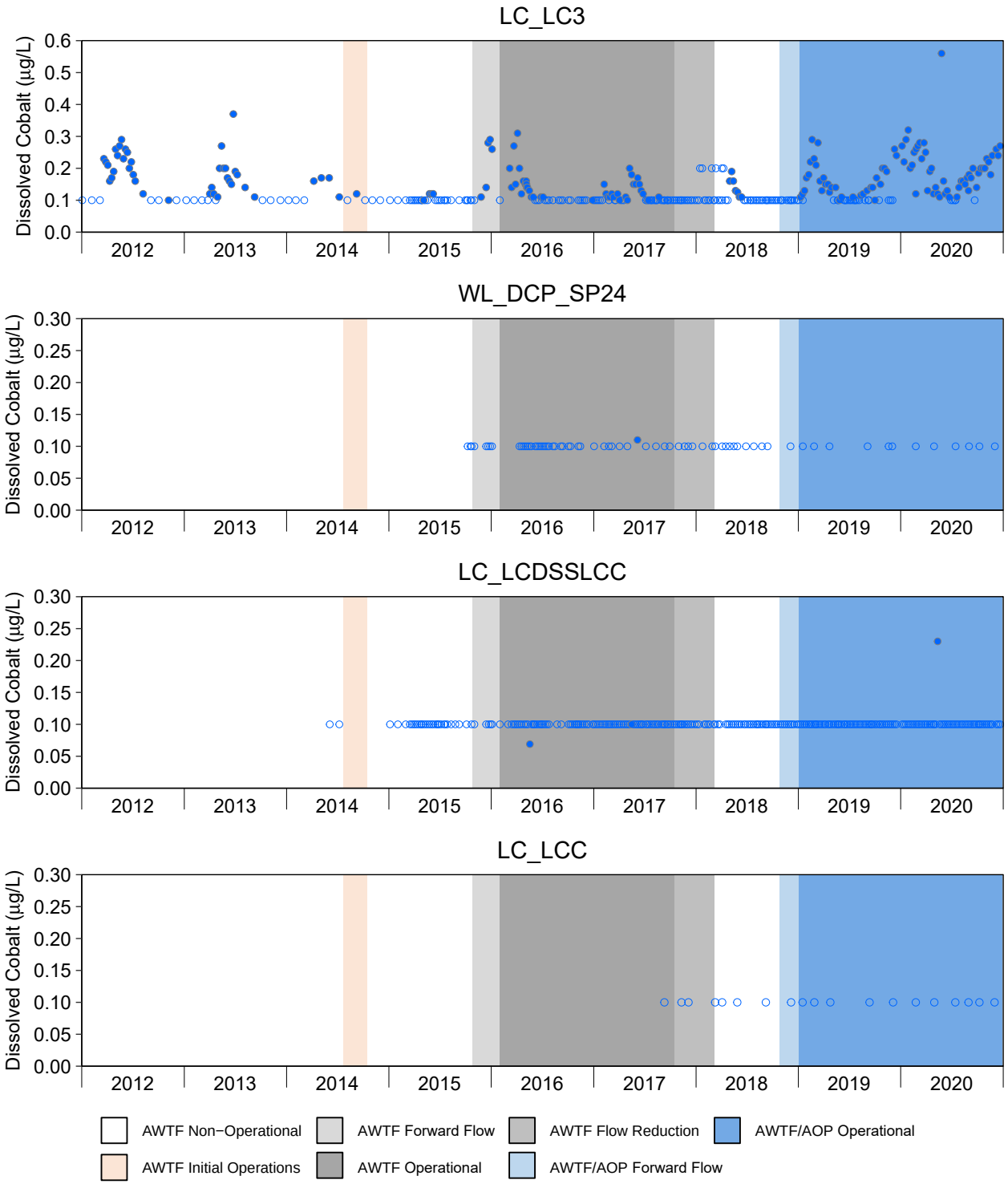

Figure D.15: Time Series Plots for Dissolved Cobalt Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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).

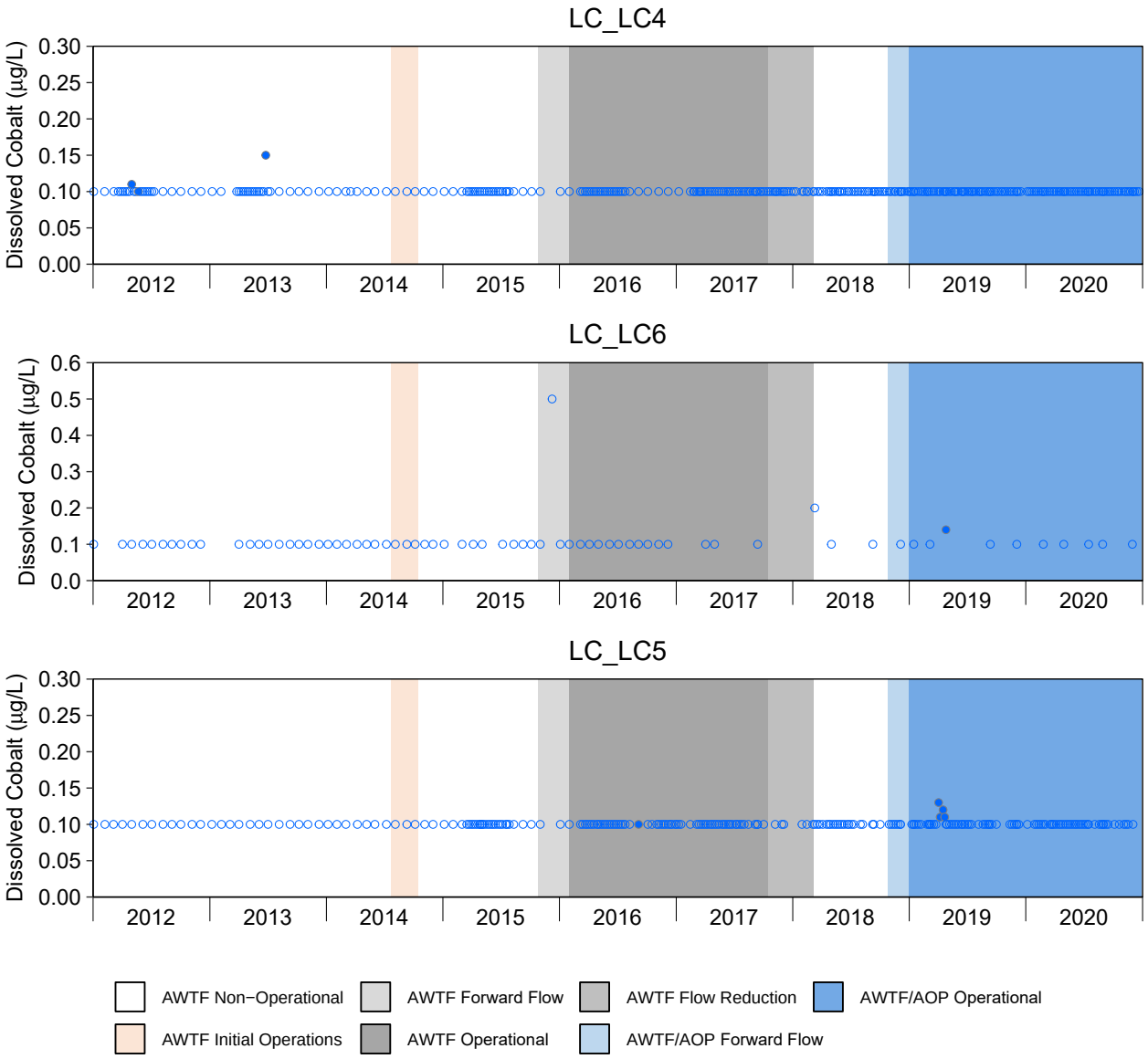

Figure D.15: Time Series Plots for Dissolved Cobalt Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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).

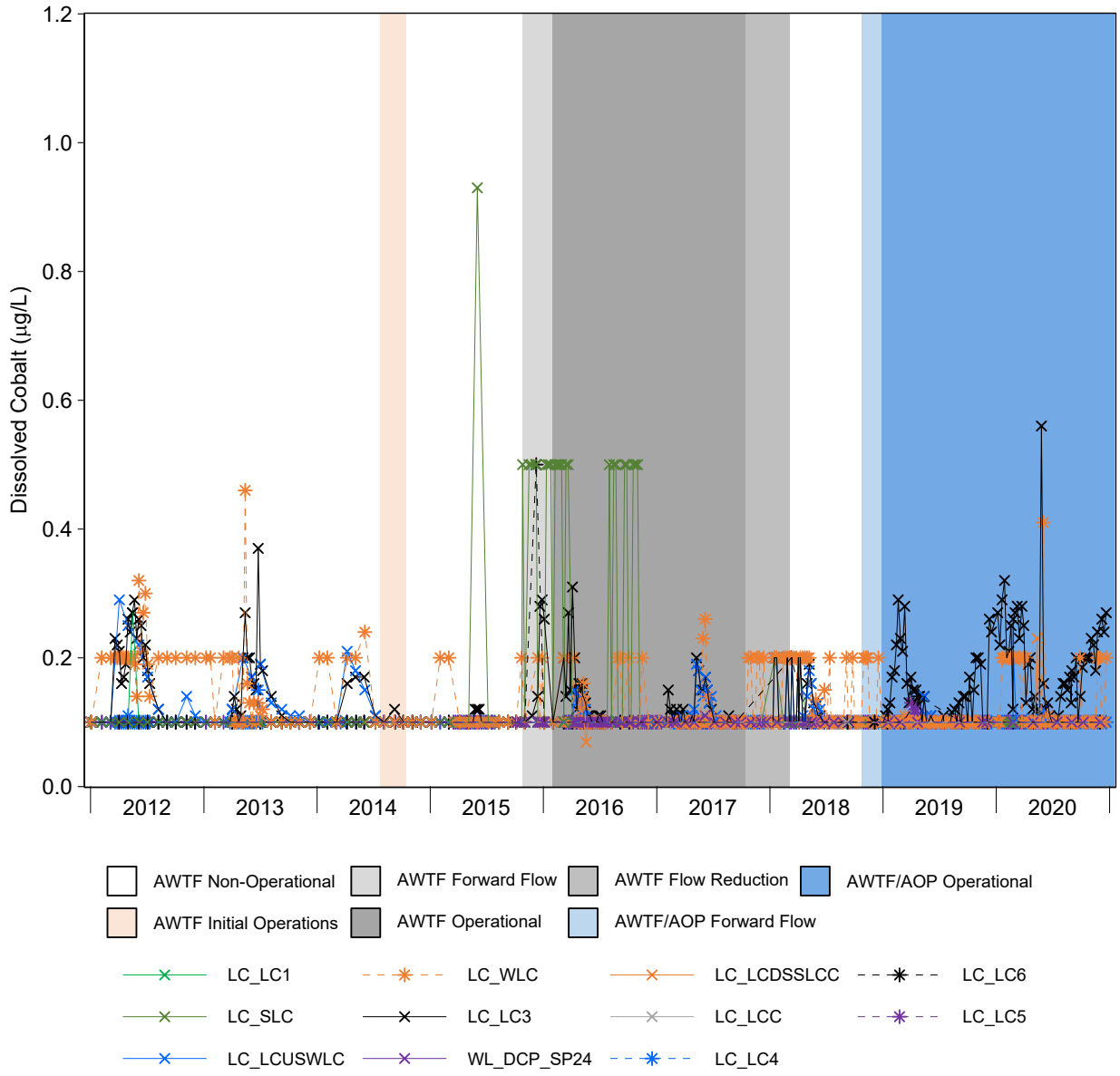

Figure D.16: Time Series Plots for Aqueous Dissolved Cobalt Concentrations from the Line Creek LAEMP Sampling Stations, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted at the LRL (LRLs between 0.10 and 0.50 mg/L). West Line Creek (WLC) Active Water Treatment Facility (AWTF) operational timelines pertain only to mine-exposed monitoring areas located downstream of the AWTF discharge. 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 September 2017.

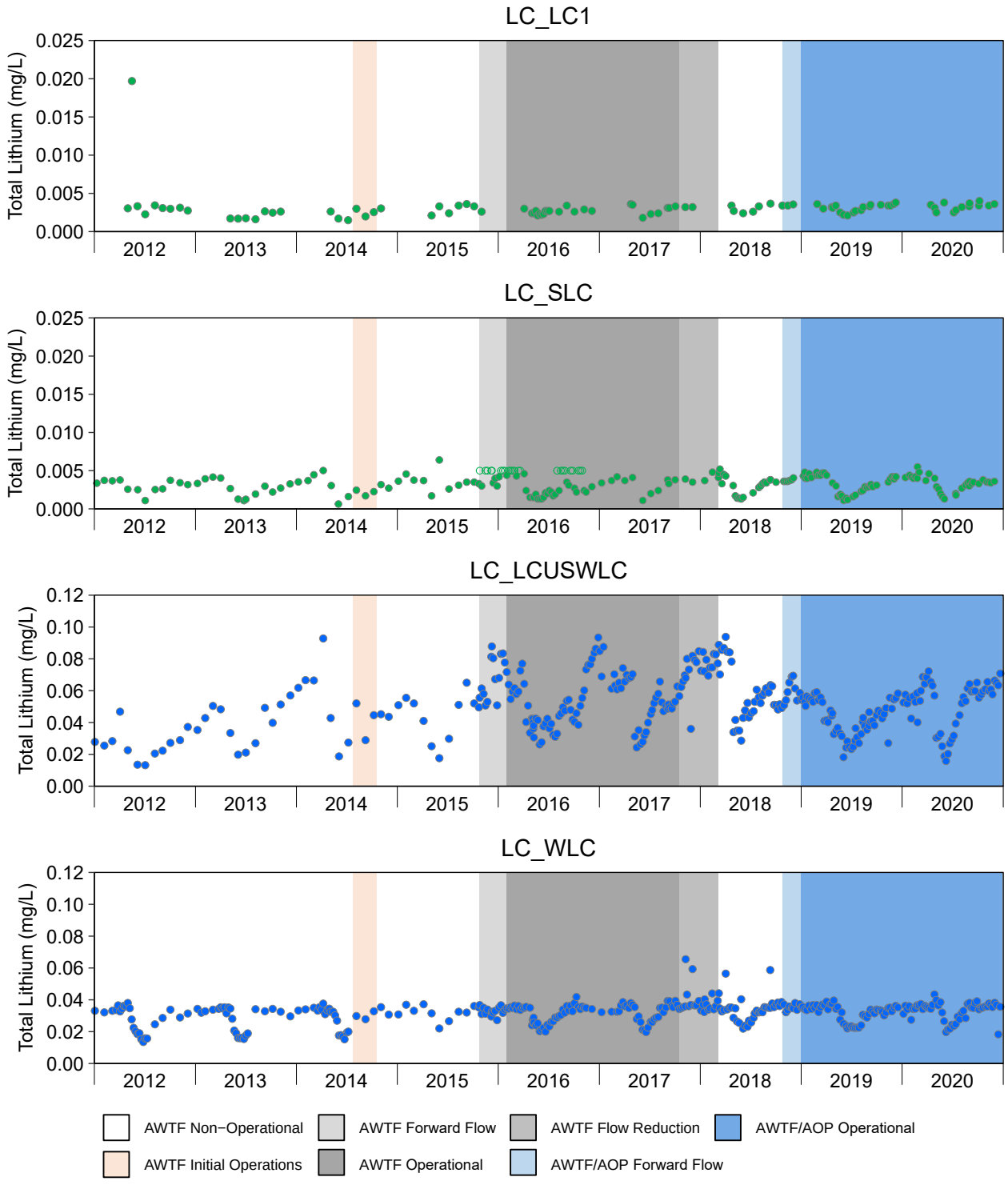

Figure D.17: Time Series Plots for Total Lithium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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). 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.

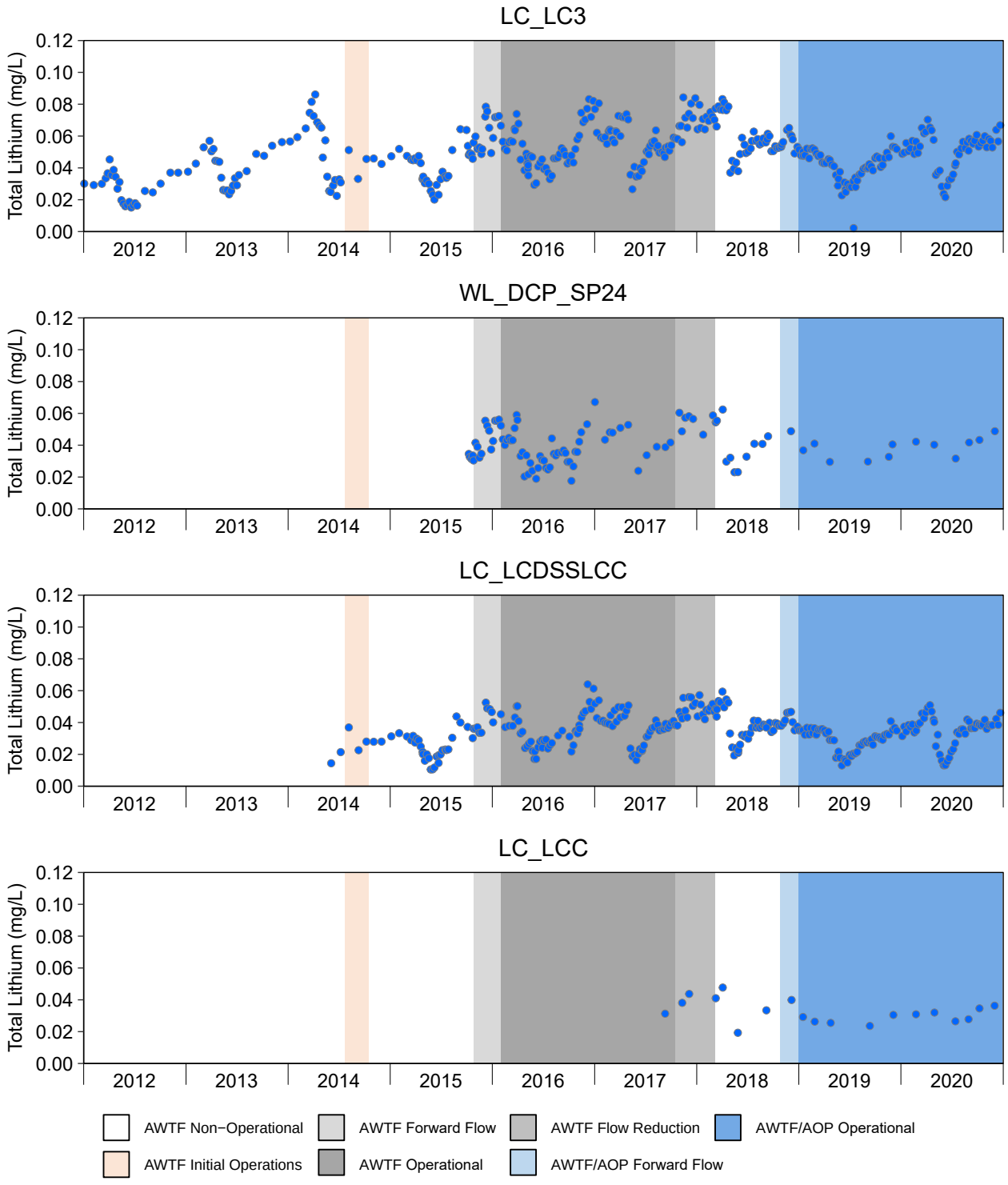

Figure D.17: Time Series Plots for Total Lithium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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).

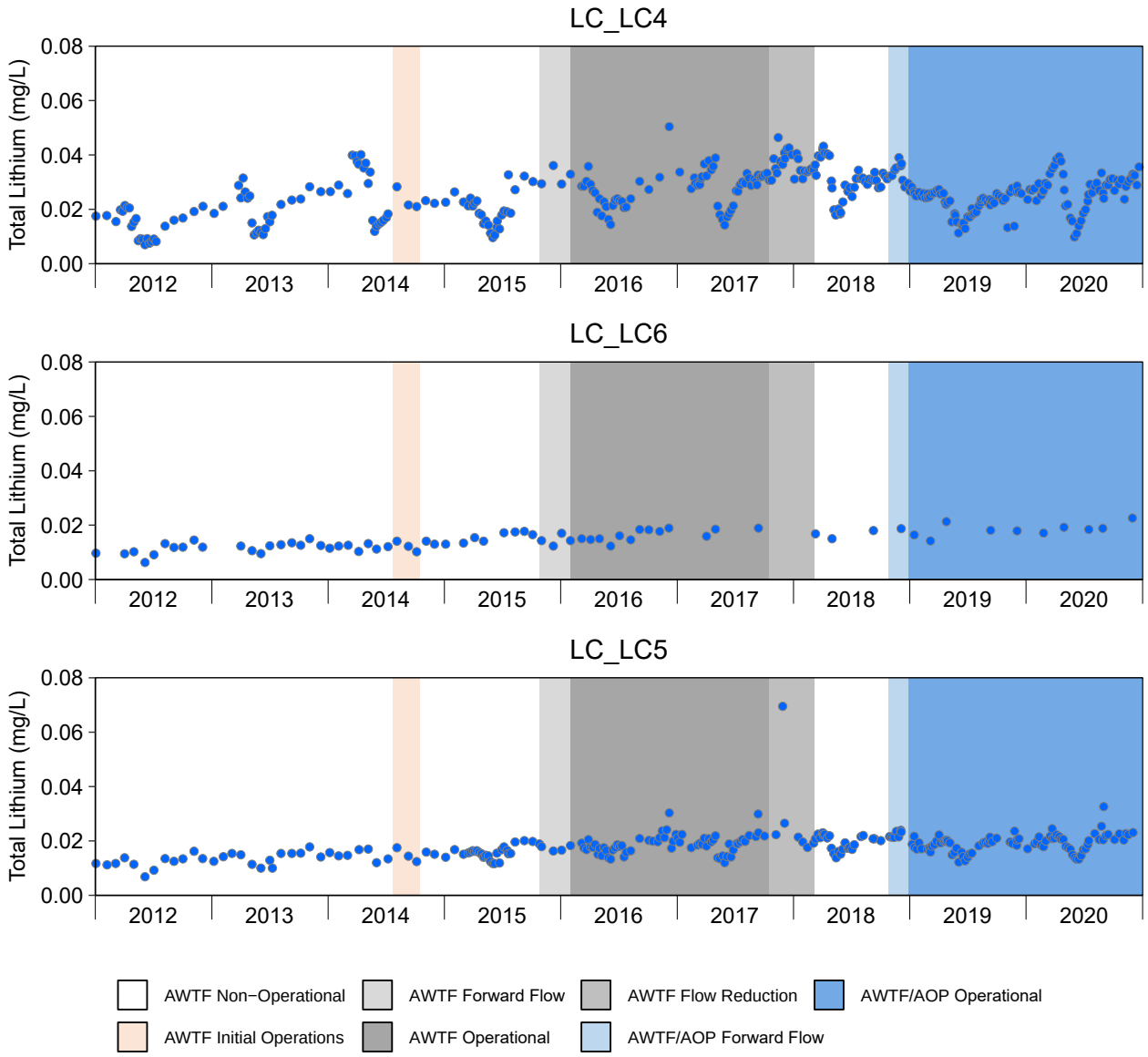

Figure D.17: Time Series Plots for Total Lithium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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).

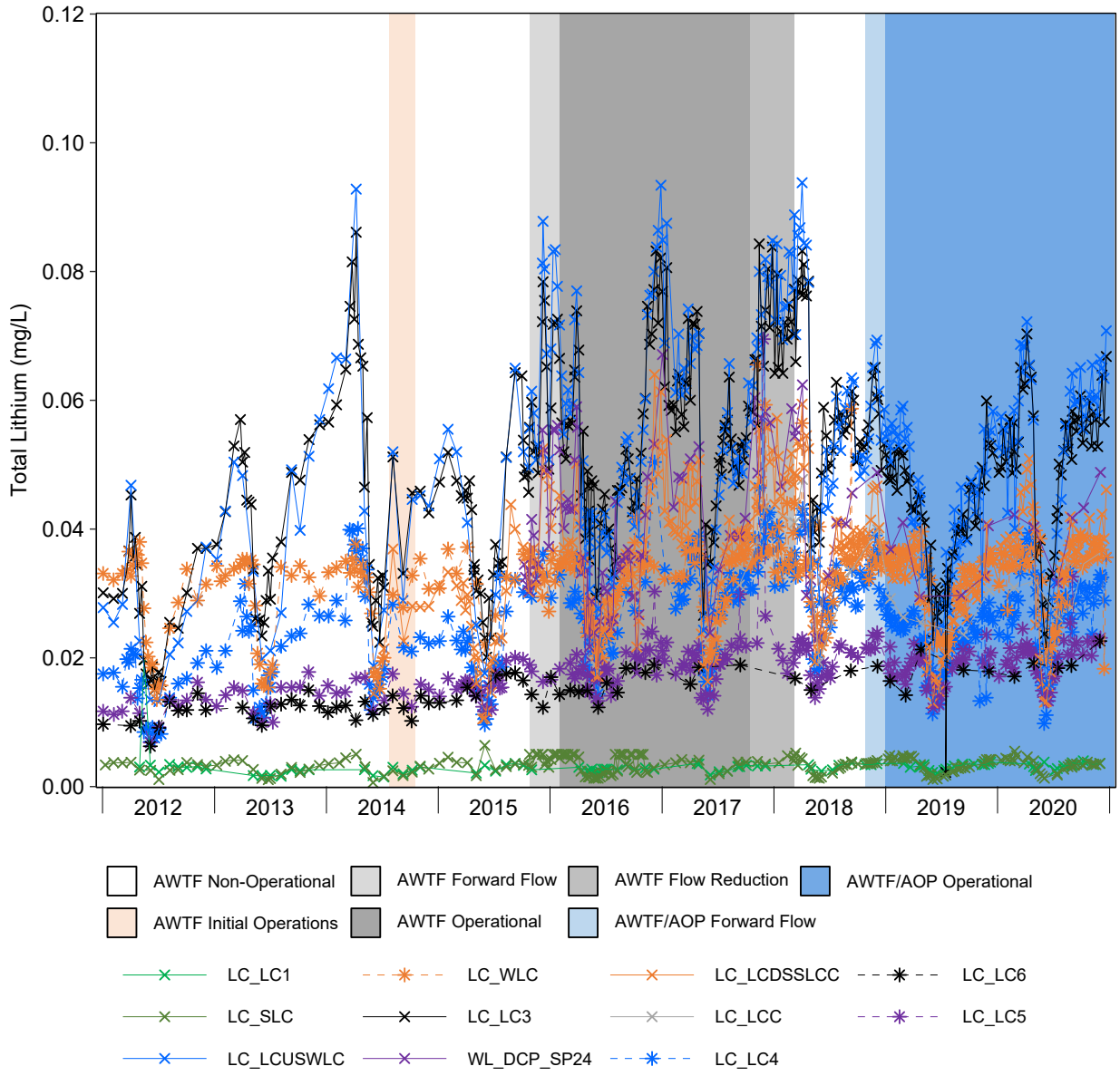

Figure D.18: Time Series Plots for Aqueous Total Lithium Concentrations from the Line Creek LAEMP Sampling Stations, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted at the LRL (LRLs were 0.0050 mg/L). West Line Creek (WLC) Active Water Treatment Facility (AWTF) operational timelines pertain only to mine-exposed monitoring areas located downstream of the AWTF discharge. 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 September 2017.

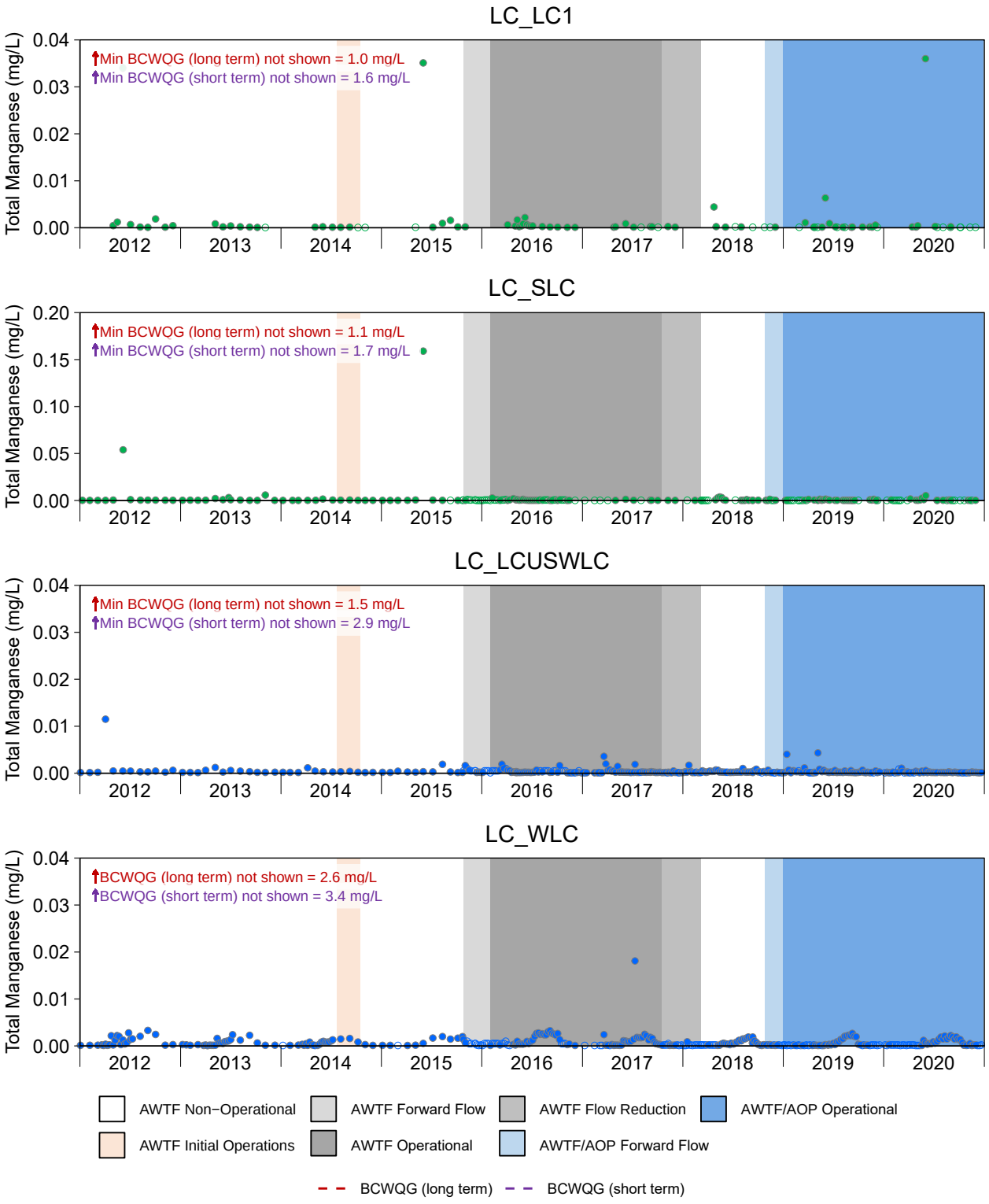

Figure D.19: Time Series Plots for Total Manganese Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. 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). 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.

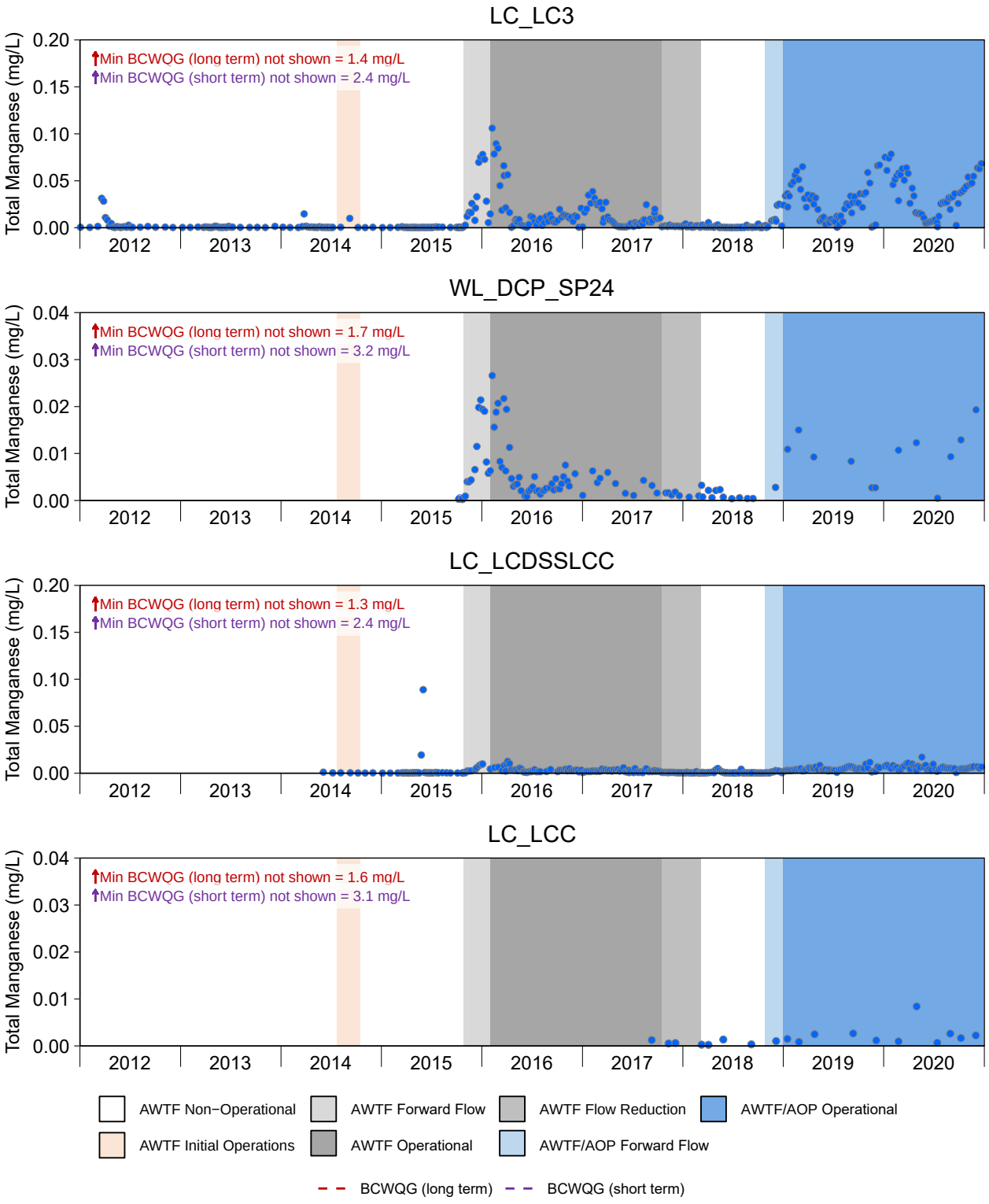

Figure D.19: Time Series Plots for Total Manganese Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. 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).

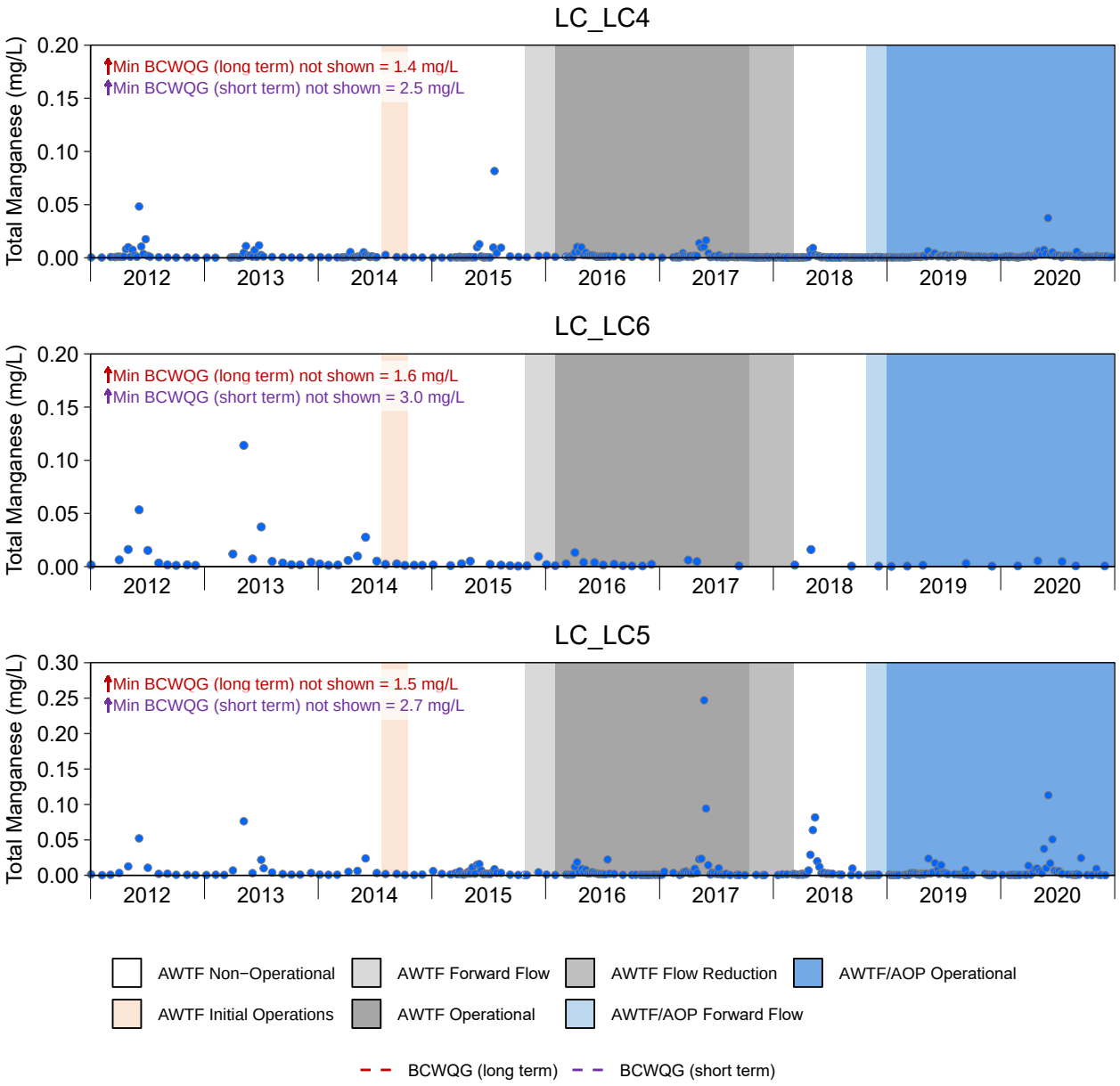

Figure D.19: Time Series Plots for Total Manganese Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. 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).

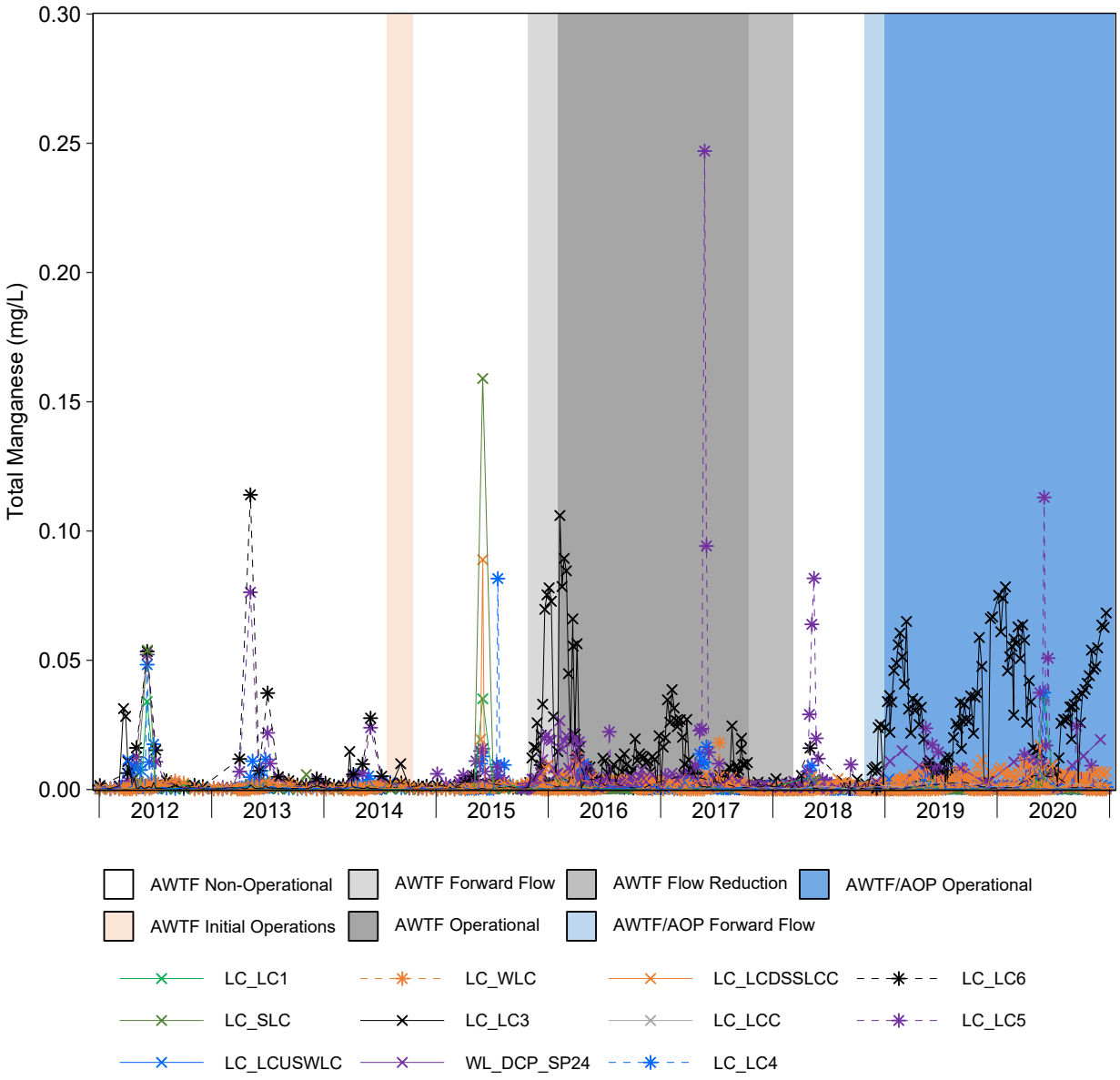

Figure D.20: Time Series Plots for Aqueous Total Manganese Concentrations from the Line Creek LAEMP Sampling Stations, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted at the LRL (LRLs between 0.000050 and 0.0010 mg/L). West Line Creek (WLC) Active Water Treatment Facility (AWTF) operational timelines pertain only to mine-exposed monitoring areas located downstream of the AWTF discharge. 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 September 2017.

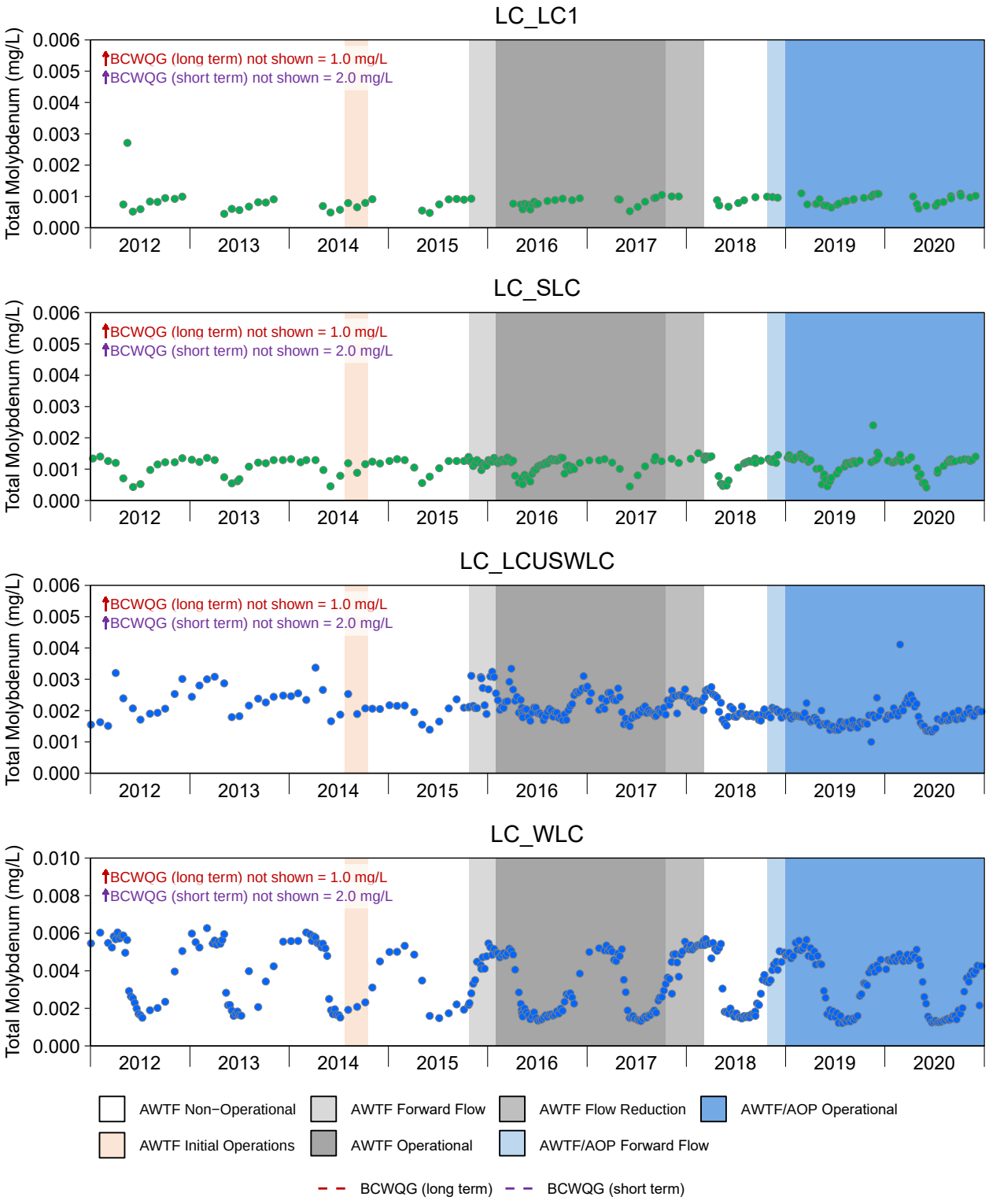

Figure D.21: Time Series Plots for Total Molybdenum Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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). 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.

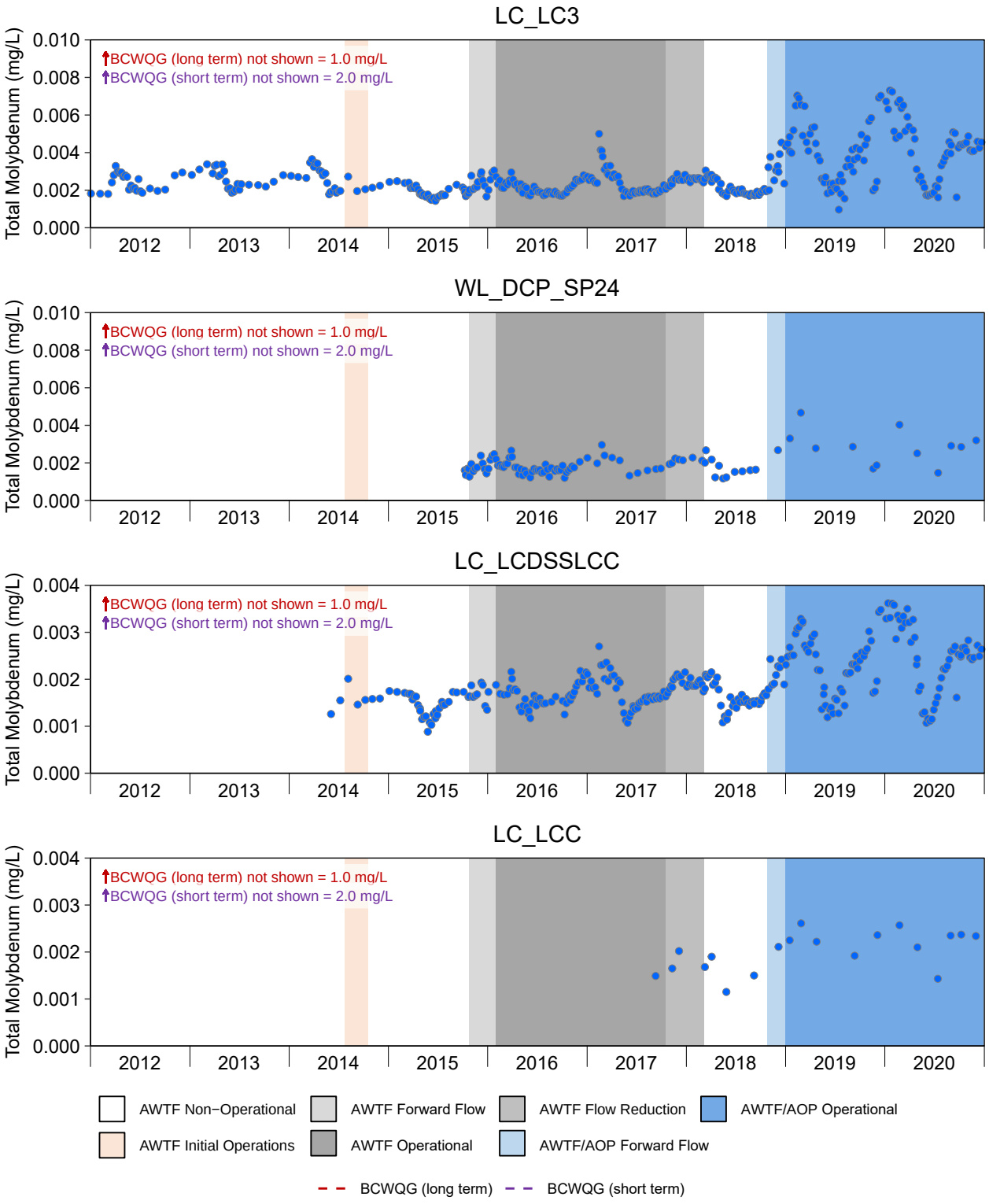

Figure D.21: Time Series Plots for Total Molybdenum Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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).

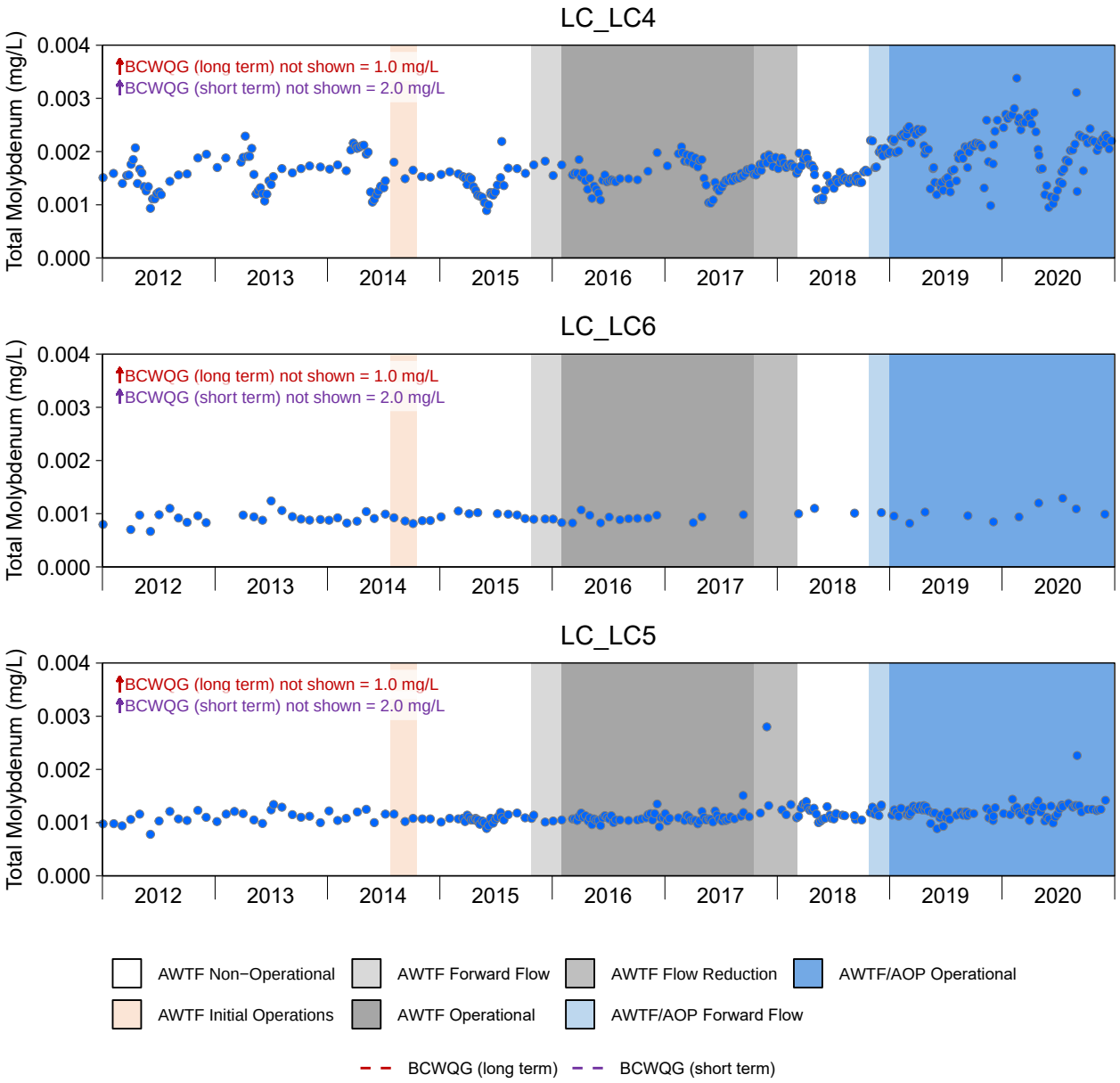

Figure D.21: Time Series Plots for Total Molybdenum Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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).

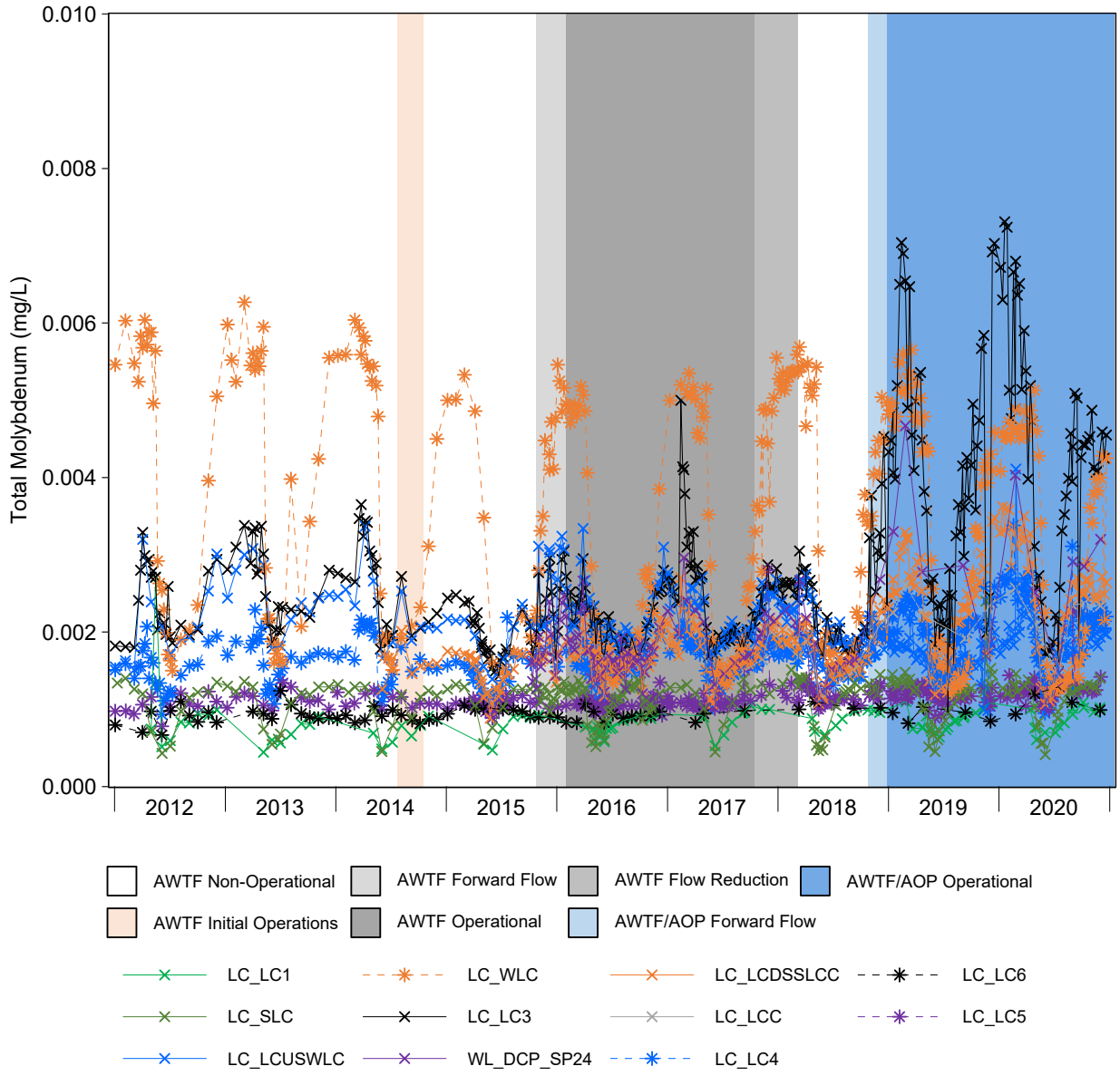

Figure D.22: Time Series Plots for Aqueous Total Molybdenum Concentrations from the Line Creek LAEMP Sampling Stations, 2012 to 2020

Notes: All concentrations reported by the laboratory were detectable. West Line Creek (WLC) Active Water Treatment Facility (AWTF) operational timelines pertain only to mine-exposed monitoring areas located downstream of the AWTF discharge. 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 September 2017.

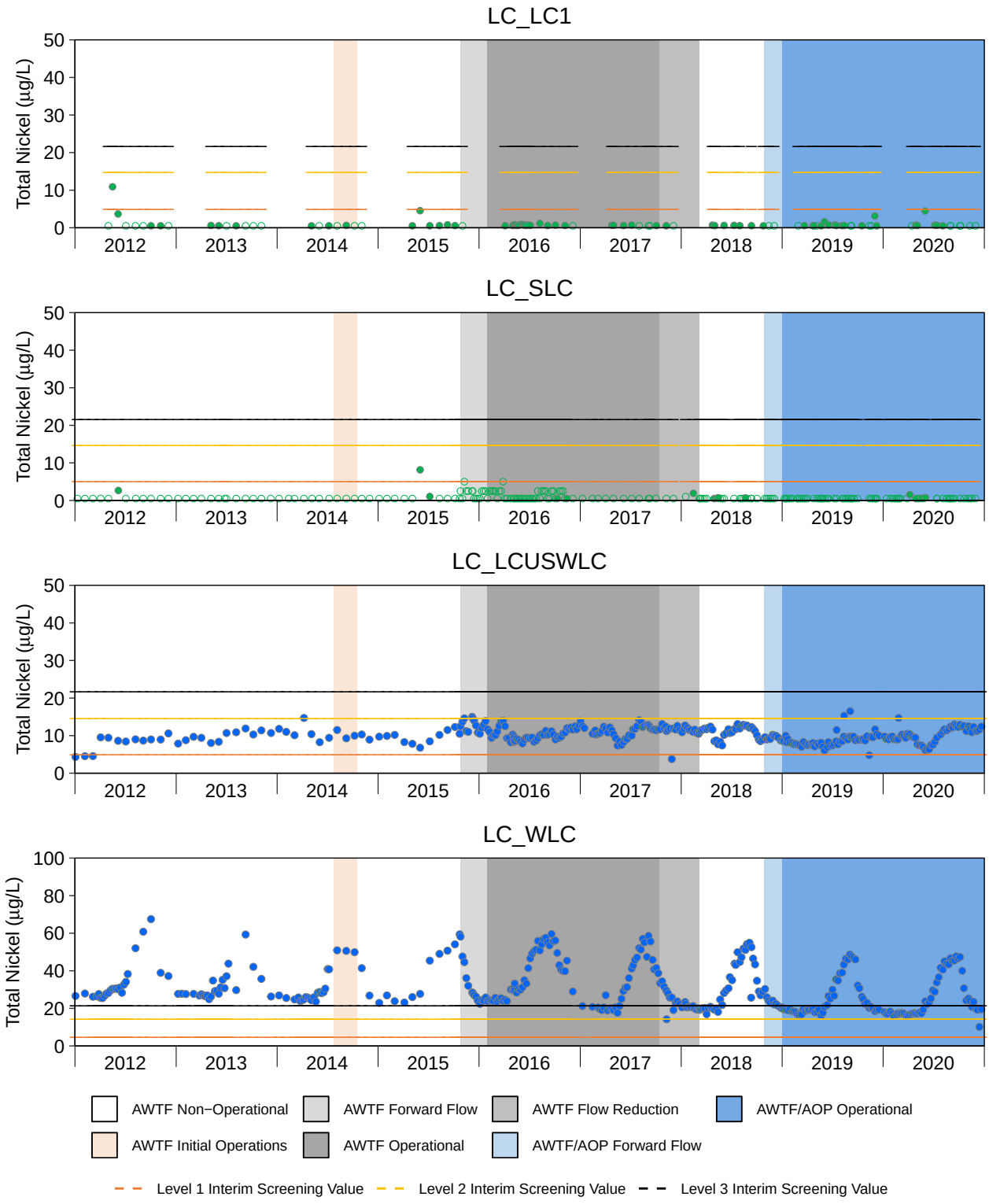

Figure D.23: Time Series Plots for Total Nickel Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. 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). 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.

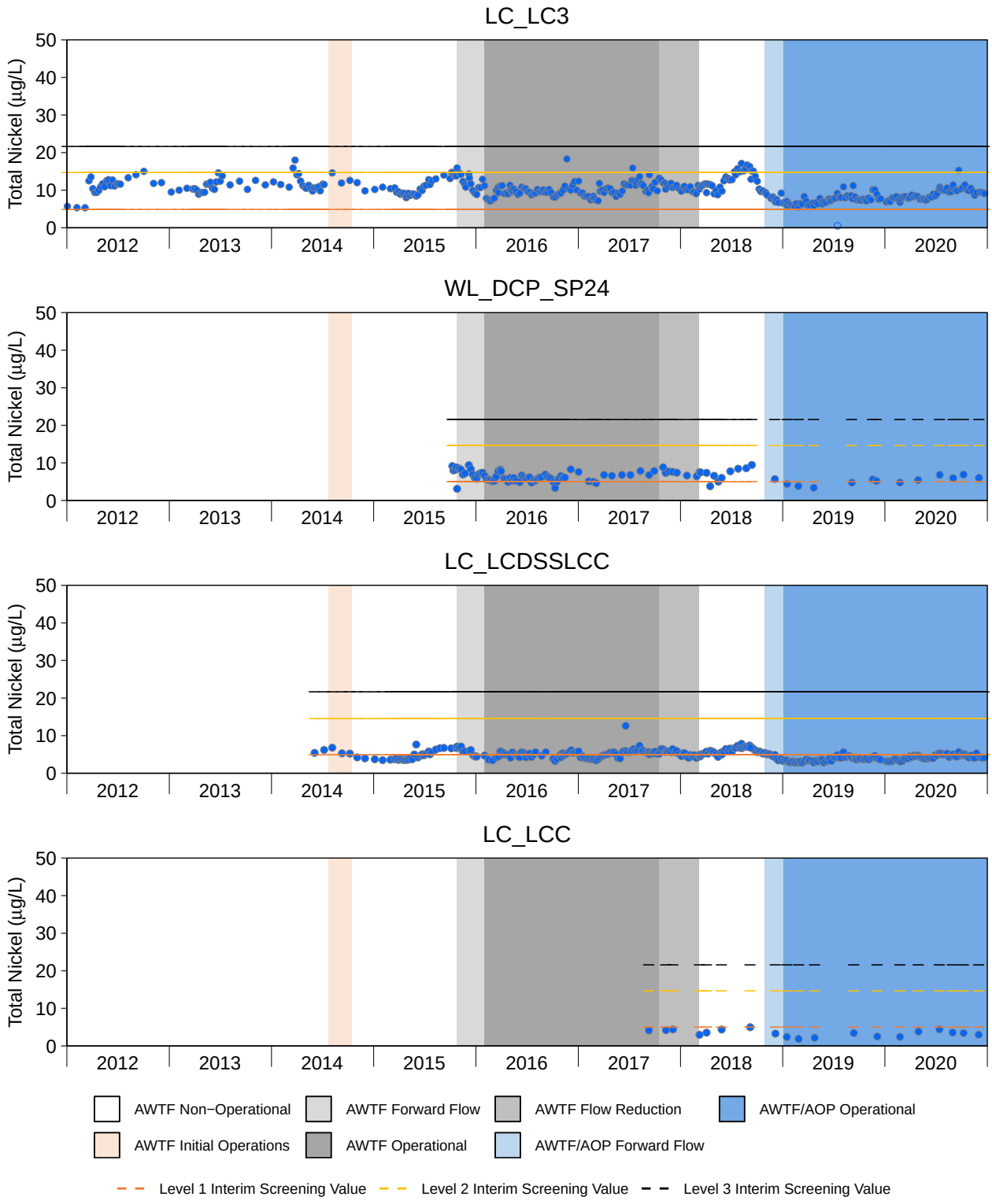

Figure D.23: Time Series Plots for Total Nickel Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. 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). 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.

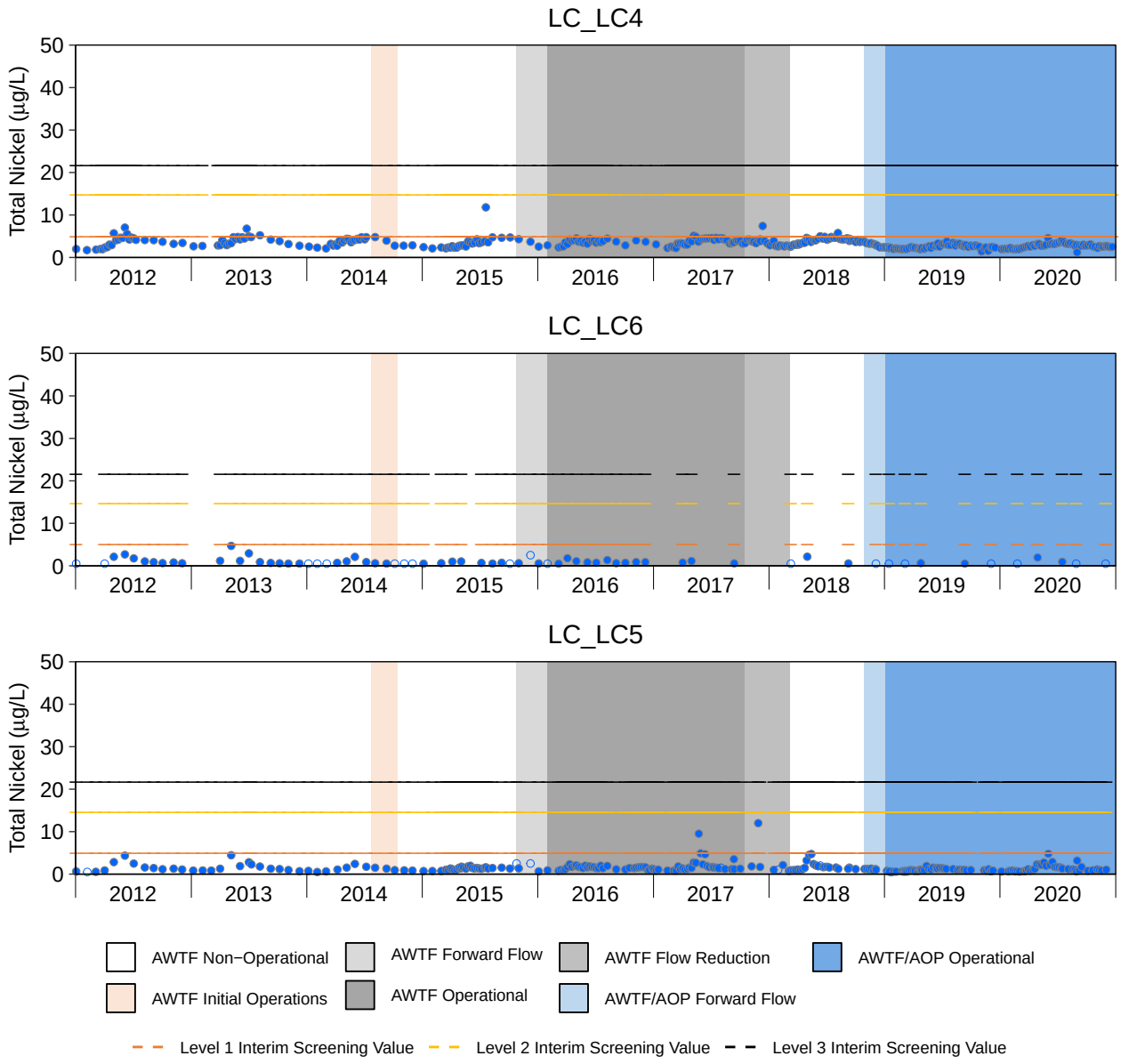

Figure D.23: Time Series Plots for Total Nickel Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. 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). 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.

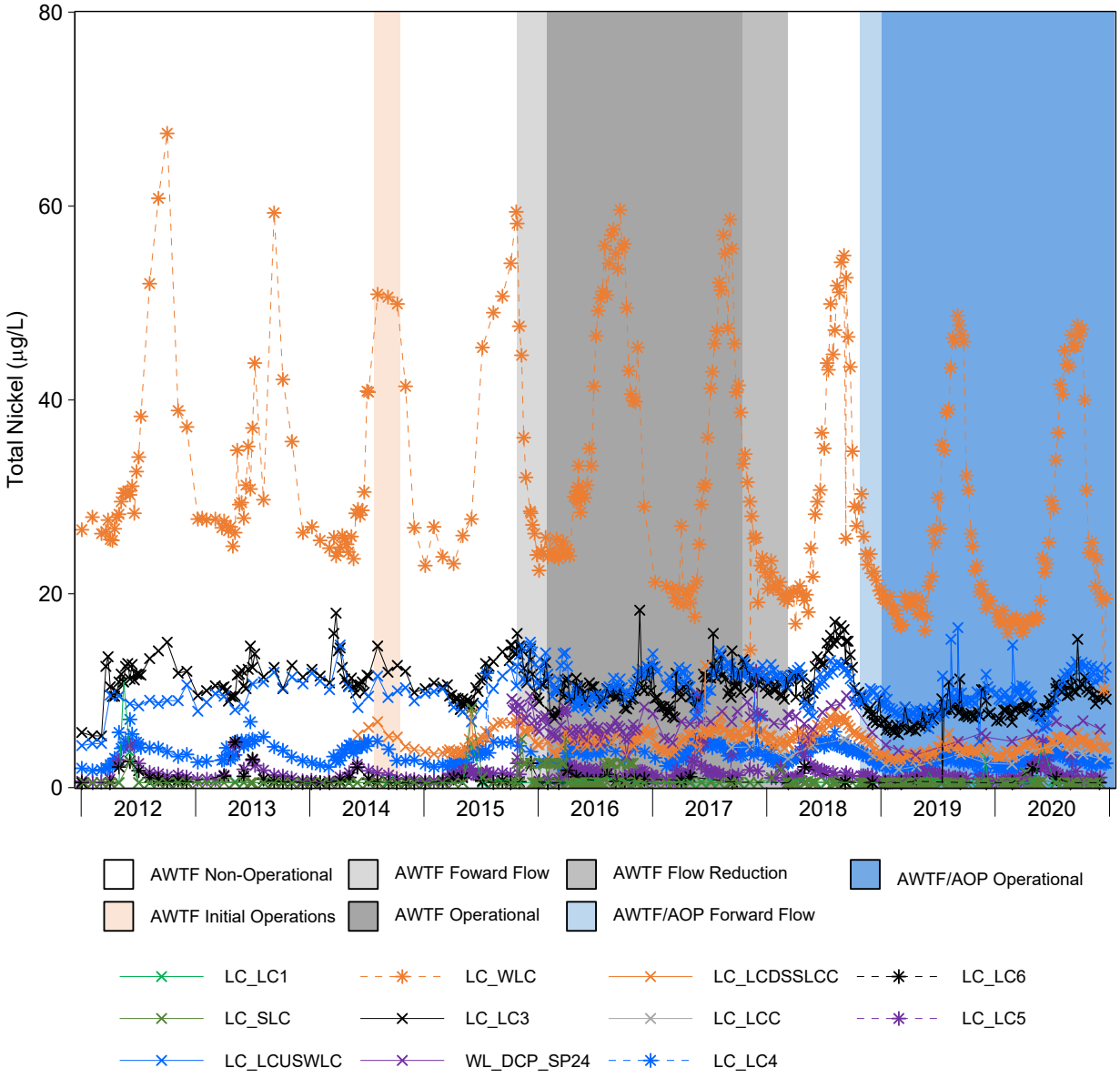

Figure D.24: Time Series Plots for Aqueous Total Nickel Concentrations from the Line Creek LAEMP Sampling Stations, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted at the LRL (LRLs were 0.0050 mg/L). West Line Creek (WLC) Active Water Treatment Facility (AWTF) operational timelines pertain only to mine-exposed monitoring areas located downstream of the AWTF discharge. 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 September 2017.

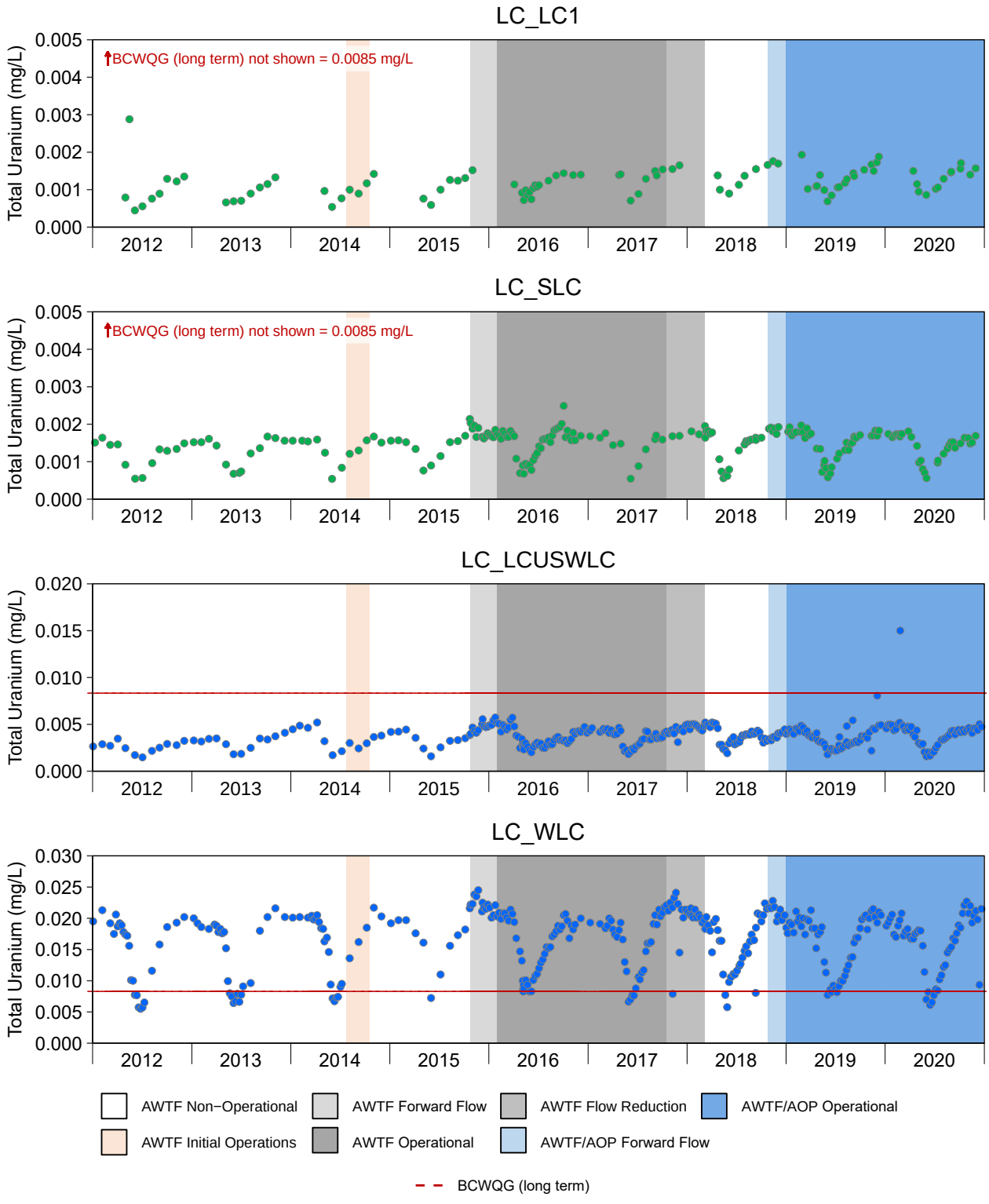

Figure D.25: Time Series Plots for Total Uranium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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). 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.

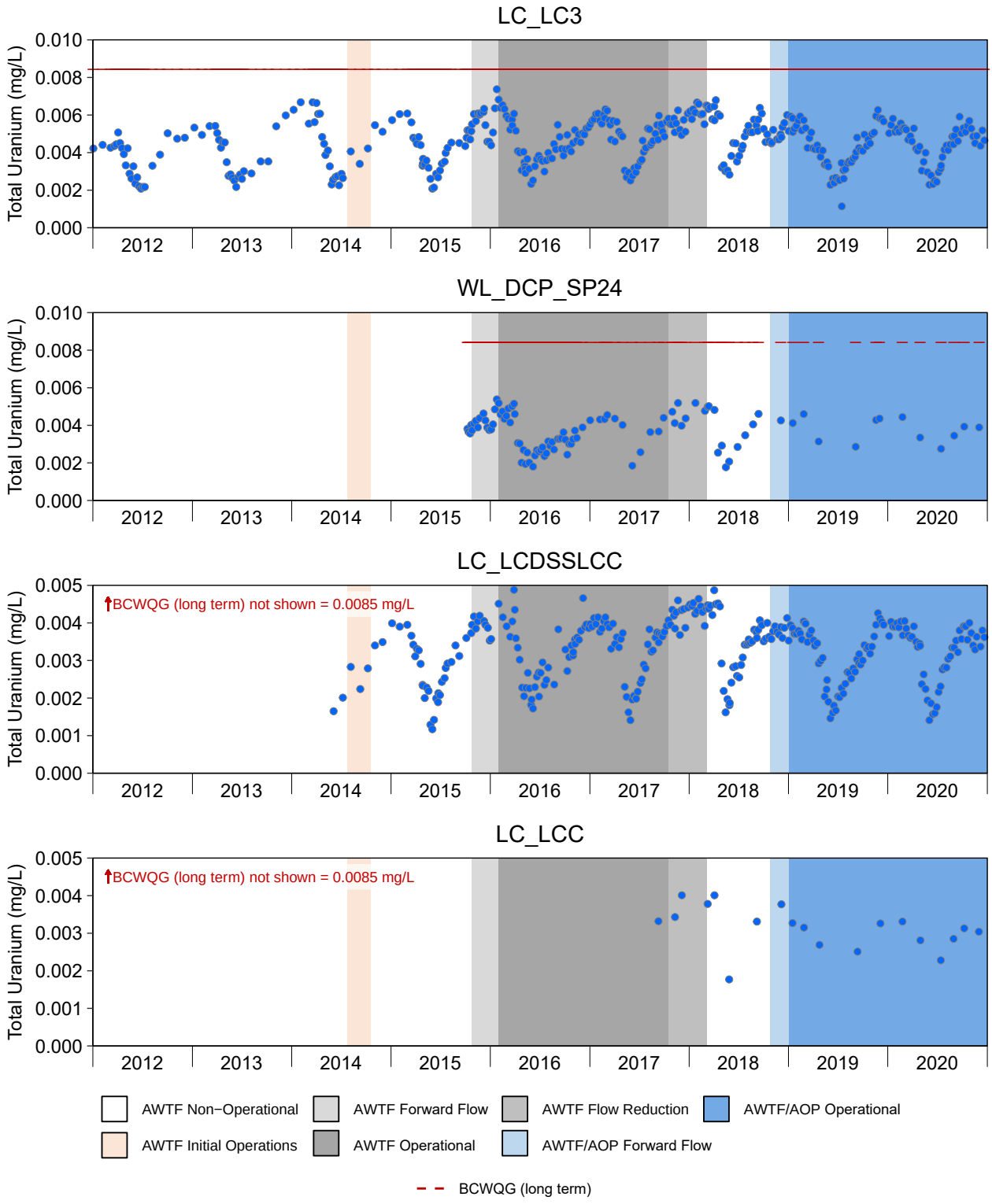

Figure D.25: Time Series Plots for Total Uranium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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).

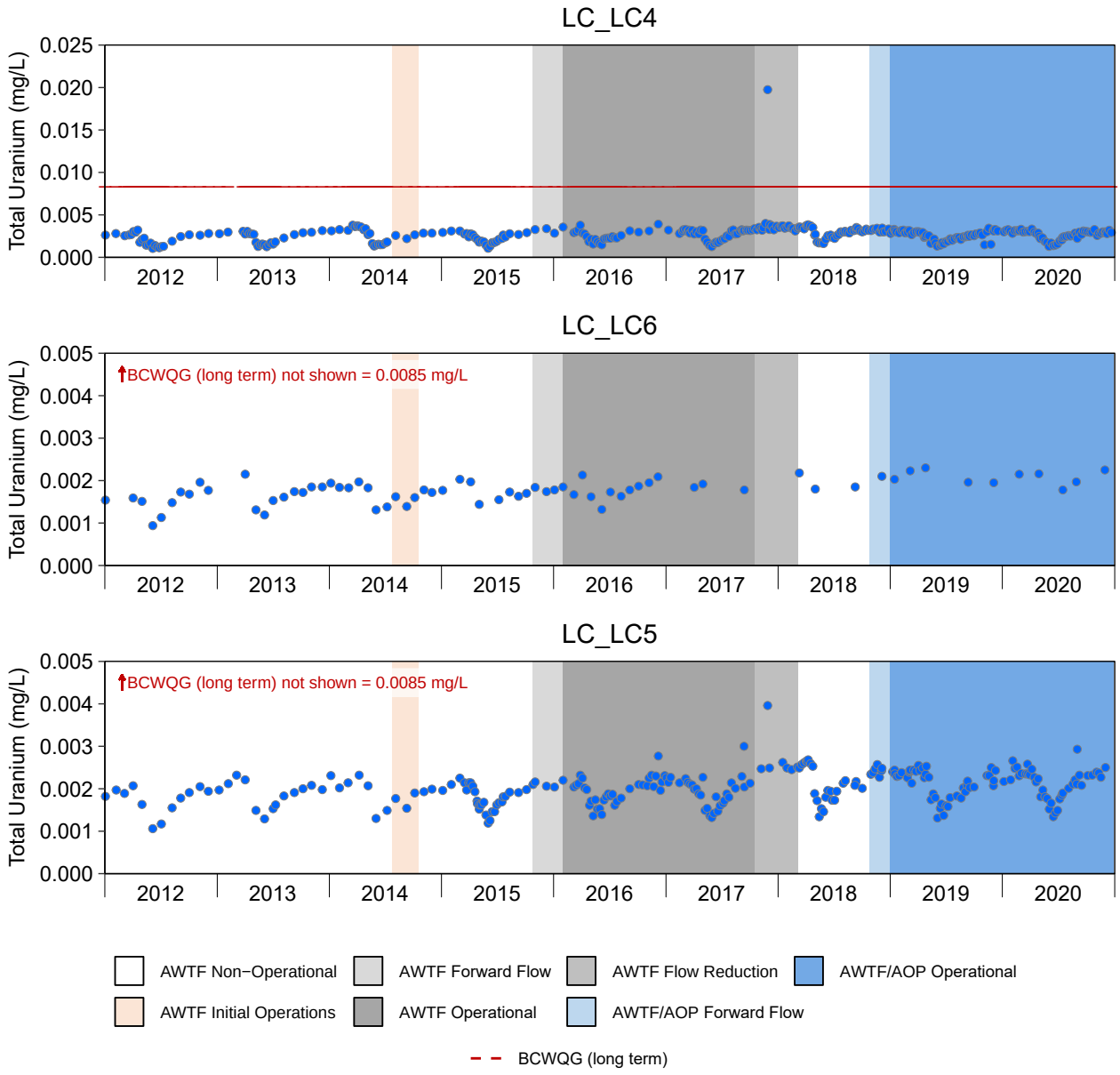

Figure D.25: Time Series Plots for Total Uranium Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: 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).

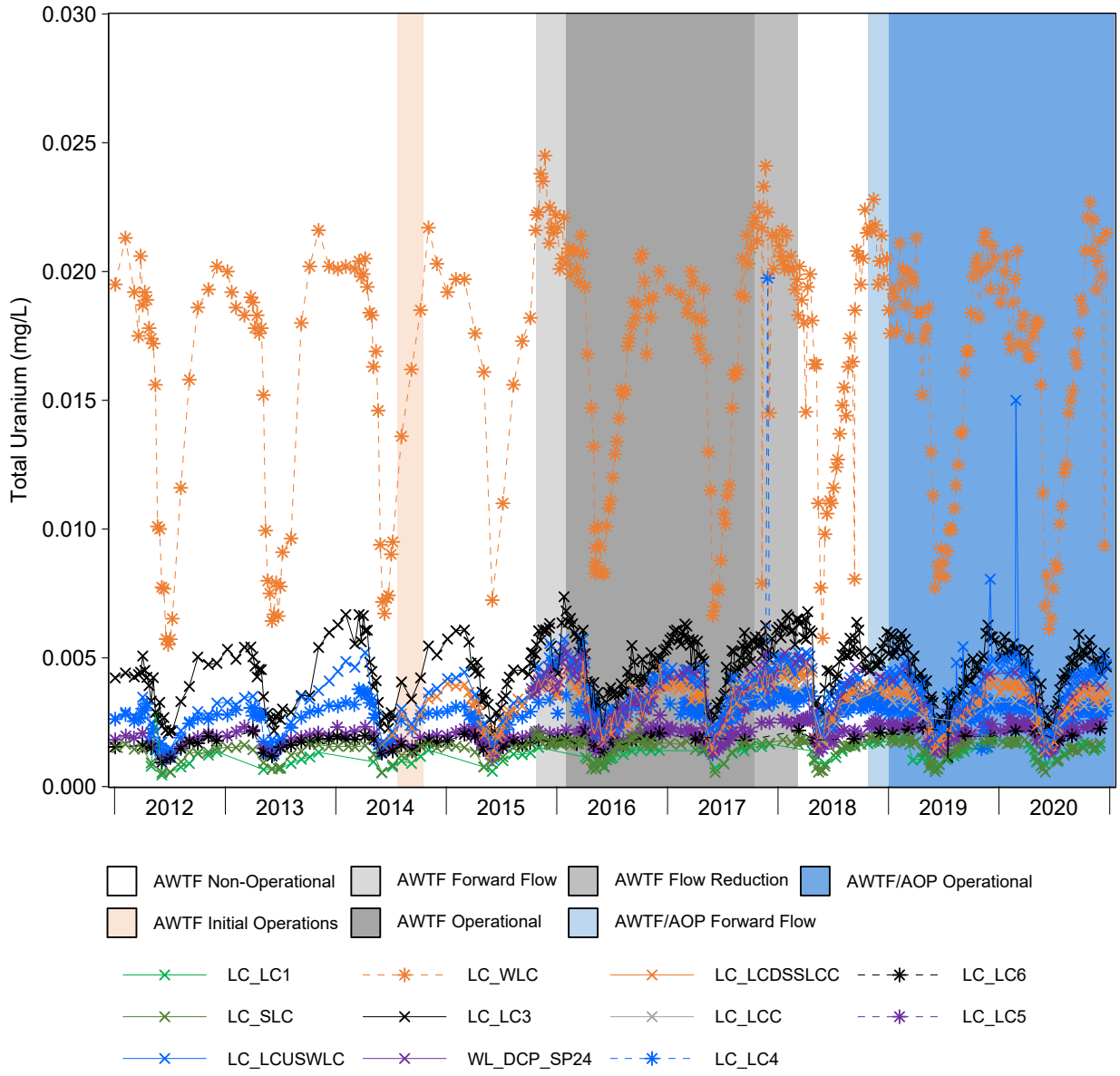

Figure D.26: Time Series Plots for Aqueous Total Uranium Concentrations from the Line Creek LAEMP Sampling Stations, 2012 to 2020

Notes: All concentrations reported by the laboratory were detectable. West Line Creek (WLC) Active Water Treatment Facility (AWTF) operational timelines pertain only to mine-exposed monitoring areas located downstream of the AWTF discharge. 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 September 2017.

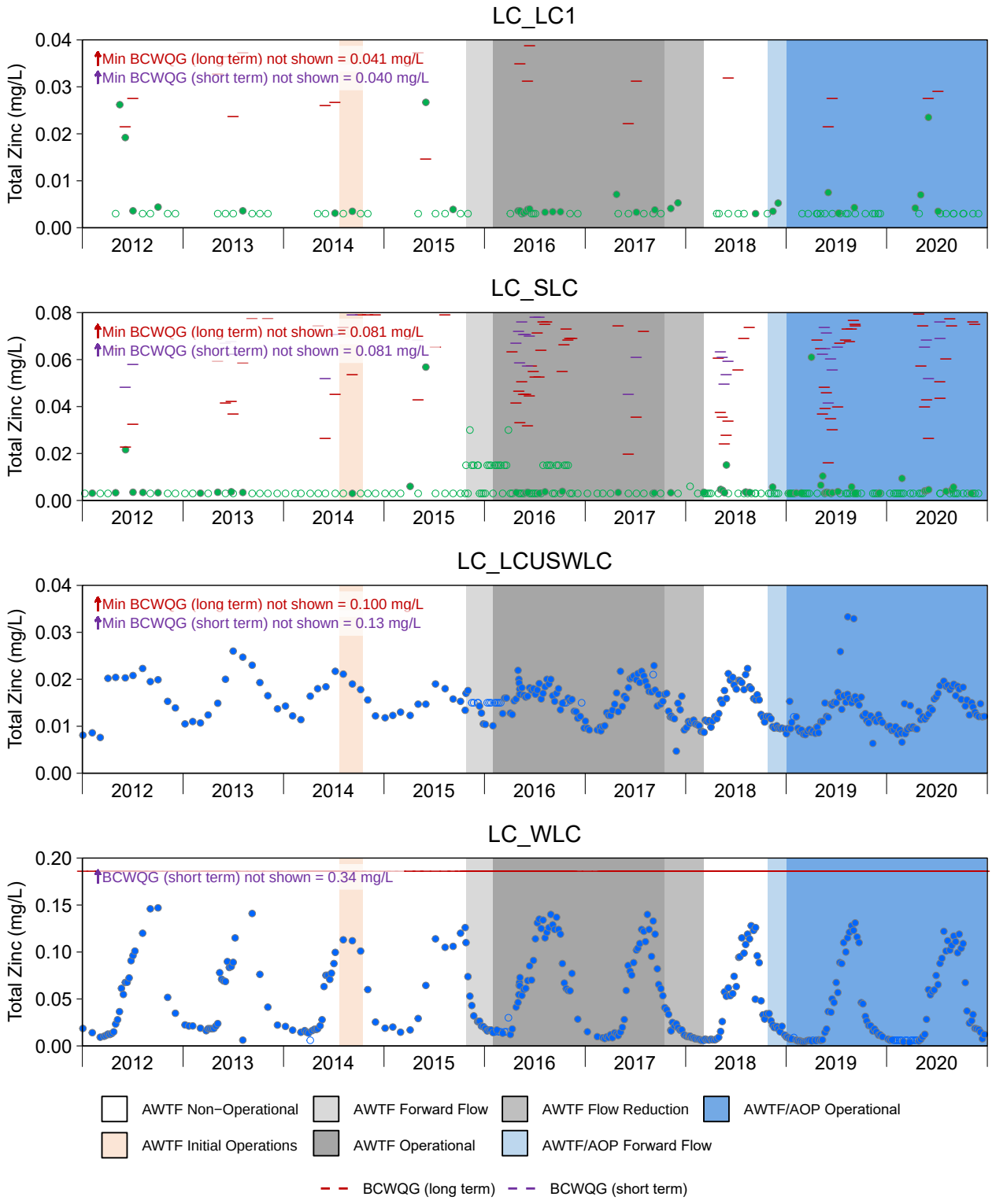

Figure D.27: Time Series Plots for Total Zinc Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. 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). 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.

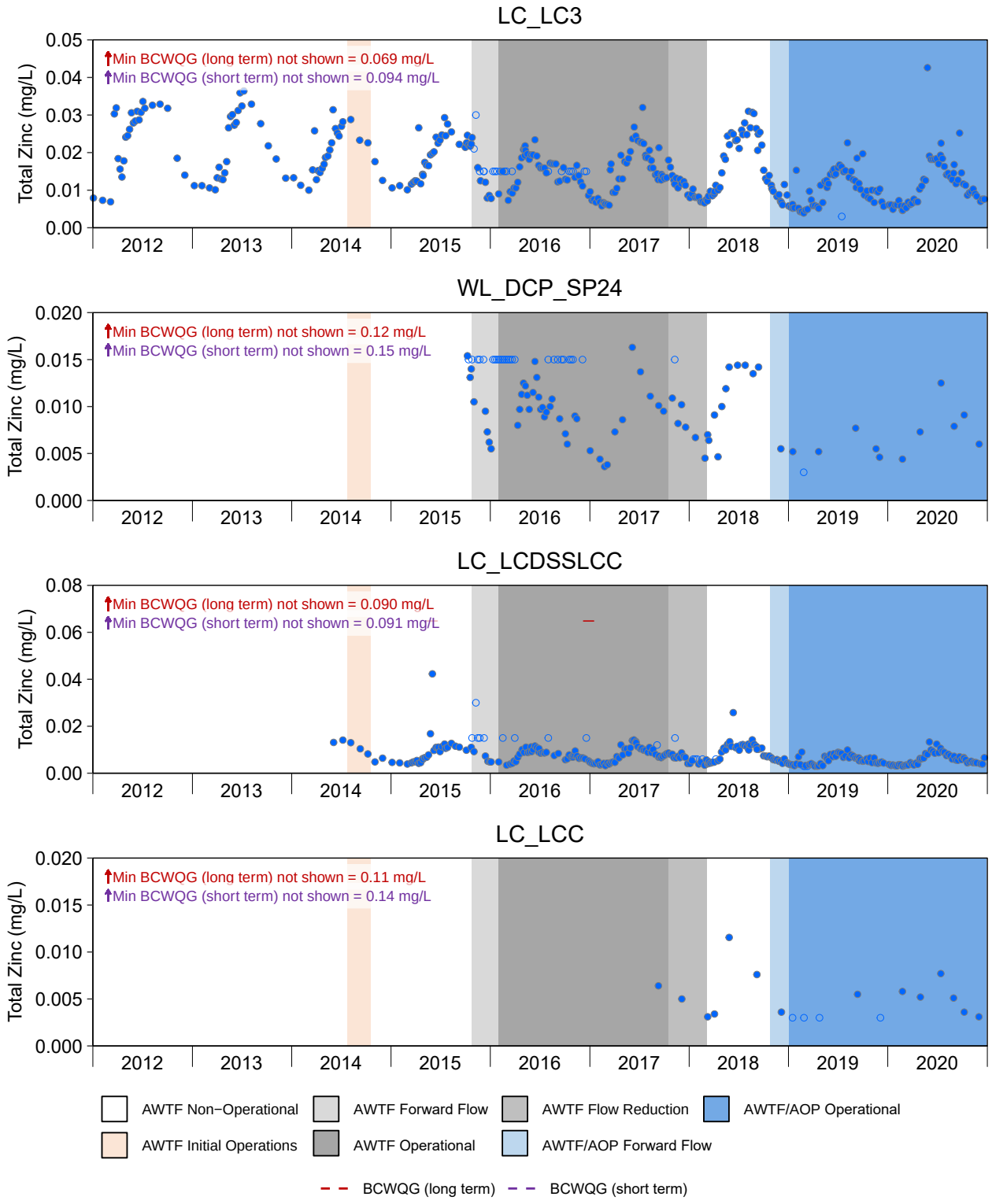

Figure D.27: Time Series Plots for Total Zinc Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. 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).

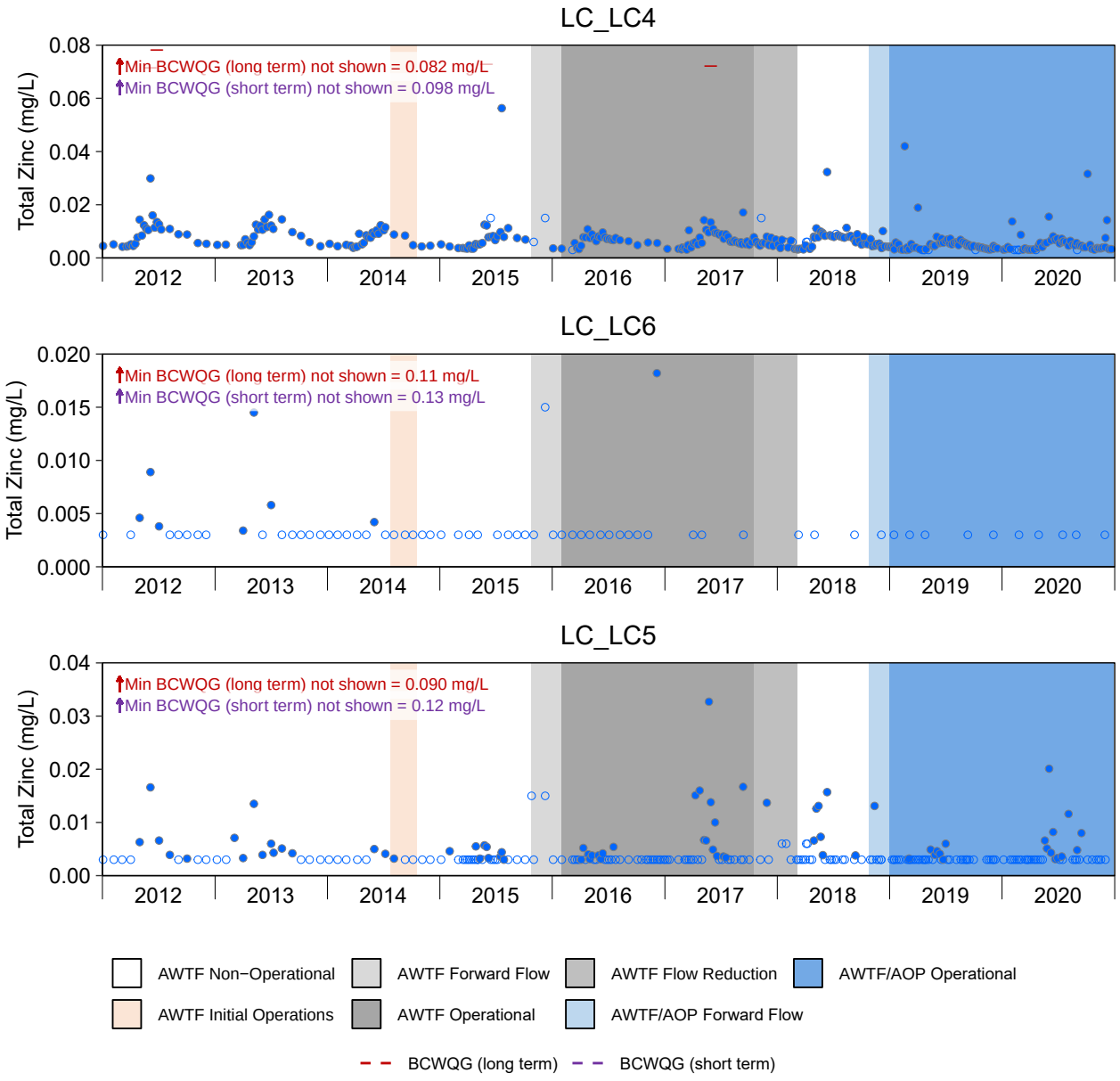

Figure D.27: Time Series Plots for Total Zinc Concentrations from Line Creek LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. 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).

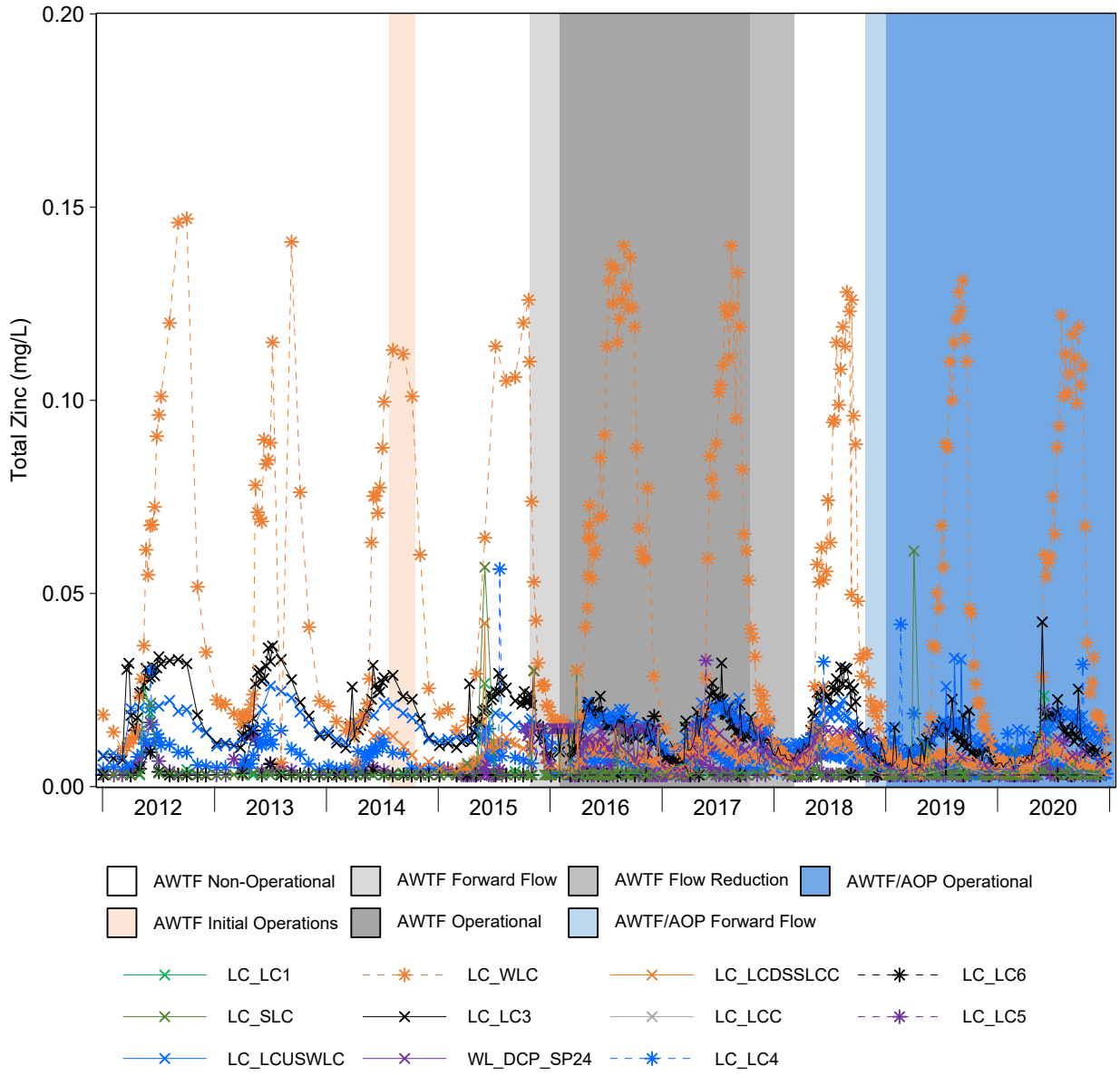

Figure D.28: Time Series Plots for Aqueous Total Zinc Concentrations from the Line Creek LAEMP Sampling Stations, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted at the LRL (LRLs between 0.0030 and 0.030 mg/L). West Line Creek (WLC) Active Water Treatment Facility (AWTF) operational timelines pertain only to mine-exposed monitoring areas located downstream of the AWTF discharge. 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 September 2017.

Table D.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, 2020

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	Level 1 EVWQP benchmark= $10^{1.0003[\log(\text{hardness})]-1.52}$ Maximum applicable hardness = 500 mg/L Level 2 EVWQP benchmark= $10^{1.0003[\log(\text{hardness})]-1.38}$ Maximum applicable hardness = 500 mg/L
	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	Level 1 EVWQP Benchmark = BCWQG = 429
	Total Dissolved Solids	mg/L	-	-	-	-	Screening Level 1 Benchmark = 1000
Metals and Metalloids — Total	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	mg/L	0.004	0.11	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	1	2	1986	Approved	-
	Nickel[g]	µg/L	-	-	-	-	Level 1 Interim Screening Value = 5.3 Level 2 Interim Screening Value = 15 Level 3 Interim Screening Value = 22
	Selenium	µg/L	2	-	2014	Approved	Level 1 EVWQP Benchmark = 19 Level 2 EVWQP Benchmark = 74
	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, BCWQG = [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	-
Metals and Metalloids — Dissolved	Aluminum	mg/L	When pH ≥ 6.5, BCWQG = 0.05 When pH < 6.5, BCWQG = exp[1.6 - 3.327(median pH)+ 0.402(median pH)2]	When pH ≥ 6.5, BCWQG = 0.1 When pH < 6.5, BCWQG = exp[1.209 - 2.426(pH)+ 0.286 (pH)2]	2001	Approved	-
	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	-

Note: "-" = no data available.

[a] British Columbia Working (BCMOECCS 2021) or Accepted (BCMOECCS 2019) 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

[c] Temperature and pH dependent; range of minimum and maximum values.

[d] Dependent on concurrent chloride, range of values reported (BCMOECCS 2019)

[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 D.2: Summary of Water Chemistry Data for Key Parameters for the Line Creek LAEMP Monitoring Stations, 2020

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 Antimony (mg/L)	Total Arsenic (mg/L)	Total Barium (mg/L)	Total Beryllium (mg/L)	Total Boron (mg/L)	Total Chromium (mg/L)
LC_LC1	n	13	13	21	22	13	13	13	13	13	13	13	13	13	13	13	13	13
	Annual Minimum	140	8.15	7.53	10.1	106	0.0829	<0.001	<0.005	16.4	0.200	0.198	<0.0001	0.000140	0.0345	<0.00002	<0.01	0.000170
	Annual Maximum	241	8.34	8.26	12.5	126	0.221	<0.001	0.0407	82.0	<0.5	0.432	0.000170	0.000810	0.0571	0.0000500	<0.01	0.00247
	Annual Mean	197	8.27	8.08	11.3	118	0.161	<0.001	0.0120	52.3	0.242	0.327	0.000105	0.000226	0.0451	0.0000223	<0.01	0.000380
	Annual Median	208	8.30	8.13	11.2	121	0.145	<0.001	0.0101	63.3	0.235	0.332	<0.0001	0.000170	0.0458	<0.00002	<0.01	0.000200
	% < LRL	0%	0%	0%	0%	0%	0%	100%	23%	0%	54%	0%	92%	0%	0%	92%	100%	0%
	% > BCWQG[a]	-	0%	0%	0%	0%	0%	0%	0%	0%	0%	-	0%	-	0%	0%	0%	8%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%	0%	-	0%	0%	-	0%	-	-	-	-
	% > Level 1 Benchmark	0%	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LC_SLC	n	32	32	31	31	32	32	32	32	32	32	32	31	31	31	31	31	31
	Annual Minimum	133	8.15	7.83	9.66	117	0.0152	<0.001	<0.005	7.56	0.310	0.143	<0.0001	<0.0001	0.0247	<0.00002	<0.01	0.000130
	Annual Maximum	275	8.42	8.37	13.1	153	0.173	<0.005	0.0689	84.1	1.24	0.411	<0.0001	<0.0005	0.0477	<0.00002	<0.01	0.00365
	Annual Mean	215	8.30	8.13	11.6	141	0.0955	<0.001	0.0123	50.8	0.473	0.295	<0.0001	0.000133	0.0403	<0.00002	<0.01	0.000297
	Annual Median	222	8.32	8.16	11.7	144	0.0978	<0.001	0.00605	54.0	0.370	0.302	<0.0001	0.000120	0.0425	<0.00002	<0.01	0.000170
	% < LRL	0%	0%	0%	0%	0%	0%	100%	50%	0%	38%	0%	100%	10%	0%	100%	100%	0%
	% > BCWQG[a]	-	0%	0%	0%	0%	0%	0%	0%	0%	0%	-	0%	-	0%	0%	0%	3%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%	0%	-	0%	0%	-	0%	-	-	-	-
	% > Level 1 Benchmark	0%	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LC_LCUSWLC	n	52	52	53	53	52	52	52	52	52	52	52	52	52	52	52	52	52
	Annual Minimum	266	7.80	7.38	9.96	140	3.73	<0.001	<0.005	77.5	1.65	0.139	0.000250	0.000100	0.0232	<0.00002	<0.01	<0.0001
	Annual Maximum	1,970	8.46	8.15	12.9	313	20.2	0.00500	0.0295	1,020	13.2	0.270	0.000490	<0.0007	0.0779	<0.00002	0.0250	0.000260
	Annual Mean	699	8.25	7.74	10.9	209	14.8	0.00115	0.00884	277	7.56	0.192	0.000379	0.000153	0.0592	<0.00002	0.0170	0.000141
	Annual Median	751	8.28	7.69	10.9	214	16.4	<0.001	0.00585	296	8.05	0.198	0.000390	0.000145	0.0679	<0.00002	0.0180	0.000140
	% < LRL	0%	0%	0%	0%	0%	0.0%	94%	42%	0%	0%	0%	0%	2%	0%	100%	6%	6%
	% > BCWQG[a]	-	0%	0%	0%	0%	100%	0%	0%	2%	0%	-	0%	-	0%	0%	0%	0%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%	0%	-	0%	0%	-	0%	-	-	-	-
	% > Level 1 Benchmark	2%	-	-	-	-	65%	-	-	2%	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LC_WLC	n	51	51	52	52	51	51	51	51	51	51	51	51	51	51	51	51	51
	Annual Minimum	900	6.90	7.39	10.6	166	7.72	<0.001	<0.005	387	1.46	0.0900	0.000290	0.000130	0.0123	<0.00002	0.0115	<0.0001
	Annual Maximum	2,350	8.46	8.29	11.9	428	20.6	0.0103	0.0388	1,280	7.30	0.290	0.000620	0.000550	0.0271	<0.00004	0.0230	0.000370
	Annual Mean	1,856	8.17	7.87	11.2	327	15.6	0.00152	0.00897	974.9	4.28	0.169	0.000466	0.000256	0.0213	<0.00002	0.0175	0.000124
	Annual Median	1,990	8.21	7.93	11.2	329	16.5	<0.005	0.00700	1,080	4.20	0.160	0.000470	0.000260	0.0220	<0.00002	0.0170	0.000110
	% < LRL	0%	0%	0%	0%	0%	0.0%	92%	39%	0%	6%	12%	0%	0%	0%	100%	31%	55%
	% > BCWQG[a]	-	0%	0%	0%	0%	100%	0%	0%	94%	0%	-	0%	-	0%	0%	0%	0%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%	0%	-	0%	0%	-	0%	-	-	-	-
	% > Level 1 Benchmark	94%	-	-	-	-	59%	-	-	94%	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

> 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: "LRL" = laboratory reporting limit. "BCWQG" = British Columbia Working or Accepted Water Quality Guideline.

[a] Long-term average BCQWG for the Protection of Aquatic Life.

[b] Short-term maximum BCQWG for the Protection of Aquatic Life. 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.

Table D.2: Summary of Water Chemistry Data for Key Parameters for the Line Creek LAEMP Monitoring Stations, 2020

Station	Summary Statistic	Total Cobalt (mg/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 Sliver (mg/L)	Total Thallium (mg/L)	Total Uranium (mg/L)	Total Zinc (mg/L)	Dissolved Aluminum (mg/L)	Dissolved Cadmium (µg/L)	Dissolved Cobalt (mg/L)	Dissolved Copper (mg/L)	Dissolved Iron (mg/L)
LC_LC1	n	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
	Annual Minimum	<0.0001	<0.01	<0.00005	0.00250	<0.0001	<0.0000005	0.000605	<0.5	1.43	<0.00001	<0.00001	0.000859	<0.003	<0.003	<0.005	<0.0001	<0.0002	<0.01
	Annual Maximum	0.000400	0.862	0.00109	0.00400	0.0360	<0.000005	0.00109	4.47	3.13	0.0000620	0.0000430	0.00171	0.0235	<0.003	0.0375	<0.0001	<0.0002	<0.01
	Annual Mean	0.000123	0.0759	0.000130	0.00329	0.00292	0.000000853	0.000878	0.854	2.32	0.0000140	0.0000125	0.00131	0.00502	<0.003	0.0108	<0.0001	<0.0002	<0.01
	Annual Median	<0.0001	<0.01	<0.00005	0.00340	<0.0001	<0.0000005	0.000935	<0.5	2.51	<0.00001	<0.00001	0.00140	<0.003	<0.003	0.0091	<0.0001	<0.0002	<0.01
	% < LRL	92%	85%	92%	0%	54%	92%	0%	54%	0%	92%	92%	0%	69%	100%	15%	100%	100%	100%
	% > BCWQG[a]	0%	-	0%	-	0%	15%	0%	-	69%	0%	0%	0%	0%	0%	0%	-	0%	-
	% > BCWQG[b]	0%	0%	0%	-	0%	-	0%	-	-	0%	-	-	0%	0%	0%	-	0%	0%
	% > Level 1 Benchmark	-	-	-	-	-	-	-	0%	0%	-	-	-	-	-	0%	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	0%	0%	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-
LC_SLC	n	31	31	31	31	31	31	31	31	33	31	31	31	31	31	31	31	31	31
	Annual Minimum	<0.0001	<0.01	<0.00005	0.00130	<0.0001	<0.0000005	0.000413	<0.5	0.505	<0.00001	<0.00001	0.000560	<0.003	<0.003	0.0079	<0.0001	<0.0002	<0.01
	Annual Maximum	<0.0001	0.0820	0.000106	0.00550	0.00514	0.00000212	0.00146	1.55	1.74	<0.00001	<0.00001	0.00181	0.00940	0.00340	0.0574	<0.0001	0.000360	0.0130
	Annual Mean	<0.0001	0.0156	0.0000531	0.00340	0.000495	0.000000614	0.00115	0.544	1.29	<0.00001	<0.00001	0.00142	0.00350	0.00301	0.0141	<0.0001	0.000219	0.0101
	Annual Median	<0.0001	<0.01	<0.00005	0.00350	0.000150	<0.0000005	0.00125	<0.5	1.47	<0.00001	<0.00001	0.00151	<0.003	<0.003	0.0123	<0.0001	<0.0002	<0.01
	% < LRL	100%	81%	90%	0%	45%	77%	0%	87%	0%	100%	100%	0%	74%	97%	0%	100%	77%	97%
	% > BCWQG[a]	0%	-	0%	-	0%	6%	0%	-	0%	0%	0%	0%	0%	0%	0%	-	3%	-
	% > BCWQG[b]	0%	0%	0%	-	0%	-	0%	-	-	0%	-	-	0%	0%	0%	-	0%	0%
	% > Level 1 Benchmark	-	-	-	-	-	-	-	0%	0%	-	-	-	-	-	0%	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	0%	0%	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-
LC_LCUSWLC	n	52	52	52	52	52	52	52	52	56	52	52	52	52	52	52	52	52	52
	Annual Minimum	<0.0001	<0.01	<0.00005	0.0158	<0.0001	<0.0000005	0.00132	6.11	16.1	<0.00001	<0.00001	0.00158	0.00660	<0.003	0.104	<0.0001	0.000200	<0.01
	Annual Maximum	0.000150	0.0560	0.0000980	0.0722	0.00107	0.00000129	0.00411	14.7	390	<0.00001	0.0000220	0.0150	0.0196	0.0100	0.452	<0.0002	0.000860	<0.02
	Annual Mean	0.000103	0.0111	0.0000509	0.0525	0.000194	0.000000553	0.00190	10.2	54.3	<0.00001	0.0000140	0.00415	0.0133	0.00314	0.324	0.000101	0.000350	0.0101
	Annual Median	<0.0001	<0.01	<0.00005	0.0576	0.000150	<0.0000005	0.00185	10.2	53.2	<0.00001	0.0000140	0.00436	0.0128	<0.003	0.31	<0.0001	0.000300	<0.01
	% < LRL	85%	90%	98%	0%	15%	77%	0%	0%	0%	100%	12%	0%	0%	96%	0%	90%	0%	98%
	% > BCWQG[a]	0%	-	0%	-	0%	2%	0%	-	100%	0%	0%	2%	0%	0%	0%	-	0%	-
	% > BCWQG[b]	0%	0%	0%	-	0%	-	0%	-	-	0%	-	-	0%	0%	0%	-	0%	0%
	% > Level 1 Benchmark	-	-	-	-	-	-	-	100%	95%	-	-	-	-	-	46%	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	0%	2%	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-
LC_WLC	n	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
	Annual Minimum	<0.0001	<0.01	<0.00005	0.0183	<0.0001	0.000000770	0.00124	10.1	174	<0.00001	0.0000160	0.00612	0.00380	<0.003	0.054	<0.0001	0.000485	<0.01
	Annual Maximum	0.000430	0.0470	<0.0001	0.0434	0.00221	0.00000135	0.00513	47.7	523	<0.00002	0.0000320	0.0227	0.122	0.00470	2.98	0.000410	0.00164	<0.02
	Annual Mean	0.000107	0.0125	<0.00005	0.0333	0.000604	0.00000107	0.00314	26.2	405	<0.00001	0.0000256	0.0162	0.0426	0.00303	1.06	0.000106	0.000873	0.0101
	Annual Median	<0.0001	<0.01	<0.00005	0.0351	0.000150	0.00000112	0.00361	20.8	441	<0.00001	0.0000260	0.0175	0.0187	<0.003	0.645	<0.0001	0.000820	<0.01
	% < LRL	94%	82%	100%	0%	43%	0%	0%	0%	0%	100%	8%	0%	22%	98%	0%	94%	0%	96%
	% > BCWQG[a]	0%	-	0%	-	0%	4%	0%	-	100%	0%	0%	88%	0%	0%	55%	-	0%	-
	% > BCWQG[b]	0%	0%	0%	-	0%	-	0%	-	-	0%	-	-	0%	0%	6%	-	0%	0%
	% > Level 1 Benchmark	-	-	-	-	-	-	-	100%	100%	-	-	-	-	-	61%	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	98%	100%	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	49%	-	-	-	-	-	-	-	-	-	-

> 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: "LRL" = laboratory reporting limit. "BCWQG" = British Columbia Working or Accepted Water Quality Guideline.

[a] Long-term average BCQWG for the Protection of Aquatic Life.

[b] Short-term maximum BCQWG for the Protection of Aquatic Life. 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.

Table D.2: **Summary of Water Chemistry Data for Key Parameters for the Line Creek LAEMP Monitoring Stations, 2020**

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 Antimony (mg/L)	Total Arsenic (mg/L)	Total Barium (mg/L)	Total Beryllium (mg/L)	Total Boron (mg/L)	Total Chromium (mg/L)
LC_LC3	n	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53
	Annual Minimum	364	7.91	6.75	10.5	158	4.80	<0.001	<0.005	127	3.61	0.120	0.000240	<0.0001	0.0235	<0.00002	0.0100	<0.0001
	Annual Maximum	1,110	8.48	8.33	13.9	254	16.2	0.00980	0.0677	504	44.3	0.290	0.000390	0.000320	0.0739	<0.00002	0.0230	0.000280
	Annual Mean	820	8.26	7.68	11.5	212	11.2	0.00164	0.0129	353	24.6	0.187	0.000318	0.000133	0.0530	<0.00002	0.0171	0.000136
	Annual Median	907	8.28	7.70	11.5	219	11.7	<0.001	0.00730	403	26.8	0.188	0.000325	0.000130	0.0584	<0.00002	0.0170	0.000130
	% < LRL	0%	0%	0%	0%	0%	0%	79%	32%	0%	0%	0%	0%	13%	0%	100%	0%	4%
	% > BCWQG[a]	-	0%	0%	0%	0%	100%	0%	0%	34%	0%	-	0%	-	0%	0%	0%	0%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%	0%	-	0%	0%	-	0%	-	-	-	-
	% > Level 1 Benchmark	15%	-	-	-	-	4%	-	-	34%	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WL_DCP_SP24	n	6	6	5	5	6	6	6	6	6	6	6	6	6	6	6	6	6
	Annual Minimum	480	8.24	8.10	10.4	183	6.94	<0.001	<0.005	141	2.70	0.158	0.000200	0.000110	0.0413	<0.00002	0.0130	0.000110
	Annual Maximum	806	8.48	8.34	12.1	210	10.8	<0.005	0.0139	347	24.4	0.235	0.000270	0.000140	0.0724	<0.00002	0.0160	0.000160
	Annual Mean	669	8.33	8.18	11.2	201	9.42	0.00200	0.00732	261	14.9	0.196	0.000240	0.000128	0.0560	<0.00002	0.0145	0.000133
	Annual Median	660	8.33	8.14	11.2	204	9.68	0.00205	0.00620	263	15.0	0.202	0.000240	0.000130	0.0591	<0.00002	0.0145	0.000135
	% < LRL	0%	0%	0%	0%	0%	0.0%	50%	50%	0%	0%	0%	0%	0%	0%	100%	0%	0%
	% > BCWQG[a]	-	0%	0%	0%	0%	100%	0%	0%	0%	0%	-	0%	-	0%	0%	0%	0%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%	0%	-	0%	0%	-	0%	-	-	-	-
	% > Level 1 Benchmark	0%	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LC_LCDSSLCC	n	52	52	50	50	52	52	52	52	52	52	52	52	52	52	52	52	52
	Annual Minimum	264	8.15	7.88	9.86	145	2.58	<0.001	<0.005	71.8	2.06	0.130	0.000150	<0.0001	0.0278	<0.00002	<0.01	<0.0001
	Annual Maximum	790	8.51	8.41	12.4	217	12.1	0.00640	0.0364	343	22.6	0.260	0.000270	0.000290	0.0863	<0.00002	0.0200	0.000330
	Annual Mean	608	8.35	8.16	11.3	192	8.26	0.00169	0.0106	240	13.7	0.201	0.000209	0.000134	0.0634	<0.00002	0.0134	0.000154
	Annual Median	664	8.36	8.16	11.4	198	8.82	0.00110	0.00710	266	16.0	0.200	0.000210	0.000125	0.0700	<0.00002	0.0130	0.000140
	% < LRL	0%	0%	0%	0%	0%	0.0%	54%	37%	0%	0%	0%	0%	17%	0%	100%	12%	4%
	% > BCWQG[a]	-	0%	0%	0%	0%	98%	0%	0%	0%	0%	-	0%	-	0%	0%	0%	0%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%	0%	-	0%	0%	-	0%	-	-	-	-
	% > Level 1 Benchmark	0%	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LC_LCC	n	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
	Annual Minimum	412	8.31	7.94	10.3	173	5.91	<0.001	<0.005	134	2.90	0.180	0.000140	<0.0001	0.0459	<0.00002	0.0120	0.000120
	Annual Maximum	662	8.51	8.46	12.1	196	8.54	<0.005	0.140	273	16.0	0.234	0.000230	0.000170	0.0895	<0.00002	0.0150	0.000270
	Annual Mean	569	8.40	8.25	11.4	189	7.54	0.00196	0.0310	219	11.3	0.213	0.000192	0.000133	0.0706	<0.00002	0.0130	0.000165
	Annual Median	593	8.40	8.31	11.7	192	7.66	0.00200	0.00940	222	12.0	0.218	0.000200	0.000140	0.0745	<0.00002	0.0130	0.000155
	% < LRL	0%	0%	0%	0%	0%	0.0%	50%	17%	0%	0%	0%	0%	17%	0%	100%	0%	0%
	% > BCWQG[a]	-	0%	0%	0%	0%	100%	0%	0%	0%	0%	-	0%	-	0%	0%	0%	0%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%	0%	-	0%	0%	-	0%	-	-	-	-
	% > Level 1 Benchmark	0%	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

> 5% of samples exceed the guideline or benchmark.
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Notes: "LRL" = laboratory reporting limit. "BCWQG" = British Columbia Working or Accepted Water Quality Guideline.

[a] Long-term average BCQWG for the Protection of Aquatic Life.

[b] Short-term maximum BCQWG for the Protection of Aquatic Life. 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.

Table D.2: **Summary of Water Chemistry Data for Key Parameters for the Line Creek LAEMP Monitoring Stations, 2020**

Station	Summary Statistic	Total Cobalt (mg/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 Sliver (mg/L)	Total Thallium (mg/L)	Total Uranium (mg/L)	Total Zinc (mg/L)	Dissolved Aluminum (mg/L)	Dissolved Cadmium (µg/L)	Dissolved Cobalt (mg/L)	Dissolved Copper (mg/L)	Dissolved Iron (mg/L)
LC_LC3	n	53	53	53	53	53	53	53	53	57	53	53	53	53	53	53	53	53	53
	Annual Minimum	<0.0001	<0.01	<0.00005	0.0216	0.00118	<0.0000005	0.00161	6.74	24.4	<0.00001	<0.00001	0.00229	0.00460	<0.003	0.117	<0.0001	<0.0002	<0.01
	Annual Maximum	0.000320	0.204	0.0000670	0.0703	0.0784	0.00000138	0.00731	15.3	95.4	<0.00001	0.0000190	0.00591	0.0426	0.0371	0.598	0.000560	0.00260	0.0390
	Annual Mean	0.000202	0.0770	0.0000504	0.0511	0.0358	0.000000549	0.00417	9.03	42.6	<0.00001	0.0000116	0.00447	0.0119	0.00390	0.274	0.000192	0.000386	0.0112
	Annual Median	0.000200	0.0820	<0.00005	0.0534	0.0339	<0.0000005	0.00440	8.72	43.8	<0.00001	0.0000100	0.00469	0.0103	<0.003	0.249	0.000185	0.000290	<0.01
	% < LRL	6%	6%	96%	0%	0%	77%	0%	0%	0%	100%	49%	0%	0%	96%	0%	9%	2%	87%
	% > BCWQG[a]	0%	-	0%	-	0%	2%	0%	-	100%	0%	0%	0%	0%	0%	9%	-	0%	-
	% > BCWQG[b]	0%	0%	0%	-	0%	-	0%	-	-	0%	-	-	0%	0%	0%	-	0%	0%
	% > Level 1 Benchmark	-	-	-	-	-	-	-	100%	100%	-	-	-	-	-	30%	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	2%	2%	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-
WL_DCP_SP24	n	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
	Annual Minimum	<0.0001	<0.01	<0.00005	0.0316	0.000490	<0.0000005	0.00147	4.76	30.7	<0.00001	<0.00001	0.00275	0.00440	<0.003	0.0902	<0.0001	<0.0002	<0.01
	Annual Maximum	0.000110	0.0470	0.0000590	0.0488	0.0193	<0.000005	0.00403	6.88	41	<0.00001	0.0000120	0.00444	0.0125	<0.003	0.329	<0.0001	0.000310	<0.01
	Annual Mean	0.000102	0.0277	0.0000515	0.0413	0.0108	<0.0000005	0.00283	5.98	35.6	<0.00001	0.0000103	0.00364	0.00787	<0.003	0.186	<0.0001	0.000228	<0.01
	Annual Median	<0.0001	0.0275	<0.00005	0.0420	0.0115	<0.0000005	0.00288	5.99	36.4	<0.00001	<0.00001	0.00367	0.00760	<0.003	0.178	<0.0001	0.000205	<0.01
	% < LRL	83%	17%	83%	0%	0%	100%	0%	0%	0%	100%	83%	0%	0%	100%	0%	100%	50%	100%
	% > BCWQG[a]	0%	-	0%	-	0%	17%	0%	-	100%	0%	0%	0%	0%	0%	0%	-	0%	-
	% > BCWQG[b]	0%	0%	0%	-	0%	-	0%	-	-	0%	-	-	0%	0%	0%	-	0%	0%
	% > Level 1 Benchmark	-	-	-	-	-	-	-	83%	100%	-	-	-	-	-	17%	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	0%	0%	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-
LC_LCDSSLCC	n	52	52	52	52	52	52	52	52	56	52	52	52	52	52	52	52	52	52
	Annual Minimum	<0.0001	<0.01	<0.00005	0.0131	0.000810	<0.0000005	0.00107	3.10	16.2	<0.00001	<0.00001	0.00141	0.00300	<0.003	0.0737	<0.0001	<0.0002	<0.01
	Annual Maximum	0.000160	0.139	0.000110	0.0509	0.0171	<0.000005	0.00362	5.64	55.5	<0.00001	0.0000120	0.00405	0.0133	0.0813	0.239	0.000230	0.00173	0.0340
	Annual Mean	0.000102	0.0213	0.0000513	0.0352	0.00597	0.000000557	0.00246	4.31	34.7	<0.00001	0.0000100	0.00325	0.00597	0.00466	0.133	0.000102	0.000271	0.0105
	Annual Median	<0.0001	0.0140	<0.00005	0.0378	0.00556	<0.0000005	0.00252	4.28	37.8	<0.00001	<0.00001	0.00352	0.00565	<0.003	0.122	<0.0001	<0.0002	<0.01
	% < LRL	94%	23%	94%	0%	0%	83%	0%	0%	0%	100%	98%	0%	0%	92%	0%	98%	58%	96%
	% > BCWQG[a]	0%	-	0%	-	0%	4%	0%	-	100%	0%	0%	0%	0%	2%	0%	-	0%	-
	% > BCWQG[b]	0%	0%	0%	-	0%	-	0%	-	-	0%	-	-	0%	0%	0%	-	0%	0%
	% > Level 1 Benchmark	-	-	-	-	-	-	-	2%	89%	-	-	-	-	-	0%	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	0%	0%	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-
LC_LCC	n	6	6	6	6	6	6	6	6	7	6	6	6	6	6	6	6	6	6
	Annual Minimum	<0.0001	<0.01	<0.00005	0.0265	0.000670	<0.0000005	0.00143	2.41	26.8	<0.00001	<0.00001	0.00228	0.00310	<0.003	0.0698	<0.0001	<0.0002	<0.01
	Annual Maximum	<0.0001	0.0450	<0.00005	0.0363	0.00841	<0.000005	0.00257	4.41	34.2	<0.00001	<0.00001	0.00331	0.00770	0.00310	0.186	<0.0001	0.000240	<0.01
	Annual Mean	<0.0001	0.0158	<0.00005	0.0313	0.00276	0.000000552	0.00219	3.44	30.5	<0.00001	<0.00001	0.00290	0.00508	0.00302	0.114	<0.0001	0.000210	<0.01
	Annual Median	<0.0001	<0.01	<0.00005	0.0314	0.00196	<0.0000005	0.00234	3.50	30	<0.00001	<0.00001	0.00294	0.00515	<0.003	0.102	<0.0001	<0.0002	<0.01
	% < LRL	100%	83%	100%	0%	0%	83%	0%	0%	0%	100%	100%	0%	0%	83%	0%	100%	67%	100%
	% > BCWQG[a]	0%	-	0%	-	0%	17%	0%	-	100%	0%	0%	0%	0%	0%	0%	-	0%	-
	% > BCWQG[b]	0%	0%	0%	-	0%	-	0%	-	-	0%	-	-	0%	0%	0%	-	0%	0%
	% > Level 1 Benchmark	-	-	-	-	-	-	-	0%	100%	-	-	-	-	-	0%	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	0%	0%	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	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: "LRL" = laboratory reporting limit. "BCWQG" = British Columbia Working or Accepted Water Quality Guideline.

[a] Long-term average BCQWG for the Protection of Aquatic Life.

[b] Short-term maximum BCQWG for the Protection of Aquatic Life. 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.

Table D.2: Summary of Water Chemistry Data for Key Parameters for the Line Creek LAEMP Monitoring Stations, 2020

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 Antimony (mg/L)	Total Arsenic (mg/L)	Total Barium (mg/L)	Total Beryllium (mg/L)	Total Boron (mg/L)	Total Chromium (mg/L)
LC_LC4	n	56	56	57	57	56	56	56	56	56	56	56	56	56	56	56	56	56
	Annual Minimum	225	7.80	8.03	10.0	130	1.99	<0.001	<0.005	56.7	1.53	0.153	0.000120	<0.0001	0.0326	<0.00002	<0.01	0.000120
	Annual Maximum	672	8.51	8.62	13.4	198	9.21	<0.005	0.0840	258	17.5	0.324	0.000210	0.000430	0.0967	0.0000340	0.0160	0.00315
	Annual Mean	503	8.36	8.36	11.7	176	6.29	0.00154	0.0133	189	10.4	0.241	0.000162	0.000139	0.0663	0.0000202	0.0117	0.000228
	Annual Median	546	8.38	8.37	11.7	180	6.56	0.00115	0.00850	208	12.0	0.239	0.000160	0.000130	0.0714	<0.00002	0.0120	0.000160
	% < LRL	0%	0%	0%	0%	0%	0.0%	45%	18%	0%	0%	0%	0%	7%	0%	98%	20%	0%
	% > BCWQG[a]	-	0%	0%	0%	0%	95%	0%	0%	0%	0%	-	0%	-	0%	0%	0%	2%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%	0%	-	0%	0%	-	0%	-	-	-	-
	% > Level 1 Benchmark	0%	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LC_LC6	n	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Annual Minimum	432	8.29	7.23	8.39	175	7.58	0.00220	<0.005	120	0.930	0.112	<0.0001	<0.0001	0.0790	<0.00002	<0.01	0.000120
	Annual Maximum	614	8.47	8.33	13.2	203	12.5	0.0102	0.0624	232	2.02	0.190	0.000150	0.000130	0.104	<0.00002	<0.01	0.000160
	Annual Mean	533	8.39	7.99	11.1	190	10.6	0.00574	0.0275	184	1.63	0.159	0.000120	0.000118	0.0959	<0.00002	<0.01	0.000134
	Annual Median	525	8.41	8.10	10.9	188	11.2	0.00510	0.0198	184	1.68	0.161	0.000110	0.000130	0.101	<0.00002	<0.01	0.000130
	% < LRL	0%	0%	0%	0%	0%	0.0%	0%	20%	0%	0%	0%	40%	20%	0%	100%	100%	0%
	% > BCWQG[a]	-	0%	0%	0%	0%	100%	0%	0%	0%	0%	-	0%	-	0%	0%	0%	0%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%	0%	-	0%	0%	-	0%	-	-	-	-
	% > Level 1 Benchmark	0%	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LC_LC5	n	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
	Annual Minimum	277	8.22	7.89	9.03	148	4.85	<0.001	<0.005	74.7	1.12	0.108	<0.0001	<0.0001	0.0556	<0.00002	<0.01	0.000100
	Annual Maximum	626	8.46	8.62	14.5	205	11.4	0.00850	0.0383	229	6.39	0.237	0.000190	0.000770	0.117	0.0000790	0.0160	0.00166
	Annual Mean	496	8.36	8.27	11.5	185	8.82	0.00313	0.00904	173	3.79	0.183	0.000129	0.000164	0.0870	0.0000220	0.0103	0.000233
	Annual Median	517	8.36	8.27	11.8	189	9.52	0.00305	0.00520	187	4.01	0.179	0.000120	0.000125	0.0930	<0.00002	<0.01	0.000155
	% < LRL	0%	0%	0%	0%	0%	0.0%	23%	50%	0%	0%	0%	20%	18%	0%	93%	80%	0%
	% > BCWQG[a]	-	0%	0%	0%	0%	100%	0%	0%	0%	0%	-	0%	-	0%	0%	0%	3%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%	0%	-	0%	0%	-	0%	-	-	-	-
	% > Level 1 Benchmark	0%	-	-	-	-	0%	-	-	0%	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

> 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: "LRL" = laboratory reporting limit. "BCWQG" = British Columbia Working or Accepted Water Quality Guideline.

[a] Long-term average BCQWG for the Protection of Aquatic Life.

[b] Short-term maximum BCQWG for the Protection of Aquatic Life. 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.

Table D.2: Summary of Water Chemistry Data for Key Parameters for the Line Creek LAEMP Monitoring Stations, 2020

Station	Summary Statistic	Total Cobalt (mg/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 Sliver (mg/L)	Total Thallium (mg/L)	Total Uranium (mg/L)	Total Zinc (mg/L)	Dissolved Aluminum (mg/L)	Dissolved Cadmium (µg/L)	Dissolved Cobalt (mg/L)	Dissolved Copper (mg/L)	Dissolved Iron (mg/L)
LC_LC4	n	56	56	56	56	56	56	56	56	59	56	56	56	56	56	56	56	56	56
	Annual Minimum	<0.0001	<0.01	<0.00005	0.00980	0.000460	<0.0000005	0.000950	1.21	14	<0.00001	<0.00001	0.00129	<0.003	<0.003	0.0276	<0.0001	<0.0002	<0.01
	Annual Maximum	0.000460	0.682	0.000506	0.0394	0.0374	0.00000404	0.00338	4.58	41.4	0.0000250	0.0000260	0.00333	0.0316	0.00540	0.167	<0.0001	0.00129	0.258
	Annual Mean	0.000106	0.0266	0.0000640	0.0272	0.00248	0.000000634	0.00210	2.75	26.9	0.0000103	0.0000103	0.00268	0.00558	0.00309	0.0673	<0.0001	0.000246	0.0144
	Annual Median	<0.0001	<0.01	<0.00005	0.0285	0.00131	<0.0000005	0.00219	2.72	28.6	<0.00001	<0.00001	0.00285	0.00410	<0.003	0.0556	<0.0001	<0.0002	<0.01
	% < LRL	98%	68%	89%	0%	0%	70%	0%	0%	0%	98%	95%	0%	11%	95%	0%	100%	64%	98%
	% > BCWQG[a]	0%	-	0%	-	0%	2%	0%	-	100%	0%	0%	0%	0%	0%	0%	-	0%	-
	% > BCWQG[b]	0%	0%	0%	-	0%	-	0%	-	-	0%	-	-	0%	0%	0%	-	0%	0%
	% > Level 1 Benchmark	-	-	-	-	-	-	-	0%	86%	-	-	-	-	-	0%	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	0%	0%	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-
LC_LC6	n	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Annual Minimum	<0.0001	<0.01	<0.00005	0.0171	0.000670	<0.0000005	0.000939	<0.5	31.4	<0.00001	<0.00001	0.00178	<0.003	<0.003	0.0053	<0.0001	<0.0002	<0.01
	Annual Maximum	0.000100	0.0610	0.0000600	0.0226	0.00537	0.000000800	0.00129	1.95	55	<0.00001	<0.00001	0.00225	<0.003	<0.003	0.0219	<0.0001	0.000410	<0.01
	Annual Mean	0.000100	0.0276	0.0000520	0.0192	0.00245	0.000000560	0.00110	0.876	44.7	<0.00001	<0.00001	0.00206	<0.003	<0.003	0.0122	<0.0001	0.000242	<0.01
	Annual Median	<0.0001	0.0110	<0.00005	0.0188	0.000760	<0.0000005	0.00109	<0.5	45.5	<0.00001	<0.00001	0.00215	<0.003	<0.003	0.0099	<0.0001	<0.0002	<0.01
	% < LRL	80%	40%	80%	0%	0%	80%	0%	60%	0%	100%	100%	0%	100%	100%	0%	100%	60%	100%
	% > BCWQG[a]	0%	-	0%	-	0%	0%	0%	-	100%	0%	0%	0%	0%	0%	0%	-	0%	-
	% > BCWQG[b]	0%	0%	0%	-	0%	-	0%	-	-	0%	-	-	0%	0%	0%	-	0%	0%
	% > Level 1 Benchmark	-	-	-	-	-	-	-	0%	100%	-	-	-	-	-	0%	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	0%	0%	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-
LC_LC5	n	40	40	40	40	40	40	40	40	41	40	40	40	40	40	40	40	40	40
	Annual Minimum	<0.0001	<0.01	<0.00005	0.0133	0.000340	<0.0000005	0.000993	0.600	19.9	<0.00001	<0.00001	0.00134	<0.003	<0.003	0.0107	<0.0001	<0.0002	<0.01
	Annual Maximum	0.000810	1.63	0.00115	0.0326	0.113	0.00000496	0.00226	4.78	49.1	0.0000220	0.0000380	0.00293	0.0201	0.0189	0.0876	<0.0001	0.000940	0.0110
	Annual Mean	0.000138	0.111	0.000112	0.0200	0.00870	0.000000795	0.00126	1.39	38.2	0.0000103	0.0000112	0.00214	0.00414	0.00373	0.0238	<0.0001	0.000266	0.0100
	Annual Median	<0.0001	0.0130	<0.00005	0.0205	0.00121	<0.0000005	0.00125	1.08	39.8	<0.00001	<0.00001	0.00222	<0.003	<0.003	0.0198	<0.0001	<0.0002	<0.01
	% < LRL	75%	40%	68%	0%	0%	68%	0%	0%	0%	93%	90%	0%	73%	90%	0%	100%	68%	98%
	% > BCWQG[a]	0%	-	0%	-	0%	15%	0%	-	100%	0%	0%	0%	0%	0%	0%	-	0%	-
	% > BCWQG[b]	0%	3%	0%	-	0%	-	0%	-	-	0%	-	-	0%	0%	0%	-	0%	0%
	% > Level 1 Benchmark	-	-	-	-	-	-	-	0%	100%	-	-	-	-	-	0%	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	0%	0%	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-

> 5% of samples exceed the guideline or benchmark.
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Notes: "LRL" = laboratory reporting limit. "BCWQG" = British Columbia Working or Accepted Water Quality Guideline.

[a] Long-term average BCQWG for the Protection of Aquatic Life.

[b] Short-term maximum BCQWG for the Protection of Aquatic Life. 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.

Table D.3 Acute Toxicity Results for Line Creek Operations, 2020

Water Station		*Daphnia magna*		*Oncorhynchus mykiss*	
Teck Code	**Description**	**Date**	**Percent Mortality**	**Date**	**Percent Mortality**
WL_BFWB_OUT_SP21	West Line Creek AWTF effluent outfall	6-Jan-20	0%	6-Jan-20	0%
		13-Jan-20	0%	13-Jan-20	0%
		20-Jan-20	0%	20-Jan-20	0%
		27-Jan-20	0%	27-Jan-20	0%
		10-Feb-20	0%	10-Feb-20	0%
		24-Feb-20	0%	24-Feb-20	0%
		3-Mar-20	0%	3-Mar-20	0%
		9-Mar-20	0%	9-Mar-20	0%
		23-Mar-20	0%	23-Mar-20	0%
		6-Apr-20	0%	6-Apr-20	0%
		20-Apr-20	0%	20-Apr-20	0%
		23-Apr-20	0%	23-Apr-20	0%
		4-May-20	0%	4-May-20	0%
		18-May-20	0%	18-May-20	0%
		26-May-20	0%	26-May-20	0%
		1-Jun-20	0%	1-Jun-20	0%
		15-Jun-20	0%	15-Jun-20	0%
		29-Jun-20	0%	29-Jun-20	0%
		13-Jul-20	0%	13-Jul-20	0%
		27-Jul-20	0%	27-Jul-20	0%
		10-Aug-20	0%	10-Aug-20	0%
		24-Aug-20	0%	24-Aug-20	0%
		7-Sep-20	0%	7-Sep-20	0%
		22-Sep-20	0%	22-Sep-20	0%
		7-Oct-20	0%	7-Oct-20	0%
		19-Oct-20	0%	19-Oct-20	0%
		2-Nov-20	0%	2-Nov-20	0%
		16-Nov-20	0%	16-Nov-20	0%
		30-Nov-20	0%	30-Nov-20	0%
		20-Dec-20	0%	20-Dec-20	0%
		28-Dec-20	0%	28-Dec-20	0%

APPENDIX E - BIOLOGICAL TRIGGERS

APPENDIX E BIOLOGICAL TRIGGERS

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E1 INTRODUCTION

E1.1 Background

Biological triggers for potential monitoring and management action are required as part of Teck's Adaptive Management Plan (AMP; Teck 2018). Generally, triggers are intended as a simple way to identify potential unexpected monitoring results that may require management action. Additionally, information provided from the analysis of biological triggers may lead to responses under the AMP response framework if necessary, and as such would be reported within the annual AMP report. Draft biological triggers were developed in the 2018 AMP (Teck 2018) under Management Question 5 for 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.
- 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.

These three endpoints are evaluated (where data are available) in other sections of the Local Aquatic Effects Monitoring Program (LAEMP) and the Regional Aquatic Effects Monitoring Program (RAEMP) reports, and therefore there is some degree of redundancy in the analysis of biological triggers. Data collected during the RAEMP is incorporated into the aquatic data integration tool (ADIT), which together is used to characterize the state of the aquatic environment. Biological trigger analyses are not identical to the evaluations in the LAEMP, RAEMP and, by extension, the ADIT, and are expected to be complementary to these other analyses. The methods applied for biological trigger analyses in this report reflect refinements made in consultation with the EMC since the draft triggers were developed in the 2018 AMP (Teck 2018). The 2020 LCO LAEMP represents the first time that biological triggers have been evaluated and reported (i.e., implemented) in LAEMP reports. Through future iterative biological trigger evaluations, the process and/or biological triggers may adjust over time.

E2 METHODS

E2.1 Overview

As outlined in Section E1.1, analyses for biological triggers are meant to be complementary to other analyses conducted in the LAEMPs and RAEMP. For the 2020 LCO LAEMP, biological trigger analyses only included two of the three measurement endpoints (%EPT and BIT Se) since fish tissue sampling was not completed in 2020.[1]

For the purpose of application of the biological triggers, expectations for the endpoints evaluated (both the %EPT and BIT Se for the 2020 LCO LAEMP) 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[2]. 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.

E2.2 Percent EPT

Data for percent EPT were compared to:

- Normal range: The lower limit of habitat-adjusted normal range (2.5th percentile).
- Expectations: The %EPT corresponding to the predicted ADIT score. The predicted ADIT scores correspond to potential effects on benthic invertebrate community (BIC) endpoints, based on relationships between water quality projections (for nitrate,

[1] Fish tissue monitoring was excluded from the 2020 LCO LAEMP monitoring program in an effort to help reduce the potential for sampling stress on bull trout and westslope cutthroat populations in Line Creek related to LAEMP monitoring activities. See Section 2.1 of the report for further information.

[2] Biological triggers have not been developed for lentic habitats, because water quality projections are not generally available for lentic locations. For two of the three endpoints (BIT Se and WCT Se; %EPT not relevant in lentic areas), if projections become available for lentic habitats then triggers could be developed in future, using the available lentic bioaccumulation model from water to invertebrates (updated in 2020), and the invertebrate to fish bioaccumulation model (which should be applicable to both lotic and lentic habitats).

sulphate and cadmium)[3] and invertebrate toxicity endpoints originally developed for the EVWQP (Teck 2014). 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 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 (August/September) for the 2020 LCO LAEMP were included in the biological trigger analysis.

E2.3 Benthic Invertebrate Tissue Selenium (BIT Se)

Data for BIT Se were compared to:

- Normal range: The upper limit of regional normal range (97.5th percentile).
- Expectations: The upper limit of the 95% prediction interval based on the water to BIT bioaccumulation model. The model was originally developed in the EVWQP (Golder 2014) was updated (Golder 2020) and the updated best fit relationship is $log_{10}[Se]_{inv} = 0.720 + 0.071 \times log_{10}[Se]_{aq}$. Prediction intervals were estimated for BIT Se for individual replicates, taking into account that the data points for the original model were based on geometric means rather than individual replicates (Azimuth 2021, In Preparation).

Benthic invertebrate tissue selenium data from sampling events completed throughout 2020 for the LCO LAEMP (February, April, July, August/September, and November/December)

[3] Notes: (a) Selenium not included because selenium effects on BIC endpoints were not expected. (b) Projections were based on the highest maximum monthly mean across all flow scenarios (low, average, high).

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).

E3 RESULTS

E3.1 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 trigger for the August/September sampling period (Appendix Table E.1 and Appendix Figure E.1). Each mine-exposed area (RG_LCUT [1 of 1 replicate], RG_LILC3 [5 of 5 replicates], RG_LIDSL [5 of 5 replicates], RG_LI8 [1 of 3 replicates], and RG_FO23 [4 of 5 replicates] had % EPT results that were lower than the biological trigger value . RG_LILC3 (the area closest in downstream proximity to the AWTF) had %EPT ranging from 5.7 to 7.5% which is substantially lower than the lower 2.5th percentile prediction limit of the biological trigger (which ranged from 73.5 to 77.9%), while %EPT values from areas further downstream did not show the same magnitude of difference. Specifically, %EPT at RG_FO23 and RG_LI8 either did not reach the biological trigger (i.e., were higher than the trigger value; one replicate at RG_FO23 and two replicates at RG_LI8) or were slightly lower than the trigger (45.6 to 70.5 %EPT [reported value] compared to 66.4 to 73.5 %EPT [lower 2.5th percentile trigger prediction limit];Table E.1). The reference area RG_LI24 had one replicate (of 5) with a %EPT (75.2%) that was marginally lower than the lower 2.5th percentile prediction limit of the biological trigger (75.6%), while RG_SLINE had no replicates (of 3 replicates sampled) that reached the biological trigger (Appendix Table E.1 and Appendix Figure E.1).

E3.2 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 five sampling events (February, April, July, August/September, and November/December; Appendix Table E.2 and Appendix Figure E.2). RG_LILC3 was the only area for which replicates exceeded the biological trigger (4 of 40 replicates at this area in 2020), with each of those being collected in the April sampling event (10 replicates collected in April). It should be noted that with 40 replicates, we would expect 1 of 40 to exceed the upper 95th prediction limit by chance. The four replicates, which had benthic invertebrate tissue concentrations ranging from 15 to 17 mg/kg dw, exceeded the upper 95% prediction limit of the biological trigger (14.4 mg/kg) by 4.0 to 17%. The remaining mine-exposed areas (RG_LCUT, RG_LIDSL, RG_LI8, and RG_FO23) and reference areas

Table E.1: Biological trigger analysis for %EPT in Line Creek and Fording River, August/September 2020

Waterbody		Area	Stream Type	Replicate	Reported Value	ADIT Value [a]	Lower 2.5th Percentile of the Habitat Adjusted Normal Range
Line Creek	Reference	RG_SLINE	T	1	87.1	70.9	65.4
		RG_SLINE	T	2	78.3	71.7	66.7
		RG_SLINE	T	3	85.8	73.9	68.9
		RG_LI24	T	1	89.6	81.6	77.1
		RG_LI24	T	2	86.7	82.4	78.0
		RG_LI24	T	3	91.4	79.9	74.8
		RG_LI24	T	4	85.3	80.9	75.9
		RG_LI24	T	5	75.2	80.5	75.6
	Mine-exposed	RG_LCUT	T	1	13.5	81.4	77.0
		RG_LILC3	T	1	7.4	78.4	73.5
		RG_LILC3	T	2	5.7	79.2	74.2
		RG_LILC3	T	3	6.8	82.5	77.9
		RG_LILC3	T	4	7.5	80.5	76.1
		RG_LILC3	T	5	7.2	81.9	77.2
		RG_LIDSL	T	1	46.5	78.4	73.9
		RG_LIDSL	T	2	43.6	79.2	74.4
		RG_LIDSL	T	3	65.4	77.9	73.2
		RG_LIDSL	T	4	58.2	79.1	74.1
		RG_LIDSL	T	5	59.2	77.9	73.0
		RG_LI8	T	1	78.9	78.1	73.6
		RG_LI8	T	2	75.2	78.9	74.1
		RG_LI8	T	3	67.1	78.0	73.5
Fording River		RG_FO23	M	1	45.6	75.4	69.8
		RG_FO23	M	2	70.5	76.8	72.1
		RG_FO23	M	3	74.8	75.1	70.1
		RG_FO23	M	4	60.7	72.0	66.4
		RG_FO23	M	5	64.2	73.7	68.1

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.

[a] Information pertaining to the calculation of the ADIT value is shown in Section E3.1. In short, all LCO areas evaluated had an ADIT score of 0, which corresponds to the 80% lower limit of the expected %EPT (as based on water quality projections).

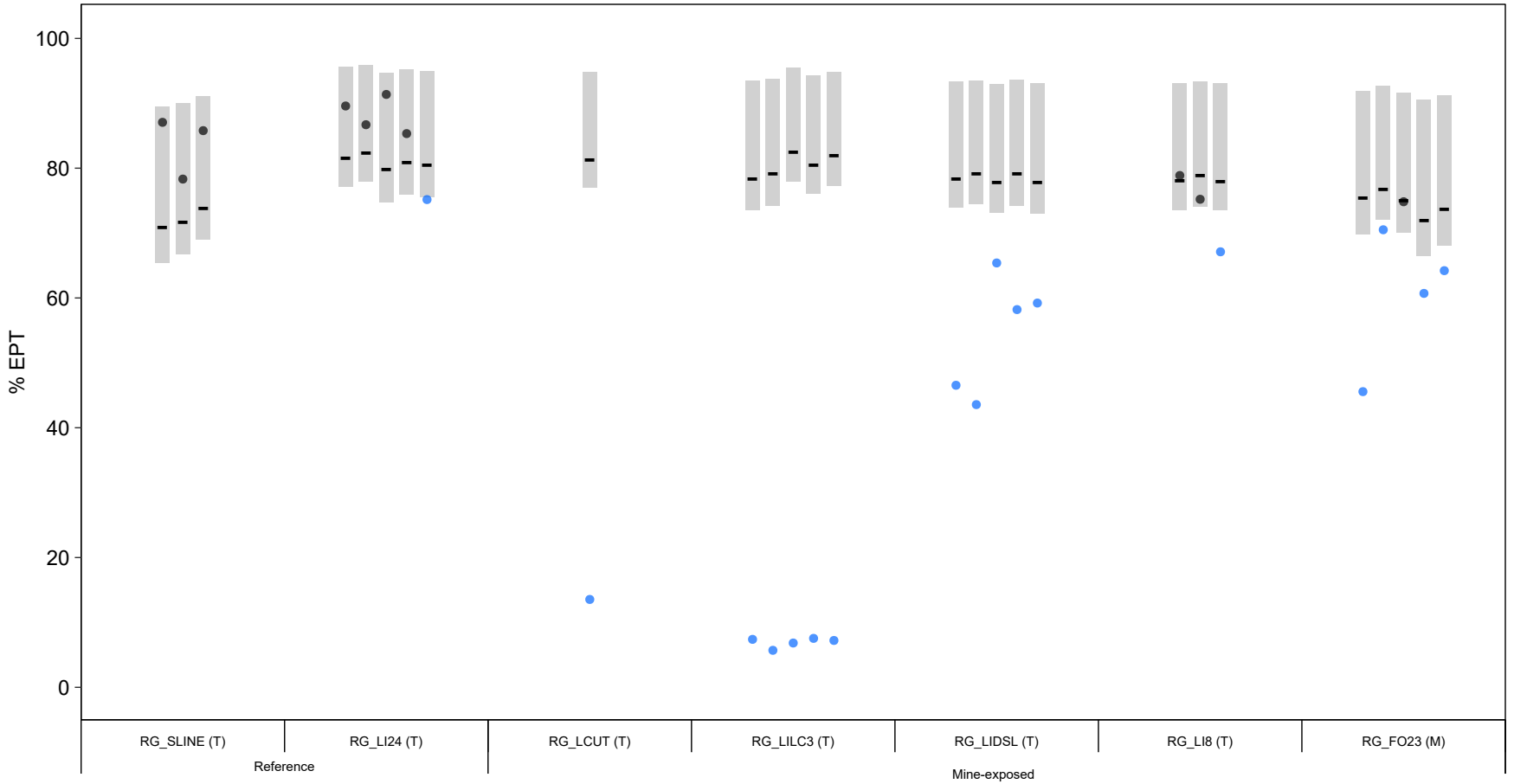

Figure E.1: Biological Trigger Analysis for %EPT in Line Creek and Fording River, August/September 2020

Notes: Black bars indicate the lower limit of the predicted ADIT score for the location. Blue dots represent values exceeding the trigger (below the 2.5th percentile of habitat-adjusted normal range and below lower limit of predicted ADIT score). Gray shading represents the habitat-adjusted normal range for each replicate. T = Tributary, M = Mainstem.

Table E.2: Biological Trigger Analysis for Selenium Concentrations in Benthic Invertebrate Tissue in Line Creek and Fording River, 2020

Waterbody		Stream Type	Area	Date	Replicate	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	Reference	T	RG_LI24	28-Apr-2020	1	1.1	10.6	8.7	5.8
		T	RG_LI24	28-Apr-2020	2	1.1	10.6	8.7	9.2
		T	RG_LI24	28-Apr-2020	3	1.1	10.6	8.7	6.0
		T	RG_LI24	28-Apr-2020	4	1.1	10.6	8.7	7.0
		T	RG_LI24	28-Apr-2020	5	1.1	10.6	8.7	3.8
		T	RG_LI24	28-Apr-2020	6	1.1	10.6	8.7	6.8
		T	RG_LI24	28-Apr-2020	7	1.1	10.6	8.7	4.4
		T	RG_LI24	28-Apr-2020	8	1.1	10.6	8.7	6.9
		T	RG_LI24	28-Apr-2020	9	1.1	10.6	8.7	5.3
		T	RG_LI24	28-Apr-2020	10	1.1	10.6	8.7	5.6
		T	RG_LI24	14-Jul-2020	1	1.1	10.6	8.7	5.9
		T	RG_LI24	14-Jul-2020	2	1.1	10.6	8.7	5.2
		T	RG_LI24	14-Jul-2020	3	1.1	10.6	8.7	5.5
		T	RG_LI24	14-Jul-2020	4	1.1	10.6	8.7	4.7
		T	RG_LI24	14-Jul-2020	5	1.1	10.6	8.7	4.2
		T	RG_LI24	14-Jul-2020	6	1.1	10.6	8.7	5.0
		T	RG_LI24	14-Jul-2020	7	1.1	10.6	8.7	6.3
		T	RG_LI24	14-Jul-2020	8	1.1	10.6	8.7	4.1
		T	RG_LI24	14-Jul-2020	9	1.1	10.6	8.7	3.9
		T	RG_LI24	14-Jul-2020	10	1.1	10.6	8.7	3.8
		T	RG_LI24	31-Aug-2020	1	1.1	10.6	8.7	6.6
		T	RG_LI24	31-Aug-2020	2	1.1	10.6	8.7	6.5
		T	RG_LI24	31-Aug-2020	3	1.1	10.6	8.7	5.4
		T	RG_LI24	31-Aug-2020	4	1.1	10.6	8.7	6.9
		T	RG_LI24	1-Sep-2020	5	1.1	10.6	8.7	7.8
		T	RG_LI24	30-Nov-2020	1	1.1	10.6	8.7	5.2
		T	RG_LI24	30-Nov-2020	2	1.1	10.6	8.7	7.0
		T	RG_LI24	30-Nov-2020	3	1.1	10.6	8.7	6.4
		T	RG_LI24	30-Nov-2020	4	1.1	10.6	8.7	5.1
		T	RG_LI24	30-Nov-2020	5	1.1	10.6	8.7	5.9
		T	RG_SLINE	26-Feb-2020	1	1.1	10.6	8.7	7.6
		T	RG_SLINE	26-Feb-2020	2	1.1	10.6	8.7	6.7
		T	RG_SLINE	26-Feb-2020	3	1.1	10.6	8.7	5.0
		T	RG_SLINE	26-Feb-2020	4	1.1	10.6	8.7	5.9
		T	RG_SLINE	26-Feb-2020	5	1.1	10.6	8.7	5.2
		T	RG_SLINE	26-Feb-2020	6	1.1	10.6	8.7	7.9
		T	RG_SLINE	26-Feb-2020	7	1.1	10.6	8.7	6.3
		T	RG_SLINE	26-Feb-2020	8	1.1	10.6	8.7	8.5
		T	RG_SLINE	26-Feb-2020	9	1.1	10.6	8.7	8.8
		T	RG_SLINE	26-Feb-2020	10	1.1	10.6	8.7	7.7
		T	RG_SLINE	28-Apr-2020	1	1.1	10.6	8.7	9.2
		T	RG_SLINE	28-Apr-2020	2	1.1	10.6	8.7	8.4
		T	RG_SLINE	28-Apr-2020	3	1.1	10.6	8.7	6.1
		T	RG_SLINE	28-Apr-2020	4	1.1	10.6	8.7	8.9
		T	RG_SLINE	28-Apr-2020	5	1.1	10.6	8.7	6.7
		T	RG_SLINE	28-Apr-2020	6	1.1	10.6	8.7	6.7
		T	RG_SLINE	28-Apr-2020	7	1.1	10.6	8.7	10.0
		T	RG_SLINE	28-Apr-2020	8	1.1	10.6	8.7	5.3
		T	RG_SLINE	28-Apr-2020	9	1.1	10.6	8.7	9.0
		T	RG_SLINE	28-Apr-2020	10	1.1	10.6	8.7	7.1
		T	RG_SLINE	14-Jul-2020	1	1.1	10.6	8.7	4.8
		T	RG_SLINE	14-Jul-2020	2	1.1	10.6	8.7	4.6
		T	RG_SLINE	14-Jul-2020	3	1.1	10.6	8.7	6.8
		T	RG_SLINE	14-Jul-2020	4	1.1	10.6	8.7	6.5
		T	RG_SLINE	14-Jul-2020	5	1.1	10.6	8.7	6.5
		T	RG_SLINE	14-Jul-2020	6	1.1	10.6	8.7	5.7
		T	RG_SLINE	14-Jul-2020	7	1.1	10.6	8.7	8.1
		T	RG_SLINE	14-Jul-2020	8	1.1	10.6	8.7	5.5
		T	RG_SLINE	14-Jul-2020	9	1.1	10.6	8.7	7.0
		T	RG_SLINE	14-Jul-2020	10	1.1	10.6	8.7	6.1
		T	RG_SLINE	31-Aug-2020	1	1.1	10.6	8.7	9.5
		T	RG_SLINE	31-Aug-2020	2	1.1	10.6	8.7	5.7
		T	RG_SLINE	31-Aug-2020	3	1.1	10.6	8.7	6.4
		T	RG_SLINE	31-Aug-2020	4	1.1	10.6	8.7	6.4
		T	RG_SLINE	31-Aug-2020	5	1.1	10.6	8.7	4.6
		T	RG_SLINE	30-Nov-2020	1	1.1	10.6	8.7	7.0
		T	RG_SLINE	30-Nov-2020	2	1.1	10.6	8.7	7.7
		T	RG_SLINE	30-Nov-2020	3	1.1	10.6	8.7	8.5
		T	RG_SLINE	30-Nov-2020	4	1.1	10.6	8.7	6.1
		T	RG_SLINE	30-Nov-2020	5	1.1	10.6	8.7	6.9
	Mine-Exposed	T	RG_LCUT	26-Feb-2020	1	84.0	14.5	8.7	7.1
		T	RG_LCUT	26-Feb-2020	2	84.0	14.5	8.7	8.5
		T	RG_LCUT	26-Feb-2020	3	84.0	14.5	8.7	8.3
		T	RG_LCUT	26-Feb-2020	4	84.0	14.5	8.7	7.8
		T	RG_LCUT	26-Feb-2020	5	84.0	14.5	8.7	6.9
		T	RG_LCUT	26-Feb-2020	6	84.0	14.5	8.7	6.8
		T	RG_LCUT	26-Feb-2020	7	84.0	14.5	8.7	7.5
		T	RG_LCUT	26-Feb-2020	8	84.0	14.5	8.7	6.5
		T	RG_LCUT	26-Feb-2020	9	84.0	14.5	8.7	6.8
		T	RG_LCUT	26-Feb-2020	10	84.0	14.5	8.7	7.8
		T	RG_LCUT	27-Apr-2020	1	84.0	14.5	8.7	8.2
		T	RG_LCUT	27-Apr-2020	2	84.0	14.5	8.7	7.2
		T	RG_LCUT	27-Apr-2020	3	84.0	14.5	8.7	7.1
		T	RG_LCUT	27-Apr-2020	4	84.0	14.5	8.7	7.9
		T	RG_LCUT	27-Apr-2020	5	84.0	14.5	8.7	9.4
		T	RG_LCUT	27-Apr-2020	6	84.0	14.5	8.7	9.9

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 and T = Tributary.

Table E.2: Biological Trigger Analysis for Selenium Concentrations in Benthic Invertebrate Tissue in Line Creek and Fording River, 2020

Waterbody		Stream Type	Area	Date	Replicate	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	27-Apr-2020	7	84.0	14.5	8.7	6.0
		T	RG_LCUT	27-Apr-2020	8	84.0	14.5	8.7	11.0
		T	RG_LCUT	27-Apr-2020	9	84.0	14.5	8.7	8.4
		T	RG_LCUT	27-Apr-2020	10	84.0	14.5	8.7	7.0
		T	RG_LCUT	13-Jul-2020	1	84.0	14.5	8.7	4.0
		T	RG_LCUT	13-Jul-2020	2	84.0	14.5	8.7	4.4
		T	RG_LCUT	13-Jul-2020	3	84.0	14.5	8.7	3.6
		T	RG_LCUT	13-Jul-2020	4	84.0	14.5	8.7	3.3
		T	RG_LCUT	13-Jul-2020	5	84.0	14.5	8.7	3.0
		T	RG_LCUT	13-Jul-2020	6	84.0	14.5	8.7	4.4
		T	RG_LCUT	13-Jul-2020	7	84.0	14.5	8.7	5.1
		T	RG_LCUT	13-Jul-2020	8	84.0	14.5	8.7	4.2
		T	RG_LCUT	13-Jul-2020	9	84.0	14.5	8.7	2.2
		T	RG_LCUT	13-Jul-2020	10	84.0	14.5	8.7	4.3
		T	RG_LCUT	1-Sep-2020	1	84.0	14.5	8.7	7.0
		T	RG_LCUT	1-Sep-2020	2	84.0	14.5	8.7	8.3
		T	RG_LCUT	1-Sep-2020	3	84.0	14.5	8.7	6.6
		T	RG_LCUT	1-Sep-2020	4	84.0	14.5	8.7	8.0
		T	RG_LCUT	1-Sep-2020	5	84.0	14.5	8.7	6.3
		T	RG_LCUT	1-Dec-2020	1	84.0	14.5	8.7	5.4
		T	RG_LCUT	1-Dec-2020	2	84.0	14.5	8.7	5.9
		T	RG_LCUT	1-Dec-2020	3	84.0	14.5	8.7	5.1
		T	RG_LCUT	1-Dec-2020	4	84.0	14.5	8.7	5.8
		T	RG_LCUT	1-Dec-2020	5	84.0	14.5	8.7	6.9
		T	RG_LILC3	24-Feb-2020	1	78.5	14.4	8.7	5.8
		T	RG_LILC3	24-Feb-2020	2	78.5	14.4	8.7	8.2
		T	RG_LILC3	24-Feb-2020	3	78.5	14.4	8.7	9.0
		T	RG_LILC3	24-Feb-2020	4	78.5	14.4	8.7	9.7
		T	RG_LILC3	24-Feb-2020	5	78.5	14.4	8.7	9.5
		T	RG_LILC3	24-Feb-2020	6	78.5	14.4	8.7	8.9
		T	RG_LILC3	24-Feb-2020	7	78.5	14.4	8.7	10.0
		T	RG_LILC3	24-Feb-2020	8	78.5	14.4	8.7	9.4
		T	RG_LILC3	24-Feb-2020	9	78.5	14.4	8.7	9.8
		T	RG_LILC3	24-Feb-2020	10	78.5	14.4	8.7	12.0
		T	RG_LILC3	27-Apr-2020	1	78.5	14.4	8.7	11.0
		T	RG_LILC3	27-Apr-2020	2	78.5	14.4	8.7	14.0
		T	RG_LILC3	27-Apr-2020	3	78.5	14.4	8.7	12.0
		T	RG_LILC3	27-Apr-2020	4	78.5	14.4	8.7	15.0
		T	RG_LILC3	27-Apr-2020	5	78.5	14.4	8.7	15.0
		T	RG_LILC3	27-Apr-2020	6	78.5	14.4	8.7	17.0
		T	RG_LILC3	27-Apr-2020	7	78.5	14.4	8.7	11.0
		T	RG_LILC3	27-Apr-2020	8	78.5	14.4	8.7	15.0
		T	RG_LILC3	27-Apr-2020	9	78.5	14.4	8.7	14.0
		T	RG_LILC3	27-Apr-2020	10	78.5	14.4	8.7	14.0
		T	RG_LILC3	15-Jul-2020	1	78.5	14.4	8.7	6.7
		T	RG_LILC3	15-Jul-2020	2	78.5	14.4	8.7	7.1
		T	RG_LILC3	15-Jul-2020	3	78.5	14.4	8.7	7.2
		T	RG_LILC3	15-Jul-2020	4	78.5	14.4	8.7	6.2
		T	RG_LILC3	15-Jul-2020	5	78.5	14.4	8.7	7.9
		T	RG_LILC3	15-Jul-2020	6	78.5	14.4	8.7	7.7
		T	RG_LILC3	15-Jul-2020	7	78.5	14.4	8.7	9.6
		T	RG_LILC3	15-Jul-2020	8	78.5	14.4	8.7	6.0
		T	RG_LILC3	15-Jul-2020	9	78.5	14.4	8.7	6.2
		T	RG_LILC3	15-Jul-2020	10	78.5	14.4	8.7	9.3
		T	RG_LILC3	27-Aug-2020	1	78.5	14.4	8.7	6.9
		T	RG_LILC3	27-Aug-2020	2	78.5	14.4	8.7	12.0
		T	RG_LILC3	27-Aug-2020	3	78.5	14.4	8.7	13.0
		T	RG_LILC3	27-Aug-2020	4	78.5	14.4	8.7	12.0
		T	RG_LILC3	27-Aug-2020	5	78.5	14.4	8.7	9.3
		T	RG_LILC3	1-Dec-2020	1	78.5	14.4	8.7	6.3
		T	RG_LILC3	1-Dec-2020	2	78.5	14.4	8.7	6.8
		T	RG_LILC3	1-Dec-2020	3	78.5	14.4	8.7	8.7
		T	RG_LILC3	1-Dec-2020	4	78.5	14.4	8.7	8.9
		T	RG_LILC3	1-Dec-2020	5	78.5	14.4	8.7	12.0
		T	RG_LIDSL	25-Feb-2020	1	53.9	14.0	8.7	5.2
		T	RG_LIDSL	25-Feb-2020	2	53.9	14.0	8.7	6.3
		T	RG_LIDSL	25-Feb-2020	3	53.9	14.0	8.7	5.1
		T	RG_LIDSL	25-Feb-2020	4	53.9	14.0	8.7	6.4
		T	RG_LIDSL	25-Feb-2020	5	53.9	14.0	8.7	5.4
		T	RG_LIDSL	25-Feb-2020	6	53.9	14.0	8.7	6.0
		T	RG_LIDSL	25-Feb-2020	7	53.9	14.0	8.7	6.8
		T	RG_LIDSL	25-Feb-2020	8	53.9	14.0	8.7	4.7
		T	RG_LIDSL	25-Feb-2020	9	53.9	14.0	8.7	4.0
		T	RG_LIDSL	25-Feb-2020	10	53.9	14.0	8.7	4.6
		T	RG_LIDSL	29-Apr-2020	1	53.9	14.0	8.7	6.5
		T	RG_LIDSL	29-Apr-2020	2	53.9	14.0	8.7	7.3
		T	RG_LIDSL	29-Apr-2020	3	53.9	14.0	8.7	4.7
		T	RG_LIDSL	29-Apr-2020	4	53.9	14.0	8.7	5.4
		T	RG_LIDSL	29-Apr-2020	5	53.9	14.0	8.7	5.5
		T	RG_LIDSL	29-Apr-2020	6	53.9	14.0	8.7	5.5
		T	RG_LIDSL	29-Apr-2020	7	53.9	14.0	8.7	6.1
		T	RG_LIDSL	29-Apr-2020	8	53.9	14.0	8.7	5.4
		T	RG_LIDSL	29-Apr-2020	9	53.9	14.0	8.7	6.4

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 and T = Tributary.

Table E.2: Biological Trigger Analysis for Selenium Concentrations in Benthic Invertebrate Tissue in Line Creek and Fording River, 2020

Waterbody		Stream Type	Area	Date	Replicate	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	29-Apr-2020	10	53.9	14.0	8.7	6.4
		T	RG_LIDSL	13-Jul-2020	1	53.9	14.0	8.7	5.9
		T	RG_LIDSL	13-Jul-2020	2	53.9	14.0	8.7	4.8
		T	RG_LIDSL	13-Jul-2020	3	53.9	14.0	8.7	6.9
		T	RG_LIDSL	13-Jul-2020	4	53.9	14.0	8.7	5.6
		T	RG_LIDSL	13-Jul-2020	5	53.9	14.0	8.7	5.9
		T	RG_LIDSL	13-Jul-2020	6	53.9	14.0	8.7	5.8
		T	RG_LIDSL	13-Jul-2020	7	53.9	14.0	8.7	6.1
		T	RG_LIDSL	13-Jul-2020	8	53.9	14.0	8.7	5.1
		T	RG_LIDSL	13-Jul-2020	9	53.9	14.0	8.7	5.5
		T	RG_LIDSL	13-Jul-2020	10	53.9	14.0	8.7	6.0
		T	RG_LIDSL	25-Aug-2020	1	53.9	14.0	8.7	7.3
		T	RG_LIDSL	25-Aug-2020	2	53.9	14.0	8.7	11.0
		T	RG_LIDSL	25-Aug-2020	3	53.9	14.0	8.7	11.0
		T	RG_LIDSL	25-Aug-2020	4	53.9	14.0	8.7	11.0
		T	RG_LIDSL	25-Aug-2020	5	53.9	14.0	8.7	9.3
		T	RG_LIDSL	1-Dec-2020	1	53.9	14.0	8.7	6.8
		T	RG_LIDSL	1-Dec-2020	2	53.9	14.0	8.7	3.7
		T	RG_LIDSL	1-Dec-2020	3	53.9	14.0	8.7	5.4
		T	RG_LIDSL	1-Dec-2020	4	53.9	14.0	8.7	5.8
		T	RG_LIDSL	1-Dec-2020	5	53.9	14.0	8.7	5.7
		T	RG_LI8	25-Feb-2020	1	46.7	13.9	8.7	5.5
		T	RG_LI8	25-Feb-2020	2	46.7	13.9	8.7	5.5
		T	RG_LI8	25-Feb-2020	3	46.7	13.9	8.7	5.4
		T	RG_LI8	25-Feb-2020	4	46.7	13.9	8.7	4.6
		T	RG_LI8	25-Feb-2020	5	46.7	13.9	8.7	4.7
		T	RG_LI8	25-Feb-2020	6	46.7	13.9	8.7	5.2
		T	RG_LI8	25-Feb-2020	7	46.7	13.9	8.7	4.5
		T	RG_LI8	25-Feb-2020	8	46.7	13.9	8.7	4.8
		T	RG_LI8	25-Feb-2020	9	46.7	13.9	8.7	5.8
		T	RG_LI8	25-Feb-2020	10	46.7	13.9	8.7	4.5
		T	RG_LI8	30-Apr-2020	1	46.7	13.9	8.7	5.8
		T	RG_LI8	30-Apr-2020	2	46.7	13.9	8.7	4.8
		T	RG_LI8	30-Apr-2020	3	46.7	13.9	8.7	7.3
		T	RG_LI8	30-Apr-2020	4	46.7	13.9	8.7	4.9
		T	RG_LI8	30-Apr-2020	5	46.7	13.9	8.7	8.5
		T	RG_LI8	30-Apr-2020	6	46.7	13.9	8.7	8.3
		T	RG_LI8	30-Apr-2020	7	46.7	13.9	8.7	8.0
		T	RG_LI8	30-Apr-2020	8	46.7	13.9	8.7	6.8
		T	RG_LI8	30-Apr-2020	9	46.7	13.9	8.7	7.0
		T	RG_LI8	30-Apr-2020	10	46.7	13.9	8.7	5.7
		T	RG_LI8	15-Jul-2020	1	46.7	13.9	8.7	5.3
		T	RG_LI8	15-Jul-2020	2	46.7	13.9	8.7	5.8
		T	RG_LI8	15-Jul-2020	3	46.7	13.9	8.7	4.2
		T	RG_LI8	15-Jul-2020	4	46.7	13.9	8.7	5.1
		T	RG_LI8	15-Jul-2020	5	46.7	13.9	8.7	5.5
		T	RG_LI8	15-Jul-2020	6	46.7	13.9	8.7	5.8
		T	RG_LI8	15-Jul-2020	7	46.7	13.9	8.7	5.3
		T	RG_LI8	15-Jul-2020	8	46.7	13.9	8.7	6.0
		T	RG_LI8	15-Jul-2020	9	46.7	13.9	8.7	5.4
		T	RG_LI8	15-Jul-2020	10	46.7	13.9	8.7	4.5
		T	RG_LI8	29-Aug-2020	1	46.7	13.9	8.7	9.4
		T	RG_LI8	29-Aug-2020	2	46.7	13.9	8.7	9.7
		T	RG_LI8	29-Aug-2020	3	46.7	13.9	8.7	11.0
		T	RG_LI8	29-Aug-2020	4	46.7	13.9	8.7	8.9
		T	RG_LI8	29-Aug-2020	5	46.7	13.9	8.7	13.0
		T	RG_LI8	2-Dec-2020	1	46.7	13.9	8.7	8.3
		T	RG_LI8	2-Dec-2020	2	46.7	13.9	8.7	8.2
		T	RG_LI8	2-Dec-2020	3	46.7	13.9	8.7	6.4
		T	RG_LI8	2-Dec-2020	4	46.7	13.9	8.7	7.5
		T	RG_LI8	2-Dec-2020	5	46.7	13.9	8.7	7.0
Fording River		M	RG_FO23	25-Feb-2020	1	52.8	14.0	8.7	5.7
		M	RG_FO23	25-Feb-2020	2	52.8	14.0	8.7	5.3
		M	RG_FO23	25-Feb-2020	3	52.8	14.0	8.7	6.3
		M	RG_FO23	25-Feb-2020	4	52.8	14.0	8.7	2.8
		M	RG_FO23	25-Feb-2020	5	52.8	14.0	8.7	4.1
		M	RG_FO23	25-Feb-2020	6	52.8	14.0	8.7	5.2
		M	RG_FO23	25-Feb-2020	7	52.8	14.0	8.7	4.6
		M	RG_FO23	25-Feb-2020	8	52.8	14.0	8.7	6.0
		M	RG_FO23	25-Feb-2020	9	52.8	14.0	8.7	4.5
		M	RG_FO23	25-Feb-2020	10	52.8	14.0	8.7	6.5
		M	RG_FO23	27-Apr-2020	1	52.8	14.0	8.7	7.2
		M	RG_FO23	27-Apr-2020	2	52.8	14.0	8.7	8.9
		M	RG_FO23	27-Apr-2020	3	52.8	14.0	8.7	6.8
		M	RG_FO23	27-Apr-2020	4	52.8	14.0	8.7	7.8
		M	RG_FO23	27-Apr-2020	5	52.8	14.0	8.7	6.2
		M	RG_FO23	27-Apr-2020	6	52.8	14.0	8.7	8.4
		M	RG_FO23	27-Apr-2020	7	52.8	14.0	8.7	9.6
		M	RG_FO23	27-Apr-2020	8	52.8	14.0	8.7	11.0
		M	RG_FO23	27-Apr-2020	9	52.8	14.0	8.7	6.0
		M	RG_FO23	27-Apr-2020	10	52.8	14.0	8.7	8.4
		M	RG_FO23	16-Jul-2020	1	52.8	14.0	8.7	9.7

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 and T = Tributary.

Table E.2: Biological Trigger Analysis for Selenium Concentrations in Benthic Invertebrate Tissue in Line Creek and Fording River, 2020

Waterbody		Stream Type	Area	Date	Replicate	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)
Fording River	Mine-Exposed	M	RG_FO23	16-Jul-2020	2	52.8	14.0	8.7	8.6
		M	RG_FO23	16-Jul-2020	3	52.8	14.0	8.7	8.9
		M	RG_FO23	16-Jul-2020	4	52.8	14.0	8.7	5.9
		M	RG_FO23	16-Jul-2020	5	52.8	14.0	8.7	8.8
		M	RG_FO23	16-Jul-2020	6	52.8	14.0	8.7	9.8
		M	RG_FO23	16-Jul-2020	7	52.8	14.0	8.7	6.8
		M	RG_FO23	16-Jul-2020	8	52.8	14.0	8.7	6.2
		M	RG_FO23	16-Jul-2020	9	52.8	14.0	8.7	4.3
		M	RG_FO23	16-Jul-2020	10	52.8	14.0	8.7	9.3
		M	RG_FO23	28-Aug-2020	1	52.8	14.0	8.7	6.9
		M	RG_FO23	28-Aug-2020	2	52.8	14.0	8.7	10.0
		M	RG_FO23	28-Aug-2020	3	52.8	14.0	8.7	6.8
		M	RG_FO23	28-Aug-2020	4	52.8	14.0	8.7	8.3
		M	RG_FO23	28-Aug-2020	5	52.8	14.0	8.7	5.5
		M	RG_FO23	2-Dec-2020	1	52.8	14.0	8.7	6.8
		M	RG_FO23	2-Dec-2020	2	52.8	14.0	8.7	8.1
		M	RG_FO23	2-Dec-2020	3	52.8	14.0	8.7	6.5
		M	RG_FO23	2-Dec-2020	4	52.8	14.0	8.7	6.7
		M	RG_FO23	2-Dec-2020	5	52.8	14.0	8.7	8.0

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 and T = Tributary.

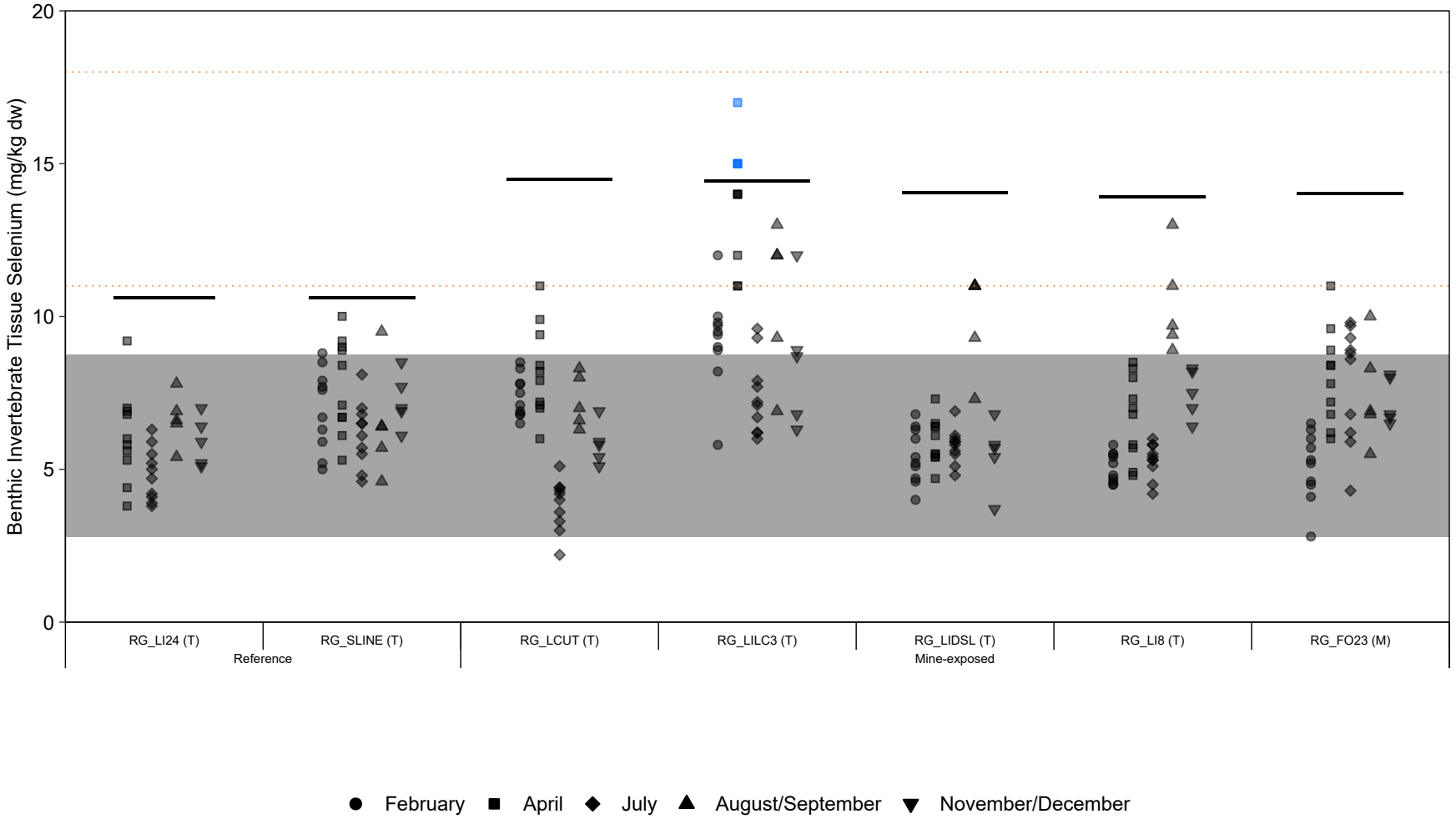

Figure E.2: Biological Trigger Analysis for Selenium Concentrations in Benthic Invertebrate Tissue in Line Creek and Fording River, 2020.

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 limit). Dotted lines indicate the Level 1 and 2 EVWQP benchmarks (11 and 18, respectively) for juvenile fish (Level 3 are beyond the plot range and are not shown). T = Tributary, M = Mainstem.

(RG_LI24 and RG_SLINE) had selenium concentrations that were below the biological trigger [0 of 40 replicates for each; Appendix Table E.2 and Appendix Figure E.2].

E4 SUMMARY

Each of the five mine-exposed areas (RG_LCUT, RG_LILC3, RG_LIDSL, RG_LI8, and RG_FO23) as well as one of the reference areas (RG_LI24) had at least one individual replicate that exceeded the %EPT biological trigger. The %EPT results for these mine-exposed areas were similar to results from 2019 (which evaluated multiple benthic invertebrate community metrics), as results were classified as 'unexpected' in the RAEMP (Minnow 2020) and were flagged for further investigation. The effect to %EPT was believed to be mine-related at each of these exposed areas, except at RG_FO23 which was believed to be "natural/possibly mine-related" (Minnow 2020). Although, RG_LI24 did not show "unexpected" benthic invertebrate community conditions in 2019 (Minnow 2020), "unexpected" water quality conditions were reported for this area, with nitrate, selenium, and sulphate above water quality projections. Given that %EPT (75.2%) was only slightly below the lower 2.5th percentile prediction limit of the biological trigger (75.6%) for a single replicate at RG_LI24, this result likely does not warrant further investigation. As discussed above, the biological trigger for benthic invertebrate tissue concentrations of selenium was only exceeded in one area, RG_LILC3, during the April sampling event (for 4 of the 10 replicates collected during this event). The biological trigger exceedance for these four replicates at RG_LILC3 is likely related to seasonal peaks in concentrations of aqueous non-selenate selenium species observed in the winter of 2020 (particularly March). Aqueous non-selenate species are known to be more readily accumulated by aquatic biota than the oxidized form selenate, which is consistent with the higher benthic invertebrate selenium concentrations observed at RG_LILC3 in the early spring (April) following the peak in non-selenate species in the winter months.

As discussed in the main report, biological triggers are consistent with the findings of the LCO LAEMP. 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 noted above. 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, as discussed with the EMC in February 2021. Uncertainties are expected to be reduced through this modelling effort, and additional monitoring or potential management responses will continue to be assessed through the adaptive management process.

E5 REFERENCES

Azimuth (Azimuth Consulting Group Inc). 2021 (In Prep). Development of biological triggers for the Elk Valley Adaptive Management Plan.

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Golder. 2020. Updates to the lotic and lentic statistical bioaccumulation models for selenium in the Elk Valley. Technical memorandum to Teck Coal Limited, 27 November 2020.

Teck (Teck Coal Limited). 2014. Elk Valley Water Quality Plan. Submitted to the British Columbia Minister of Environment for approval on July 22, 2014.

Teck. 2018. Water Quality Adaptive Management Plan for Teck Coal Operations in the Elk Valley. December 21, 2018.

APPENDIX F - OTHER SUPPORTING INFORMATION

Table F.1: In Situ Water Quality Taken at Biological Monitoring Areas, August to September 2020

Field Parameters		Reference		Mine-exposed							
		RG_SLINE	RG_LI24	RG_LILC3	RG_LIDSL	RG_LIDCOM	RG_LCUT	RG_LI8	RG_LISP24	RG_FO23	RG_FRUL
Station 1	Date	2020-08-31	2020-08-31	2020-08-27	2020-08-25	2020-08-30	2020-09-01	2020-08-30	2020-09-01	2020-08-28	2020-08-29
	Temperature (°C)	5.10	5.00	6.60	8.60	9.60	7.00	6.20	8.20	8.70	11.3
	Dissolved Oxygen (mg/L)	9.66	10.1	10.3	9.96	10.3	11.0	11.0	10.7	9.63	8.39
	Dissolved Oxygen (%)	75.9	79.2	83.8	85.7	90.5	91.7	89.1	91.0	82.7	76.8
	Conductivity (µS/cm)	215	215	1,298	1,086	1,040	663	896	598	515	546
	Specific Conductivity (µS/cm)	347	348	2,004	1,583	1,474	1,010	1,399	880	748	739
	pH	8.06	8.21	7.86	8.10	8.32	7.74	8.39	8.14	8.22	8.33
Station 2	Date	2020-08-31	2020-08-31	2020-08-27	2020-08-25	-	-	2020-08-30	-	2020-08-28	-
	Temperature (°C)	5.30	5.20	7.10	9.60	-	-	6.90	-	9.90	-
	Dissolved Oxygen (mg/L)	9.64	10.1	10.8	10.0	-	-	10.9	-	9.48	-
	Dissolved Oxygen (%)	76.1	79.4	89.9	88.7	-	-	89.6	-	84.1	-
	Conductivity (µS/cm)	216	217	1,318	1,117	-	-	917	-	514	-
	Specific Conductivity (µS/cm)	346	348	2,002	1,581	-	-	1,401	-	721	-
	pH	8.08	8.26	7.88	8.21	-	-	8.44	-	8.25	-
Station 3	Date	2020-08-31	2020-08-31	2020-08-27	2020-08-26	-	-	2020-08-30	-	2020-08-28	-
	Temperature (°C)	5.70	5.60	7.90	7.00	-	-	8.30	-	12.8	-
	Dissolved Oxygen (mg/L)	9.62	10.2	10.9	10.2	-	-	10.4	-	9.65	-
	Dissolved Oxygen (%)	76.7	80.9	92.3	85.1	-	-	89.1	-	91.1	-
	Conductivity (µS/cm)	217	218	1,350	1,015	-	-	950	-	553	-
	Specific Conductivity (µS/cm)	344	347	2,003	1,544	-	-	1,394	-	721	-
	pH	8.11	8.34	7.88	8.05	-	-	8.40	-	8.29	-
Station 4	Date	-	2020-08-31	2020-08-27	2020-08-26	-	-	-	-	2020-08-28	-
	Temperature (°C)	-	5.50	8.60	6.90	-	-	-	-	13.7	-
	Dissolved Oxygen (mg/L)	-	10.1	10.7	10.5	-	-	-	-	9.88	-
	Dissolved Oxygen (%)	-	80.3	92.1	86.8	-	-	-	-	95.5	-
	Conductivity (µS/cm)	-	218	1,369	1,018	-	-	-	-	563	-
	Specific Conductivity (µS/cm)	-	347	1,993	1,557	-	-	-	-	719	-
	pH	-	8.31	7.99	8.14	-	-	-	-	8.25	-
Station 5	Date	-	2020-09-01	2020-08-27	2020-08-26	-	-	-	-	2020-08-28	-
	Temperature (°C)	-	5.00	8.50	7.50	-	-	-	-	13.6	-
	Dissolved Oxygen (mg/L)	-	10.5	10.8	10.5	-	-	-	-	10.1	-
	Dissolved Oxygen (%)	-	82.4	93.0	88.1	-	-	-	-	97.0	-
	Conductivity (µS/cm)	-	216	1,377	1,033	-	-	-	-	562	-
	Specific Conductivity (µS/cm)	-	350	2,010	1,545	-	-	-	-	718	-
	pH	-	8.26	7.84	8.16	-	-	-	-	8.25	-

Note: "-" indicates no data available.

Table F.2: Pebble Counts and Calcite Measurements at RG_LI24, August/September 2020

RG_LI24-1				
31-Aug-2020				
Pebble	**Concreted Status**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	5.9	-
2	0	0	2.5	-
3	0	0	4.6	-
4	0	0	14.2	-
5	0	0	12.2	-
6	0	0	9.4	-
7	0	0	11.3	-
8	0	0	4.7	-
9	0	0	23.1	-
10	0	0	8.4	0.5
11	0	0	9.6	-
12	0	0	6.1	-
13	0	0	7.3	-
14	0	0	9.8	-
15	0	0	23.5	-
16	0	0	7.8	-
17	0	0	5.3	-
18	0	0	8.3	-
19	0	0	2	-
20	0	0	9.6	0.5
21	0	0	8.2	-
22	0	0	3.4	-
23	0	0	8	-
24	0	0	9.5	-
25	0	0	3.9	-
26	0	0	9.1	-
27	0	0	6	-
28	0	0	4.3	-
29	0	0	3.6	-
30	0	0	3.2	0.75
31	0	0	5.3	-
32	0	0	9.7	-
33	0	0	35.5	-
34	0	0	10.2	-
35	0	0	4.4	-
36	0	0	4.7	-
37	0	0	9.5	-
38	0	0	3.3	-
39	0	0	15.2	-
40	0	0	3.7	0
41	0	0	4.7	-
42	0	0	4.8	-
43	0	0	5.8	-
44	0	0	3.7	-
45	0	0	7.6	-
46	0	0	2.4	-
47	0	0	19	-
48	0	0	9.8	-
49	0	0	5.7	-
50	0	0	2.8	0.5
51	0	0	9.2	-
52	0	0	4.8	-
53	0	0	20.5	-
54	0	0	9.6	-
55	0	0	8.6	-
56	0	0	8.2	-
57	0	0	4.6	-
58	0	0	7.4	-
59	0	0	4	-
60	0	0	5.7	0
61	0	0	4.3	-
62	0	0	4.1	-
63	0	0	7.8	-
64	0	0	8.8	-
65	0	0	9.2	-
66	0	0	4.1	-
67	0	0	7.5	-
68	0	0	5.6	-
69	0	0	3.9	-
70	0	0	9	0
71	0	0	5.6	-
72	0	0	4.2	-
73	0	0	5.2	-
74	0	0	3.1	-
75	0	0	3.3	-
76	0	0	3.2	-
77	0	0	2.6	-
78	0	0	6.2	-
79	0	0	7.1	-
80	0	0	7.4	0.25
81	0	0	11.8	-
82	0	0	7.1	-
83	0	0	6.6	-
84	0	0	4.3	-
85	0	0	5.8	-
86	0	0	2.8	-
87	0	0	9.5	-
88	0	0	3.4	-
89	0	0	11.6	-
90	0	0	7.9	0.75
91	0	0	6.5	-
92	0	0	3	-
93	0	0	7.5	-
94	0	0	13.2	-
95	0	0	6.6	-
96	0	0	7.3	-
97	0	0	10.7	-
98	0	0	3.9	-
99	0	0	2.8	-
100	0	0	7.8	0.5
Average Ci_c, Ci_p and Embed. =	0	0	-	0.375
Calcite Index (CI) =		0		

Notes: nm = not measurable, "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.
Ci_c = Calcite concretion score; Ci_p = Calcite presence score; and Embed. = Embededness

Table F.2: Pebble Counts and Calcite Measurements at RG_LI24, August/September 2020

RG_LI24-2				
31-Aug-2020				
Pebble	**Concreted Status**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	2.6	-
2	0	0	5.6	-
3	0	0	6.7	-
4	0	0	2.5	-
5	0	0	6.1	-
6	0	0	8.5	-
7	0	0	3	-
8	0	0	2.1	-
9	0	0	6	-
10	0	0	16.8	0.5
11	0	0	8.8	-
12	0	0	6.9	-
13	0	0	5.4	-
14	0	0	4.9	-
15	0	0	4.3	-
16	0	0	5.1	-
17	0	0	5.3	-
18	0	0	4	-
19	0	0	12.2	-
20	0	0	22	0.5
21	0	0	14.5	-
22	0	0	3.2	-
23	0	0	23.5	-
24	0	0	7.3	-
25	0	0	8.4	-
26	0	0	5.1	-
27	0	0	4.7	-
28	0	0	7.3	-
29	0	0	4	-
30	0	0	3.8	0.75
31	0	0	16	-
32	0	0	8.7	-
33	0	0	7.9	-
34	0	0	2.4	-
35	0	0	5.3	-
36	0	0	4.1	-
37	0	0	4	-
38	0	0	5.2	-
39	0	0	2.9	-
40	0	0	5	1
41	0	0	4.8	-
42	0	0	6.3	-
43	0	0	12.1	-
44	0	0	4.4	-
45	0	0	4.3	-
46	0	0	4.3	-
47	0	0	4.1	-
48	0	0	8.4	-
49	0	0	10	-
50	0	0	6.8	0.25
51	0	0	4	-
52	0	0	3.1	-
53	0	0	5.5	-
54	0	0	7	-
55	0	0	40.5	-
56	0	0	6.1	-
57	0	0	8.2	-
58	0	0	5	-
59	0	0	4.9	-
60	0	0	5.5	0.75
61	0	0	8.8	-
62	0	0	5.9	-
63	0	0	7	-
64	0	0	2.7	-
65	0	0	8.5	-
66	0	0	6.1	-
67	0	0	2.2	-
68	0	0	7.1	-
69	0	0	6.2	-
70	0	0	2.5	0.75
71	0	0	5.8	-
72	0	0	4.9	-
73	0	0	5.1	-
74	0	0	5	-
75	0	0	7.5	-
76	0	0	7.4	-
77	0	0	3.3	-
78	0	0	4.2	-
79	0	0	-	-
80	0	0	-	0.5
81	0	0	2.2	-
82	0	0	4.7	-
83	0	0	2.8	-
84	0	0	3.5	-
85	0	0	6.5	-
86	0	0	11.8	-
87	0	0	2.8	-
88	0	0	2.6	-
89	0	0	3.5	-
90	0	0	3.1	0.25
91	0	0	4.4	-
92	0	0	5.2	-
93	0	0	3.7	-
94	0	0	5.2	-
95	0	0	11.3	-
96	0	0	5.1	-
97	0	0	7.1	-
98	0	0	5.2	-
99	0	0	6.6	-
100	0	0	5	0.5
Average Ci_c, Ci_p and Embed. =	0	0	-	0.575
Calcite Index (CI) =		0		

Notes: nm = not measurable, "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.
Ci_c = Calcite concretion score; Ci_p = Calcite presence score; and Embed. = Embededness

Table F.2: Pebble Counts and Calcite Measurements at RG_LI24, August/September 2020

RG_LI24-3				
31-Aug-2020				
Pebble	**Concreted Status**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	2.2	-
2	0	0	3.8	-
3	0	0	8.4	-
4	0	0	6.1	-
5	0	0	5.1	-
6	0	0	16.5	-
7	0	0	3.4	-
8	0	0	15.6	-
9	0	0	7	-
10	0	0	5.6	0.75
11	0	0	4.7	-
12	0	0	3.1	-
13	0	0	12.6	-
14	0	0	8.6	-
15	0	0	6.5	-
16	0	0	9.6	-
17	0	0	6.1	-
18	0	0	7.1	-
19	0	0	35.4	-
20	0	0	10.5	0.5
21	0	0	4.1	-
22	0	0	7.2	-
23	0	0	3.5	-
24	0	0	4.8	-
25	0	0	7.5	-
26	0	0	7	-
27	0	0	14	-
28	0	0	5.8	-
29	0	0	8.2	-
30	0	0	8	0.5
31	0	0	5.7	-
32	0	0	17.3	-
33	0	0	8.2	-
34	0	0	9.8	-
35	0	0	6.9	-
36	0	0	6.8	-
37	0	0	1.2	-
38	0	0	4.9	-
39	0	0	9.5	-
40	0	0	10	0.5
41	0	0	4.8	-
42	0	0	3.6	-
43	0	0	5.6	-
44	0	0	7.6	-
45	0	0	3.5	-
46	0	0	2	-
47	0	0	16.3	-
48	0	0	7.8	-
49	0	0	8.9	-
50	0	0	17.8	0.5
51	0	0	8.4	-
52	0	0	26.5	-
53	0	0	2.5	-
54	0	0	3.6	-
55	0	0	4.1	-
56	0	0	10.1	-
57	0	0	7.2	-
58	0	0	2.9	-
59	0	0	8.3	-
60	0	0	9.1	0.25
61	0	0	6	-
62	0	0	19.7	-
63	0	0	2.8	-
64	0	0	6.8	-
65	0	0	3.7	-
66	0	0	3.1	-
67	0	0	6.1	-
68	0	0	4	-
69	0	0	24.5	-
70	0	0	5.2	0.75
71	0	0	7.1	-
72	0	0	8.4	-
73	0	0	9.4	-
74	0	0	12.7	-
75	0	0	18	-
76	0	0	6.8	-
77	0	0	12.7	-
78	0	0	21.5	-
79	0	0	2.3	-
80	0	0	4.8	0.25
81	0	0	4.4	-
82	0	0	11.9	-
83	0	0	8.5	-
84	0	0	15	-
85	0	0	9.5	-
86	0	0	9.5	-
87	0	0	9.4	-
88	0	0	7.2	-
89	0	0	6.2	-
90	0	0	13	0.75
91	0	0	5.8	-
92	0	0	7.4	-
93	0	0	7.9	-
94	0	0	6.8	-
95	0	0	3	-
96	0	0	5.8	-
97	0	0	21	-
98	0	0	10.2	-
99	0	0	2	-
100	0	0	23	0.25
Average Ci_c, Ci_p and Embed. =	0	0	-	0.5
Calcite Index (CI) =		0		

Notes: nm = not measurable, "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.
Ci_c = Calcite concretion score; Ci_p = Calcite presence score; and Embed. = Embededness

Table F.2: Pebble Counts and Calcite Measurements at RG_LI24, August/September 2020

RG_LI24-4				
31-Aug-2020				
Pebble	**Concreted Status**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	2.2	-
2	0	0	1.7	-
3	0	0	1.3	-
4	0	0	3.6	-
5	0	0	3.5	-
6	0	0	3.8	-
7	0	0	3.5	-
8	0	0	2.2	-
9	0	0	10	-
10	0	0	3.6	0.5
11	0	0	5	-
12	0	0	10.8	-
13	0	0	4.7	-
14	0	0	39.5	-
15	0	0	10.2	-
16	0	0	9.4	-
17	0	0	8.1	-
18	0	0	8.1	-
19	0	0	4.3	-
20	0	0	3	0.5
21	0	0	8.2	-
22	0	0	2.5	-
23	0	0	4.6	-
24	0	0	5	-
25	0	0	1.7	-
26	0	0	6.9	-
27	0	0	10.3	-
28	0	0	3.4	-
29	0	0	10.8	-
30	0	0	6.6	0.5
31	0	0	7.2	-
32	0	0	15	-
33	0	0	3.5	-
34	0	0	14.4	-
35	0	0	8.1	-
36	0	0	1.9	-
37	0	0	6.4	-
38	0	0	11.2	-
39	0	0	7.6	-
40	0	0	37	0.75
41	0	0	5.1	-
42	0	0	8.2	-
43	0	0	4.6	-
44	0	0	7.4	-
45	0	0	2.7	-
46	0	0	5.6	-
47	0	0	4.7	-
48	0	0	4.6	-
49	0	0	15	-
50	0	0	6.4	0.25
51	0	0	8.1	-
52	0	0	13.7	-
53	0	0	2.5	-
54	0	0	13	-
55	0	0	7.5	-
56	0	0	13.7	-
57	0	0	5.3	-
58	0	0	3.9	-
59	0	0	2.6	-
60	0	0	8.3	0.5
61	0	0	3.3	-
62	0	0	2.4	-
63	0	0	5.3	-
64	0	0	3.6	-
65	0	0	2.7	-
66	0	0	7.2	-
67	0	0	3.9	-
68	0	0	8.2	-
69	0	0	3.1	-
70	0	0	7.5	0.5
71	0	0	9.3	-
72	0	0	18	-
73	0	0	3.6	-
74	0	0	11	-
75	0	0	22.5	-
76	0	0	3.4	-
77	0	0	8.2	-
78	0	0	8.5	-
79	0	0	10.5	-
80	0	0	10.9	0.75
81	0	0	6.9	-
82	0	0	4.2	-
83	0	0	2.2	-
84	0	0	10	-
85	0	0	2.8	-
86	0	0	5.5	-
87	0	0	6.1	-
88	0	0	7.2	-
89	0	0	10.4	-
90	0	0	13.7	0.75
91	0	0	6.2	-
92	0	0	3.5	-
93	0	0	4.1	-
94	0	0	7.9	-
95	0	0	18	-
96	0	0	17	-
97	0	0	4.9	-
98	0	0	3.7	-
99	0	0	5.8	-
100	0	0	7.4	0.25
Average Ci_c, Ci_p and Embed. =	0	0	-	0.525
Calcite Index (CI) =		0		

Notes: nm = not measurable, "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.
Ci_c = Calcite concretion score; Ci_p = Calcite presence score; and Embed. = Embededness

Table F.2: Pebble Counts and Calcite Measurements at RG_LI24, August/September 2020

RG_LI24-5				
01-Sep-2020				
Pebble	**Concreted Status**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	5.2	-
2	0	0	6.5	-
3	0	0	2.3	-
4	0	0	8.8	-
5	0	0	15	-
6	0	0	5.4	-
7	0	0	17.8	-
8	0	0	6	-
9	0	0	2.8	-
10	0	0	8.4	0.5
11	0	0	5.4	-
12	0	0	7	-
13	0	0	21.3	-
14	0	0	3.2	-
15	0	0	12.2	-
16	0	0	3.4	-
17	0	0	5.4	-
18	0	0	5	-
19	0	0	3	-
20	0	0	6.2	0.5
21	0	0	3.2	-
22	0	0	3.9	-
23	0	0	11	-
24	0	0	5	-
25	0	0	5.9	-
26	0	0	4.8	-
27	0	0	19.2	-
28	0	0	4.5	-
29	0	0	4.1	-
30	0	0	11	0.75
31	0	0	7.3	-
32	0	0	10.3	-
33	0	0	3.8	-
34	0	0	19.5	-
35	0	0	6.5	-
36	0	0	31	-
37	0	0	5.8	-
38	0	0	8.4	-
39	0	0	4.5	-
40	0	0	6	0.25
41	0	0	12.5	-
42	0	0	2	-
43	0	0	1.9	-
44	0	0	1.9	-
45	0	0	48	-
46	0	0	33	-
47	0	0	8.3	-
48	0	0	2	-
49	0	0	4.5	-
50	0	0	6	0.25
51	0	0	7	-
52	0	0	17	-
53	0	0	3.2	-
54	0	0	12	-
55	0	0	12.2	-
56	0	0	48	-
57	0	0	2.2	-
58	0	0	8	-
59	0	0	2.9	-
60	0	0	13.3	0
61	0	0	2.9	-
62	0	0	2.1	-
63	0	0	1	-
64	0	0	6	-
65	0	0	3.5	-
66	0	0	24.5	-
67	0	0	10	-
68	0	0	7.6	-
69	0	0	29.5	-
70	0	0	1.2	0.25
71	0	0	2.8	-
72	0	0	12.1	-
73	0	0	21	-
74	0	0	14	-
75	0	0	1.4	-
76	0	0	42.5	-
77	0	0	2.3	-
78	0	0	5.5	-
79	0	0	3.1	-
80	0	0	45	0.25
81	0	0	14	-
82	0	0	3.5	-
83	0	0	9	-
84	0	0	7.8	-
85	0	0	27	-
86	0	0	3.9	-
87	0	0	25	-
88	0	0	4.2	-
89	0	0	8.5	-
90	0	0	12.7	0.5
91	0	0	7.7	-
92	0	0	5.5	-
93	0	0	13.5	-
94	0	0	11.2	-
95	0	0	4	-
96	0	0	5.6	-
97	0	0	15	-
98	0	0	6.5	-
99	0	0	5.2	-
100	0	0	8.3	0.5
Average Ci_c, Ci_p and Embed. =	0	0	-	0.375
Calcite Index (CI) =		0		

Notes: nm = not measurable, "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.
Ci_c = Calcite concretion score; Ci_p = Calcite presence score; and Embed. = Embededness

Table F.3: Pebble Counts and Calcite Measurements at RG_SLINE, August/September 2020

RG_SLINE-1				
31-Aug-2020				
Pebble	**Concreted Status**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	6.1	-
2	0	0	7.4	-
3	0	0	21.6	-
4	0	0	16.1	-
5	0	0	23.5	-
6	0	0	8.2	-
7	0	0	6.5	-
8	0	0	5	-
9	0	0	2.6	-
10	0	0	21.6	0.5
11	0	0	10.7	-
12	0	0	9.8	-
13	0	0	16.4	-
14	0	0	4.9	-
15	0	0	3.8	-
16	0	0	8.5	-
17	0	0	15.5	-
18	0	0	10.7	-
19	0	0	13.6	-
20	0	0	10.5	0.5
21	0	0	8.2	-
22	0	0	21.5	-
23	0	0	17.5	-
24	0	0	10.6	-
25	0	0	11.4	-
26	0	0	7.3	-
27	0	0	8.5	-
28	0	0	11.1	-
29	0	0	6.7	-
30	0	0	8.5	0.25
31	0	0	29.5	-
32	0	0	4.8	-
33	0	0	2.5	-
34	0	0	23.5	-
35	0	0	8.2	-
36	0	0	9.1	-
37	0	0	7.6	-
38	0	0	9	-
39	0	0	6.4	-
40	0	0	15.8	0.25
41	0	0	8	-
42	0	0	9.2	-
43	0	0	8.3	-
44	0	0	5.1	-
45	0	0	16.5	-
46	0	0	9.1	-
47	0	0	13.9	-
48	0	0	8	-
49	0	0	8.2	-
50	0	0	17.5	0.75
51	0	0	8.9	-
52	0	0	10.6	-
53	0	0	5.5	-
54	0	0	12.6	-
55	0	0	10.2	-
56	0	0	10.7	-
57	0	0	9.7	-
58	0	0	14	-
59	0	0	20.5	-
60	0	0	10.2	0.5
61	0	0	15.2	-
62	0	0	8.2	-
63	0	0	19.5	-
64	0	0	8.3	-
65	0	0	7.6	-
66	0	0	11.1	-
67	0	0	13.2	-
68	0	0	7.1	-
69	0	0	19.2	-
70	0	0	12.3	0.25
71	0	0	11.2	-
72	0	0	8.5	-
73	0	0	10.9	-
74	0	0	13.6	-
75	0	0	16.1	-
76	0	0	24	-
77	0	0	11.2	-
78	0	0	13.1	-
79	0	0	11	-
80	0	0	8.5	0.25
81	0	0	6.9	-
82	0	0	16.6	-
83	0	0	11.7	-
84	0	0	9.1	-
85	0	0	7.1	-
86	0	0	10.1	-
87	0	0	14	-
88	0	0	7.2	-
89	0	0	11.3	-
90	0	0	5.6	0
91	0	0	6.2	-
92	0	0	15	-
93	0	0	10.7	-
94	0	0	10	-
95	0	0	14.2	-
96	0	0	6.3	-
97	0	0	9.7	-
98	0	0	8.9	-
99	0	0	9.8	-
100	0	0	10	0.5
Average Ci_c, Ci_p and Embed. =	0	0	-	0.375
Calcite Index (CI) =		0		

Notes: nm = not measurable, "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm; Ci_c = Calcite concretion score; Ci_p = Calcite presence score; and Embed. = Embededness

Table F.3: Pebble Counts and Calcite Measurements at RG_SLINE, August/September 2020

RG_SLINE-2				
31-Aug-2020				
Pebble	**Concreted Status**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	11	-
2	0	0	6.7	-
3	0	0	7.1	-
4	0	0	13	-
5	0	0	9.3	-
6	0	0	14.2	-
7	0	0	7.6	-
8	0	1	13.6	-
9	0	0	9.5	-
10	0	1	12.7	0.5
11	0	1	10.8	-
12	0	0	16.7	-
13	0	0	9.3	-
14	0	0	9.4	-
15	0	0	9	-
16	0	0	12.8	-
17	0	0	9.6	-
18	0	0	10.8	-
19	0	1	14	-
20	0	0	12.4	0.5
21	0	0	12.9	-
22	0	0	11.4	-
23	0	1	9.6	-
24	0	0	8.3	-
25	0	0	8	-
26	0	0	9.3	-
27	0	0	6.9	-
28	0	0	10.9	-
29	0	0	7.3	-
30	0	0	12.4	0.25
31	0	0	4.8	-
32	0	1	10.6	-
33	0	0	5.9	-
34	0	1	15.3	-
35	0	1	17.3	-
36	0	0	10.2	-
37	0	0	9	-
38	0	0	5.5	-
39	0	0	8.5	-
40	0	0	11.2	0.25
41	0	0	10	-
42	0	0	9	-
43	0	0	8	-
44	0	0	22	-
45	0	0	25	-
46	0	0	8.7	-
47	0	1	20.5	-
48	0	0	7	-
49	0	0	8.2	-
50	0	0	7	0
51	0	1	14.9	-
52	0	0	10	-
53	0	0	9.3	-
54	0	0	8.1	-
55	0	0	6.7	-
56	0	0	5.9	-
57	0	0	7.3	-
58	0	0	11	-
59	0	0	14.8	-
60	0	0	12.7	0.5
61	0	1	19	-
62	0	1	7	-
63	0	1	13	-
64	0	1	12	-
65	0	1	27.6	-
66	0	1	9	-
67	0	1	11.8	-
68	0	0	10	-
69	0	1	10	-
70	0	1	8.2	0
71	0	1	7.3	-
72	0	1	10	-
73	0	1	9.8	-
74	0	1	7.6	-
75	0	1	6.5	-
76	0	1	14.3	-
77	0	1	7	-
78	0	1	9.1	-
79	0	0	7	-
80	0	1	10.5	0
81	0	0	6.5	-
82	0	0	8	-
83	0	0	9	-
84	0	0	14.9	-
85	0	0	14	-
86	0	0	16.9	-
87	0	1	9.5	-
88	0	0	14.1	-
89	0	0	5.6	-
90	0	0	9	0
91	0	0	11.5	-
92	0	0	9.2	-
93	0	0	8.8	-
94	0	0	16.8	-
95	0	0	11.5	-
96	0	0	7.2	-
97	0	1	10	-
98	0	1	10.5	-
99	0	1	14.8	-
100	0	0	11.4	0.25
Average Ci_c, Ci_p and Embed. =	0	0.32	-	0.225
Calcite Index (CI) =		0.32		

Notes: nm = not measurable, "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm; Ci_c = Calcite concretion score; Ci_p = Calcite presence score; and Embed. = Embededness

Table F.3: Pebble Counts and Calcite Measurements at RG_SLINE, August/September 2020

RG_SLINE-3				
31-Aug-2020				
Pebble	**Concreted Status**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	8.2	-
2	0	0	9.6	-
3	0	0	7.2	-
4	0	0	12.4	-
5	0	0	21.6	-
6	0	0	8.1	-
7	0	0	12.1	-
8	0	0	6.3	-
9	0	0	9	-
10	0	0	8.2	0.75
11	0	0	8.4	-
12	0	0	9.1	-
13	0	0	5.3	-
14	0	0	7	-
15	0	0	9.2	-
16	0	0	9.1	-
17	0	0	7	-
18	0	0	3	-
19	0	0	6.3	-
20	0	0	7.5	0
21	0	0	6	-
22	0	0	7.1	-
23	0	0	13.5	-
24	0	0	10.9	-
25	0	0	3.5	-
26	0	0	11.1	-
27	0	0	2.7	-
28	0	0	5.2	-
29	0	0	9	-
30	0	0	13.1	0.75
31	0	0	10.8	-
32	0	0	14.8	-
33	0	0	11.8	-
34	0	0	12.2	-
35	0	0	10	-
36	0	0	12.2	-
37	0	0	13.5	-
38	0	0	9.9	-
39	0	0	5.7	-
40	0	0	7.4	0.75
41	0	0	7.3	-
42	0	0	8.1	-
43	0	0	15	-
44	0	0	8.6	-
45	0	0	14.1	-
46	0	0	14.1	-
47	0	0	18.2	-
48	0	0	13.5	-
49	0	0	17.4	-
50	0	0	9.1	0.5
51	0	0	14	-
52	0	0	11	-
53	0	0	10	-
54	0	0	12	-
55	0	0	4	-
56	0	0	6.3	-
57	0	0	8.5	-
58	0	0	12.2	-
59	0	0	4.5	-
60	0	0	8.5	0
61	0	0	12.8	-
62	0	0	7.6	-
63	0	0	14.2	-
64	0	0	6.5	-
65	0	0	10.9	-
66	0	0	6	-
67	0	0	6.5	-
68	0	0	16.6	-
69	0	0	8.2	-
70	0	0	8.5	0.75
71	0	0	3.8	-
72	0	0	14	-
73	0	0	13.7	-
74	0	0	9.4	-
75	0	0	8.9	-
76	0	0	3.4	-
77	0	0	8.6	-
78	0	0	8.2	-
79	0	0	9	-
80	0	0	8.4	0.75
81	0	0	6.2	-
82	0	0	7.9	-
83	0	0	14.2	-
84	0	0	7.7	-
85	0	0	17.9	-
86	0	0	4.3	-
87	0	0	10.8	-
88	0	0	7.6	-
89	0	0	8.2	-
90	0	0	12.2	0
91	0	0	11	-
92	0	0	10.1	-
93	0	0	6	-
94	0	0	12.8	-
95	0	0	16.5	-
96	0	0	18.2	-
97	0	0	8.2	-
98	0	0	10.1	-
99	0	0	20.2	-
100	0	0	12.7	0
Average Ci_c, Ci_p and Embed. =	0	0	-	0.425
Calcite Index (CI) =		0		

Notes: nm = not measurable, "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm; Ci_c = Calcite concretion score; Ci_p = Calcite presence score; and Embed. = Embededness

Table F.4: Pebble Counts and Calcite Measurements at RG_LCUT, August/September 2020

RG_LCUT-1				
01-Sep-2020				
Pebble	**Concreted Status**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	1.7	-
2	0	1	13.1	-
3	0	1	19.1	-
4	0	1	8.9	-
5	0	1	8.4	-
6	0	1	9.2	-
7	0	1	8	-
8	0	1	11.8	-
9	0	0	8.2	-
10	0	1	9.9	0.25
11	0	1	9.8	-
12	0	1	26.5	-
13	0	0	9.3	-
14	0	1	12.5	-
15	0	1	12.7	-
16	0	0	3.2	-
17	0	0	3.9	-
18	0	0	2	-
19	0	1	5.6	-
20	0	1	6.3	0.25
21	0	1	35	-
22	0	0	1.7	-
23	0	0	5	-
24	0	1	16.5	-
25	0	0	2.3	-
26	0	0	1.7	-
27	0	1	25.5	-
28	0	0	3.8	-
29	0	1	10	-
30	0	1	7.1	0.25
31	0	0	2	-
32	0	0	16.5	-
33	0	0	8.5	-
34	0	1	10.5	-
35	0	0	1.9	-
36	0	0	2.3	-
37	0	1	34	-
38	0	0	1.6	-
39	0	1	4.2	-
40	0	0	7.3	0
41	0	0	15.8	-
42	0	1	13.4	-
43	0	0	3.2	-
44	0	0	4.5	-
45	0	0	17.1	-
46	0	0	3.2	-
47	0	0	9.4	-
48	0	0	9.5	-
49	0	0	6.8	-
50	0	1	11.4	0.75
51	0	1	11.6	-
52	0	0	5.6	-
53	0	1	10	-
54	0	0	2.9	-
55	0	1	12.5	-
56	0	0	3.3	-
57	0	0	8.2	-
58	0	1	10.3	-
59	0	0	1.6	-
60	0	1	8.1	0.25
61	0	0	2.7	-
62	0	0	2.1	-
63	0	1	10.6	-
64	0	1	15.2	-
65	0	0	5.1	-
66	0	1	19.2	-
67	0	0	6.5	-
68	0	0	5.4	-
69	0	0	3.4	-
70	0	1	18.8	0.5
71	0	1	10.7	-
72	0	0	13	-
73	0	1	9.1	-
74	0	0	7.6	-
75	0	1	11.9	-
76	0	0	2.1	-
77	0	1	13.1	-
78	0	0	4	-
79	0	1	8.2	-
80	0	1	15.8	0.25
81	0	1	12	-
82	0	1	8	-
83	0	1	8	-
84	0	1	10	-
85	0	0	4.2	-
86	0	1	8.7	-
87	0	1	10.4	-
88	0	0	1.1	-
89	0	1	19.7	-
90	0	1	13.1	0
91	0	0	5.8	-
92	0	0	2.9	-
93	0	0	4.6	-
94	0	1	8.5	-
95	0	0	2.5	-
96	0	0	4.1	-
97	0	1	13.5	-
98	0	1	11.4	-
99	0	1	11.7	-
100	0	1	3.5	0.75
Average Ci_c, Ci_p and Embed. =	0	0.52	-	0.325
Calcite Index (CI) =		0.52		

Notes: nm = not measurable, "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.
Ci_c = Calcite concretion score; Ci_p = Calcite presence score; and Embed. = Embededness

Table F.5: Pebble Counts and Calcite Measurements at RG_LILC3, August/September 2020

RG_LILC3-1				
27-Aug-2020				
Pebble	**Concreted Status**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	1	1	17.5	-
2	0	1	14	-
3	0	1	11.1	-
4	0	1	11.4	-
5	0	1	7.4	-
6	0	1	9.3	-
7	0	1	8.7	-
8	2	1	20.4	-
9	0	1	12.1	-
10	0	1	17	0
11	0	1	11.4	-
12	0	1	8.2	-
13	0	1	10.3	-
14	1	1	15.6	-
15	0	1	7.1	-
16	0	1	6.6	-
17	0	1	6.9	-
18	0	1	15	-
19	0	1	6.1	-
20	0	1	11	0
21	0	1	18.3	-
22	0	1	12.4	-
23	1	1	16.1	-
24	0	1	18.6	-
25	1	1	10.1	-
26	0	0	3.9	-
27	1	1	17.1	-
28	0	1	6.5	-
29	1	1	17.1	-
30	0	1	6.3	0.5
31	1	1	9.7	-
32	0	1	11.6	-
33	0	1	9.7	-
34	0	1	9	-
35	0	1	7.1	-
36	0	1	11.2	-
37	0	1	6	-
38	0	1	10.9	-
39	0	1	11.6	-
40	0	1	15.8	0
41	0	1	5.4	-
42	2	1	20.4	-
43	0	1	11.7	-
44	0	1	10.4	-
45	0	1	15.2	-
46	0	1	14.9	-
47	0	1	4.6	-
48	0	1	7.4	-
49	0	1	3.3	-
50	0	1	7.1	0.25
51	0	1	7.7	-
52	0	1	3.7	-
53	0	0	2.2	-
54	0	1	11.7	-
55	0	1	7.7	-
56	0	1	10.6	-
57	1	1	13.2	-
58	0	1	5.6	-
59	0	1	6.8	-
60	1	1	18	0.5
61	0	1	12.4	-
62	0	1	9.1	-
63	0	1	32	-
64	1	1	18	-
65	1	1	14	-
66	0	0	9.4	-
67	0	1	11.6	-
68	0	1	7.9	-
69	0	1	5.9	-
70	0	1	9.4	0.25
71	0	1	9.2	-
72	0	1	12	-
73	1	1	13.8	-
74	0	1	5.8	-
75	0	1	12.6	-
76	0	1	10	-
77	0	1	10.4	-
78	0	1	9.9	-
79	0	1	9.2	-
80	0	1	4.9	0.25
81	0	1	7.8	-
82	0	1	11.6	-
83	0	1	18.1	-
84	0	1	5.7	-
85	0	0	2.4	-
86	0	1	14.4	-
87	0	1	5.7	-
88	0	1	9.1	-
89	0	1	15.1	-
90	0	1	6.7	0
91	0	1	2.5	-
92	0	1	12.1	-
93	0	1	9.6	-
94	0	1	12.3	-
95	0	1	3.2	-
96	0	1	5.9	-
97	0	1	5.5	-
98	0	1	7.6	-
99	0	1	10.8	-
100	0	1	6	0.75
Average Ci_c, Ci_p and Embed. =	0.16	0.96	-	0.25
Calcite Index (CI) =		1.12		

Notes: nm = not measurable, "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm; Ci_c = Calcite concretion score; Ci_p = Calcite presence score; and Embed. = Embededness

Table F.5: Pebble Counts and Calcite Measurements at RG_LILC3, August/September 2020

RG_LILC3-2				
27-Aug-2020				
Pebble	**Concreted Status**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	1	12.5	-
2	0	1	6.9	-
3	0	1	8.1	-
4	0	1	10.5	-
5	0	1	7.9	-
6	2	1	12	-
7	2	1	19	-
8	0	1	4.1	-
9	0	1	3.7	-
10	0	1	9.8	0.25
11	1	1	15	-
12	0	1	15.2	-
13	0	1	6.1	-
14	1	1	19.5	-
15	0	1	8	-
16	1	1	23.1	-
17	0	1	14.4	-
18	0	1	5.7	-
19	0	1	8.4	-
20	0	1	9	0.25
21	0	1	5.1	-
22	0	1	3.5	-
23	0	1	13.7	-
24	0	1	16.7	-
25	0	1	13.8	-
26	0	1	9.9	-
27	0	1	13.6	-
28	0	1	5.2	-
29	0	1	20.4	-
30	0	1	11.8	0.5
31	0	1	2.2	-
32	0	1	7.8	-
33	0	1	6.2	-
34	0	1	23.4	-
35	0	1	15.1	-
36	0	1	14.2	-
37	0	1	13.4	-
38	0	1	13.4	-
39	0	1	15.4	-
40	0	1	16	0.75
41	0	1	14.4	-
42	0	1	8.3	-
43	0	0	4.6	-
44	0	1	6.4	-
45	0	1	7.3	-
46	0	1	8.4	-
47	0	1	14.1	-
48	0	1	17.2	-
49	0	1	15.7	-
50	0	1	13.3	0.25
51	0	1	14.3	-
52	0	1	11.2	-
53	0	1	25	-
54	0	1	8.6	-
55	0	1	9.2	-
56	0	1	8.9	-
57	0	1	7.2	-
58	0	1	7.9	-
59	0	1	9.2	-
60	0	1	10.1	0.25
61	0	1	7.4	-
62	0	1	6.8	-
63	0	1	12	-
64	0	1	9.1	-
65	0	1	14.8	-
66	0	1	23	-
67	0	1	5.2	-
68	0	1	9.1	-
69	0	1	21.1	-
70	0	1	12.2	0
71	0	1	9.2	-
72	0	1	7.8	-
73	0	1	13.9	-
74	0	1	11.9	-
75	0	1	5.7	-
76	0	1	6.9	-
77	0	1	5.2	-
78	0	1	8.3	-
79	0	1	17.2	-
80	0	1	18.4	0
81	0	1	8.4	-
82	0	1	6.4	-
83	0	1	3.9	-
84	0	1	7.8	-
85	0	1	8.9	-
86	0	1	7.8	-
87	0	1	7.2	-
88	0	1	9.9	-
89	0	1	6.4	-
90	0	1	15.4	0.5
91	0	1	7	-
92	0	1	10.1	-
93	0	1	5.6	-
94	0	1	4.5	-
95	0	1	5.4	-
96	0	1	10.4	-
97	0	1	6.9	-
98	0	1	7.2	-
99	0	1	12	-
100	0	1	11.2	0.5
Average Ci_c, Ci_p and Embed. =	0.07	0.99	-	0.325
Calcite Index (CI) =		1.06		

Notes: nm = not measurable, "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm; Ci_c = Calcite concretion score; Ci_p = Calcite presence score; and Embed. = Embededness

Table F.5: Pebble Counts and Calcite Measurements at RG_LILC3, August/September 2020

RG_LILC3-3				
27-Aug-2020				
Pebble	**Concreted Status**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	1	4.4	-
2	0	1	3.9	-
3	0	1	3.1	-
4	0	1	5.2	-
5	0	1	5.8	-
6	0	1	6.7	-
7	0	1	7	-
8	0	1	4.9	-
9	0	1	7.9	-
10	0	1	5.4	0
11	0	1	5.6	-
12	0	0	1.6	-
13	0	1	5.2	-
14	0	1	9.6	-
15	0	1	4.2	-
16	0	1	4.9	-
17	0	1	2.8	-
18	0	1	3.1	-
19	0	1	8.2	-
20	0	1	6.6	0
21	0	1	7.4	-
22	0	1	10.6	-
23	0	1	8.6	-
24	0	1	4.4	-
25	0	1	3.8	-
26	0	1	6.3	-
27	0	0	3.6	-
28	0	1	3.8	-
29	0	1	1.8	-
30	0	1	6.4	0.25
31	0	1	9.7	-
32	0	1	10.4	-
33	0	1	5.6	-
34	0	1	3.8	-
35	0	0	2.3	-
36	0	1	5.2	-
37	0	1	12.3	-
38	0	1	4.2	-
39	0	1	6.8	-
40	0	1	7.7	0
41	0	1	5.7	-
42	0	0	1.7	-
43	0	1	4.6	-
44	0	1	5.8	-
45	0	1	6.4	-
46	0	1	6.3	-
47	0	1	6.1	-
48	0	1	3.1	-
49	0	1	8.4	-
50	0	1	8.2	0.25
51	0	1	9.1	-
52	0	1	9.6	-
53	0	1	5.2	-
54	0	1	5.6	-
55	0	0	1.4	-
56	0	1	11.4	-
57	0	1	5.2	-
58	0	1	8.4	-
59	0	1	5.1	-
60	0	1	6.1	0.5
61	0	1	7.2	-
62	0	1	7.6	-
63	0	1	6.9	-
64	0	1	3.6	-
65	0	1	8.2	-
66	0	0	2.4	-
67	0	1	8.7	-
68	0	1	6.6	-
69	0	1	7.7	-
70	0	1	6.3	0
71	0	1	10.2	-
72	0	1	10.2	-
73	0	1	7.6	-
74	0	1	6.8	-
75	0	1	10.6	-
76	0	1	9.4	-
77	0	1	8.8	-
78	0	1	4.7	-
79	0	1	9.1	-
80	0	1	5.8	0
81	0	1	6.2	-
82	0	1	8.3	-
83	0	1	5.8	-
84	0	1	8.1	-
85	0	1	8.8	-
86	0	1	6.7	-
87	0	1	3.2	-
88	0	1	10.1	-
89	0	1	5.1	-
90	0	1	7.5	0
91	0	1	8.3	-
92	0	1	5	-
93	0	1	4.6	-
94	0	1	5.7	-
95	0	1	6.3	-
96	0	1	6.1	-
97	0	1	9.8	-
98	0	0	2.4	-
99	0	1	8.9	-
100	0	1	8.1	0
Average Ci_c, Ci_p and Embed. =	0	0.93	-	0.1
Calcite Index (CI) =		0.93		

Notes: nm = not measurable, "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm; Ci_c = Calcite concretion score; Ci_p = Calcite presence score; and Embed. = Embededness

Table F.5: Pebble Counts and Calcite Measurements at RG_LILC3, August/September 2020

RG_LILC3-4				
27-Aug-2020				
Pebble	**Concreted Status**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	1	9.1	-
2	0	1	4.9	-
3	0	1	13.2	-
4	0	1	10.4	-
5	0	1	22.5	-
6	0	1	10.1	-
7	0	1	14.8	-
8	0	1	8.8	-
9	0	1	8.8	-
10	0	1	9.3	0
11	0	1	11.5	-
12	0	1	10.1	-
13	0	1	14.8	-
14	0	1	13.1	-
15	0	1	11.6	-
16	0	1	7.4	-
17	0	1	9.3	-
18	0	1	12.6	-
19	0	1	11.1	-
20	0	1	13.9	0
21	0	1	12.6	-
22	0	1	9.5	-
23	0	1	10.2	-
24	0	1	5.6	-
25	0	1	8.8	-
26	0	1	7.9	-
27	0	1	17	-
28	0	1	3.1	-
29	0	1	6.9	-
30	0	1	11.3	0.5
31	0	1	10	-
32	0	1	9.6	-
33	0	1	7.4	-
34	0	1	8.9	-
35	0	1	10.5	-
36	0	1	18.6	-
37	0	1	11.4	-
38	0	1	6.8	-
39	0	1	7.2	-
40	0	1	6.5	0.5
41	0	1	9.7	-
42	0	1	15.1	-
43	0	1	6.5	-
44	0	1	7.3	-
45	0	1	9.2	-
46	0	1	11.9	-
47	0	1	4.4	-
48	0	1	9.3	-
49	0	1	6.4	-
50	0	1	8.3	0.25
51	0	1	6.2	-
52	0	1	5.1	-
53	0	1	6.1	-
54	0	1	6	-
55	0	1	11.2	-
56	0	1	6.1	-
57	0	1	7.4	-
58	0	1	8.7	-
59	0	1	11.2	-
60	0	1	12.3	0.25
61	0	1	5.2	-
62	0	1	6.4	-
63	0	1	7.1	-
64	0	1	8.2	-
65	0	1	28.1	-
66	0	1	11.1	-
67	0	1	11.4	-
68	0	1	6.8	-
69	0	1	9.2	-
70	0	1	3.5	0
71	0	1	4.6	-
72	0	1	3.8	-
73	0	1	13.5	-
74	0	1	7.5	-
75	0	1	7.1	-
76	0	1	6.8	-
77	0	1	12.3	-
78	0	1	13.1	-
79	0	1	10	-
80	0	1	12.1	0.25
81	0	1	16.5	-
82	0	1	4.6	-
83	0	1	6.3	-
84	0	1	16	-
85	0	1	15	-
86	0	1	13.5	-
87	0	1	9.2	-
88	0	1	15.1	-
89	0	1	7.6	-
90	0	1	11.3	0
91	0	1	9	-
92	0	1	6.7	-
93	0	1	2.4	-
94	0	1	11.5	-
95	0	1	18.1	-
96	0	1	5.3	-
97	0	1	7	-
98	0	1	19.2	-
99	0	1	15.5	-
100	0	1	26.3	0.75
Average Ci_c, Ci_p and Embed. =	0	1	-	0.25
Calcite Index (CI) =		1		

Notes: nm = not measurable, "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm; Ci_c = Calcite concretion score; Ci_p = Calcite presence score; and Embed. = Embededness

Table F.5: Pebble Counts and Calcite Measurements at RG_LILC3, August/September 2020

RG_LILC3-5				
27-Aug-2020				
Pebble	**Concreted Status**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	1	10.1	-
2	0	1	21.2	-
3	0	1	10	-
4	0	1	9.2	-
5	0	1	7.6	-
6	0	1	8.1	-
7	0	1	8.6	-
8	0	1	7.9	-
9	0	1	5.1	-
10	0	1	9.1	0.25
11	0	0	4.1	-
12	0	1	9.1	-
13	0	1	9.2	-
14	0	1	7	-
15	0	1	8.6	-
16	0	1	7.4	-
17	0	1	7.1	-
18	0	1	7.6	-
19	0	1	10.2	-
20	0	1	14.8	0.25
21	0	1	8.9	-
22	0	1	13.9	-
23	0	1	11.6	-
24	0	1	10.8	-
25	0	1	9.4	-
26	0	1	8.3	-
27	0	1	6.8	-
28	0	1	8.8	-
29	0	1	14.6	-
30	0	1	14.3	0.5
31	0	1	7.8	-
32	0	1	10.2	-
33	0	1	10.5	-
34	0	1	15.6	-
35	0	1	7.4	-
36	0	1	11.8	-
37	0	1	11.1	-
38	0	1	4.1	-
39	0	1	4	-
40	0	1	9	0.5
41	0	1	4.9	-
42	0	1	10.1	-
43	0	1	14.1	-
44	0	1	9	-
45	0	1	8.1	-
46	0	1	5.8	-
47	0	1	11.4	-
48	0	1	12.6	-
49	0	1	9.9	-
50	0	1	13.9	0.25
51	0	1	11.9	-
52	0	1	11.2	-
53	0	1	16.4	-
54	0	1	13.2	-
55	0	1	7.1	-
56	0	1	6	-
57	0	1	5.9	-
58	0	1	15.1	-
59	0	1	12	-
60	0	1	8.1	0
61	0	1	8.2	-
62	0	1	11.4	-
63	0	1	6.1	-
64	0	1	10.3	-
65	0	1	5.8	-
66	0	1	6	-
67	0	1	11.1	-
68	0	1	7	-
69	0	1	8.3	-
70	0	1	7.4	0.25
71	0	1	13	-
72	0	1	11.1	-
73	0	1	9.5	-
74	0	1	17.4	-
75	0	1	8.1	-
76	0	1	6.3	-
77	0	1	8.1	-
78	0	1	6.3	-
79	0	1	9.4	-
80	0	1	5.5	0.25
81	0	1	8.2	-
82	0	1	14.1	-
83	0	1	10.2	-
84	0	1	21.8	-
85	0	1	9.1	-
86	0	1	9.4	-
87	0	1	8.1	-
88	0	1	7	-
89	0	1	15.1	-
90	0	1	9.1	0.25
91	0	1	7.4	-
92	0	1	5.9	-
93	0	1	15.2	-
94	0	1	7.1	-
95	0	1	4.8	-
96	0	1	6.6	-
97	0	1	8.8	-
98	0	1	10.2	-
99	0	1	10.5	-
100	0	1	12.7	0.5
Average Ci_c, Ci_p and Embed. =	0	0.99	-	0.3
Calcite Index (CI) =		0.99		

Notes: nm = not measurable, "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm; Ci_c = Calcite concretion score; Ci_p = Calcite presence score; and Embed. = Embededness

Table F.6: Pebble Counts and Calcite Measurements at RG_LISP24, August/September 2020

RG_LISP24-1				
01-Sep-2020				
Pebble	**Concreted Status**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	16.6	-
2	0	0	2.4	-
3	0	0	13.1	-
4	0	1	12.2	-
5	0	0	12.1	-
6	0	0	14.7	-
7	0	0	10.5	-
8	0	0	14.6	-
9	0	0	10.9	-
10	0	0	8.8	0.25
11	0	0	6.8	-
12	0	0	12.3	-
13	0	0	6.8	-
14	0	0	7	-
15	0	0	13.6	-
16	0	0	11.8	-
17	0	0	8.8	-
18	0	0	9.1	-
19	0	0	7	-
20	0	0	15.5	0.75
21	0	0	1.2	-
22	0	0	13	-
23	0	0	20	-
24	0	0	8.9	-
25	0	0	11.3	-
26	0	0	8.4	-
27	0	0	11.2	-
28	0	0	8.3	-
29	0	0	8.2	-
30	0	0	12.4	0.5
31	0	0	5.2	-
32	0	0	10.7	-
33	0	0	1.7	-
34	0	0	10.5	-
35	0	0	12.4	-
36	0	0	29.5	-
37	0	0	10.5	-
38	0	0	9.3	-
39	0	0	12.2	-
40	0	0	29	0.5
41	0	0	5.4	-
42	0	0	22.5	-
43	0	0	15.4	-
44	0	0	17.6	-
45	0	0	7.4	-
46	0	0	22	-
47	0	0	8.7	-
48	0	0	12.3	-
49	0	0	4.2	-
50	0	0	12.5	0
51	0	0	8.6	-
52	0	0	5.2	-
53	0	0	8.8	-
54	0	0	2.9	-
55	0	0	4.6	-
56	0	0	16	-
57	0	0	7	-
58	0	0	18.5	-
59	0	0	10.7	-
60	0	0	7.8	0.5
61	0	0	9.5	-
62	0	0	25	-
63	0	0	9.8	-
64	0	0	6.2	-
65	0	0	6.8	-
66	0	0	7	-
67	0	0	6.3	-
68	0	0	9.1	-
69	0	0	14.5	-
70	0	0	11.4	0.5
71	0	0	5.6	-
72	0	0	11.6	-
73	0	0	6.5	-
74	0	0	6.6	-
75	0	0	5.7	-
76	0	0	5.7	-
77	0	0	26.5	-
78	0	0	29.5	-
79	0	0	14.2	-
80	0	0	8.6	0.5
81	0	0	10.6	-
82	0	0	24.5	-
83	0	0	6.2	-
84	0	0	5.2	-
85	0	0	13	-
86	0	0	6.5	-
87	0	0	38	-
88	0	0	9.2	-
89	0	0	23.5	-
90	0	0	59	0.75
91	0	0	6.4	-
92	0	0	15.7	-
93	0	0	6.7	-
94	0	0	6.1	-
95	0	0	6.2	-
96	0	0	10.8	-
97	0	0	31	-
98	0	0	9.4	-
99	0	0	3.8	-
100	0	0	6.3	0.5
Average Ci_c, Ci_p and Embed. =	0	0.01	-	0.475
Calcite Index (CI) =		0.01		

Notes: nm = not measurable, "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.
Ci_c = Calcite concretion score; Ci_p = Calcite presence score; and Embed. = Embededness

Table F.7: Pebble Counts and Calcite Measurements at RG_LIDSL, August/September 2020

RG_LIDSL-1				
25-Aug-2020				
Pebble	**Concreted Status**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	4.3	-
2	0	0	0.1	-
3	0	1	13.4	-
4	0	0	2.5	-
5	0	0	23	-
6	0	0	8.4	-
7	0	0	6.2	-
8	0	1	9.3	-
9	0	1	9.5	-
10	0	1	-	0
11	0	1	15.1	-
12	0	1	9.6	-
13	0	0	4.2	-
14	0	1	13.5	-
15	0	0	8.4	-
16	0	0	15.1	-
17	0	1	10.6	-
18	0	1	2	-
19	0	1	14.8	-
20	0	1	15.5	0
21	0	0	4.6	-
22	0	1	10.1	-
23	0	1	16.9	-
24	0	1	7.3	-
25	0	1	7.2	-
26	0	0	10.3	-
27	0	0	5.3	-
28	0	0	9.4	-
29	0	1	4.3	-
30	0	0	10.9	0
31	0	1	17.1	-
32	0	1	5.2	-
33	0	1	6.3	-
34	0	0	11.9	-
35	0	1	6.4	-
36	0	0	17.5	-
37	0	0	5.4	-
38	0	0	11.2	-
39	0	1	12.4	-
40	0	1	7.8	0.5
41	0	0	1.5	-
42	0	0	6.3	-
43	0	0	6.5	-
44	0	1	6	-
45	0	0	11.5	-
46	0	0	4.2	-
47	0	0	4.8	-
48	0	0	3.9	-
49	0	1	6.9	-
50	0	1	25	0.75
51	0	0	9.3	-
52	0	1	2.1	-
53	1	0	9.8	-
54	0	1	10.2	-
55	0	1	8.1	-
56	0	0	6.3	-
57	0	1	9.5	-
58	0	1	12.2	-
59	0	0	4.8	-
60	0	1	10.3	0
61	0	0	8.9	-
62	0	0	15.4	-
63	0	1	16.4	-
64	0	1	16.1	-
65	0	1	16.5	-
66	0	1	23	-
67	0	1	11.2	-
68	0	0	7.4	-
69	0	0	19.3	-
70	0	1	3.2	0
71	0	0	10.3	-
72	0	1	13.2	-
73	0	1	6	-
74	0	1	5.2	-
75	0	0	10.3	-
76	0	1	8.5	-
77	0	1	15.2	-
78	0	1	10.1	-
79	0	1	10	-
80	0	1	6.2	0
81	0	0	6.5	-
82	0	0	6.2	-
83	0	0	3	-
84	0	1	12.9	-
85	0	1	9.3	-
86	0	0	6.5	-
87	0	1	9.2	-
88	0	0	4.8	-
89	0	0	3.9	-
90	0	1	4.4	0
91	0	1	8.1	-
92	0	0	6.3	-
93	0	1	12.9	-
94	0	0	5.1	-
95	0	0	12.4	-
96	0	0	6.3	-
97	0	1	27	-
98	0	0	6.3	-
99	0	1	15.6	-
100	0	1	11.5	0.25
Average Ci_c, Ci_p and Embed. =	0.01	0.54	-	0.15
Calcite Index (CI) =		0.55		

Notes: nm = not measurable, "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.
Ci_c = Calcite concretion score; Ci_p = Calcite presence score; and Embed. = Embededness

Table F.7: Pebble Counts and Calcite Measurements at RG_LIDSL, August/September 2020

RG_LIDSL-2				
25-Aug-2020				
Pebble	**Concreted Status**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	1	11.2	-
2	0	1	18.3	-
3	0	1	12	-
4	0	0	3.6	-
5	0	0	4.1	-
6	0	0	7.9	-
7	0	0	4.4	-
8	0	0	3.8	-
9	0	0	5.6	-
10	0	0	6.1	0
11	0	0	5.8	-
12	0	1	21	-
13	0	0	3.6	-
14	0	0	2.9	-
15	0	0	4.4	-
16	0	1	13.5	-
17	0	1	5.4	-
18	0	1	9.8	-
19	0	0	1.5	-
20	0	1	4.8	0.5
21	0	1	6.8	-
22	0	1	20	-
23	0	0	3.8	-
24	0	1	13.2	-
25	0	1	6.5	-
26	0	1	4.8	-
27	0	1	24.3	-
28	0	1	8.9	-
29	0	1	5.2	-
30	0	1	14.2	0.5
31	0	1	11.5	-
32	0	1	9.3	-
33	0	1	7.6	-
34	0	1	6.8	-
35	0	1	14.2	-
36	0	1	17.5	-
37	0	0	5.8	-
38	0	0	6.3	-
39	0	0	2.2	-
40	0	0	4.7	0
41	0	1	11.3	-
42	0	1	7.8	-
43	0	1	12.6	-
44	0	1	6.3	-
45	0	1	9.8	-
46	0	0	3.4	-
47	0	0	5.1	-
48	0	1	7.9	-
49	0	1	16.4	-
50	0	0	2.6	0
51	0	1	16.2	-
52	0	1	11.1	-
53	0	0	4.1	-
54	0	1	8.4	-
55	0	1	6.8	-
56	0	1	13.1	-
57	0	1	4.1	-
58	0	0	-	-
59	0	1	6.1	-
60	0	1	10.3	0.75
61	0	1	7.2	-
62	0	0	4.3	-
63	0	1	9.3	-
64	0	1	7.1	-
65	0	1	11.4	-
66	0	1	8.4	-
67	0	1	2.3	-
68	0	1	6.9	-
69	0	1	20	-
70	0	0	5.5	0
71	0	1	6.5	-
72	0	0	5.4	-
73	0	1	21.5	-
74	0	1	7.1	-
75	0	1	17.2	-
76	0	1	7.3	-
77	0	1	10.3	-
78	0	1	7.5	-
79	0	0	5.1	-
80	0	0	4.5	0
81	0	0	4.3	-
82	0	1	6.1	-
83	0	1	5.5	-
84	0	1	11.4	-
85	0	1	5.3	-
86	0	1	9	-
87	0	0	7.5	-
88	0	1	10.4	-
89	0	1	14.8	-
90	0	1	18.6	0.75
91	0	0	4.8	-
92	0	1	6.1	-
93	0	1	7.6	-
94	0	0	4.1	-
95	0	1	24.3	-
96	0	1	6	-
97	0	1	11.4	-
98	0	1	14.8	-
99	0	1	5.3	-
100	0	1	5.2	0
Average Ci_c, Ci_p and Embed. =	0	0.69	-	0.25
Calcite Index (CI) =		0.69		

Notes: nm = not measurable, "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.
Ci_c = Calcite concretion score; Ci_p = Calcite presence score; and Embed. = Embededness

Table F.7: Pebble Counts and Calcite Measurements at RG_LIDSL, August/September 2020

RG_LIDSL-3				
26-Aug-2020				
Pebble	**Concreted Status**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	1	12.2	-
2	0	1	10.1	-
3	0	0	6.4	-
4	0	0	7.2	-
5	0	0	8.3	-
6	0	1	15.1	-
7	0	1	6.8	-
8	0	0	9.9	-
9	0	1	12	-
10	0	1	12.3	0
11	0	1	10.2	-
12	0	0	8.4	-
13	0	1	15.1	-
14	0	1	12.2	-
15	0	1	10.3	-
16	0	0	6.4	-
17	0	0	8.3	-
18	0	1	17.1	-
19	0	0	8.1	-
20	0	1	23.4	0.75
21	0	1	13	-
22	0	1	9.3	-
23	0	0	4.2	-
24	0	1	17.4	-
25	0	0	6.1	-
26	0	1	15.8	-
27	0	1	10	-
28	0	0	30	-
29	0	0	6.6	-
30	0	0	9.5	0.25
31	0	1	10.7	-
32	0	1	13.3	-
33	0	0	4.1	-
34	0	1	13.4	-
35	0	1	14.2	-
36	0	0	4.2	-
37	0	1	28.9	-
38	0	0	8.4	-
39	0	0	23.8	-
40	0	0	4.1	0.5
41	0	0	13.2	-
42	0	0	6.4	-
43	0	1	10.2	-
44	0	1	-	-
45	0	1	-	-
46	0	0	10.7	-
47	0	1	11.5	-
48	0	0	8.9	-
49	0	0	12.4	-
50	0	0	6.7	0
51	0	0	9.4	-
52	0	0	18	-
53	0	0	9.1	-
54	0	0	12.4	-
55	0	1	1.5	-
56	0	0	5.1	-
57	0	1	10.9	-
58	0	1	4.3	-
59	0	1	21.5	-
60	0	1	6.4	0.25
61	0	0	30	-
62	0	0	14.8	-
63	0	0	6.3	-
64	0	0	3.8	-
65	0	1	4.4	-
66	0	1	7.6	-
67	0	0	12.4	-
68	0	0	6.4	-
69	0	0	5.1	-
70	0	1	3.3	0.75
71	0	1	7.2	-
72	0	1	20.4	-
73	0	1	6.9	-
74	0	0	7.4	-
75	0	1	12.4	-
76	0	1	5.5	-
77	0	0	11.2	-
78	0	1	11.5	-
79	0	1	3.6	-
80	0	1	10.7	0
81	0	0	15.4	-
82	0	0	11.5	-
83	0	0	2.8	-
84	0	1	15.4	-
85	0	0	2.8	-
86	0	1	11.4	-
87	0	0	2.2	-
88	0	1	19.6	-
89	0	1	13.5	-
90	0	1	14.1	0.25
91	0	1	12.7	-
92	0	1	12.2	-
93	0	1	13	-
94	0	1	9.4	-
95	0	1	26.1	-
96	0	1	9.8	-
97	0	1	18.1	-
98	0	1	8.1	-
99	0	1	11.4	-
100	0	0	4.5	0.5
Average Ci_c, Ci_p and Embed. =	0	0.56	-	0.325
Calcite Index (CI) =		0.56		

Notes: nm = not measurable, "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.
Ci_c = Calcite concretion score; Ci_p = Calcite presence score; and Embed. = Embededness

Table F.7: Pebble Counts and Calcite Measurements at RG_LIDSL, August/September 2020

RG_LIDSL-4				
26-Aug-2020				
Pebble	**Concreted Status**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	17.5	-
2	0	0	17	-
3	0	1	16	-
4	0	1	16.5	-
5	0	1	6	-
6	0	1	20.5	-
7	0	0	12	-
8	0	0	5.5	-
9	0	1	11	-
10	0	0	20.5	0.75
11	0	1	7	-
12	0	1	5	-
13	0	1	6.3	-
14	0	0	10.2	-
15	0	0	35	-
16	0	1	10.1	-
17	0	1	6.9	-
18	0	0	10.3	-
19	0	0	10.8	-
20	0	1	8.1	0
21	0	0	10.4	-
22	0	1	13.2	-
23	0	1	10.1	-
24	0	0	14.1	-
25	0	0	7.9	-
26	0	1	10.1	-
27	0	0	6.1	-
28	0	0	29	-
29	0	0	6.5	-
30	0	1	6.9	0
31	0	1	19.3	-
32	0	1	7.2	-
33	0	1	10.9	-
34	0	0	4.9	-
35	0	0	4.2	-
36	0	0	9.9	-
37	0	0	7.8	-
38	0	0	10.1	-
39	0	0	6	-
40	0	1	6.7	0
41	0	0	7.6	-
42	0	0	10	-
43	0	1	12	-
44	0	1	5.5	-
45	0	1	11.2	-
46	0	1	12.7	-
47	0	0	7.9	-
48	0	1	12.3	-
49	0	1	12.6	-
50	0	1	14.1	0.25
51	0	1	12.1	-
52	0	1	8.6	-
53	0	0	14.4	-
54	0	1	7.6	-
55	0	1	8.3	-
56	0	0	12	-
57	0	0	5.2	-
58	0	0	8.4	-
59	0	0	12.9	-
60	0	0	10	0.25
61	0	0	12.4	-
62	0	1	10.5	-
63	0	1	7.5	-
64	0	0	15.2	-
65	0	1	8.1	-
66	0	1	11	-
67	0	1	9.2	-
68	0	1	8.1	-
69	0	0	7.7	-
70	0	1	23	0.75
71	0	0	6.7	-
72	0	1	17.8	-
73	0	1	13.6	-
74	0	1	8.2	-
75	0	0	9	-
76	0	1	11.2	-
77	0	1	9.3	-
78	0	1	12.2	-
79	0	1	19.6	-
80	0	1	15.2	0.5
81	0	1	17.1	-
82	0	1	11.3	-
83	0	1	13.9	-
84	0	1	11.1	-
85	0	1	11.4	-
86	0	1	13.6	-
87	0	1	10.8	-
88	0	0	10.4	-
89	0	0	8.2	-
90	0	1	9.5	0
91	0	1	10.2	-
92	0	1	8.3	-
93	0	0	7.5	-
94	0	1	11.1	-
95	0	1	13.9	-
96	0	1	11	-
97	0	0	8	-
98	0	0	6.9	-
99	0	1	10.2	-
100	0	1	9.9	0.25
Average Ci_c, Ci_p and Embed. =	0	0.6	-	0.275
Calcite Index (CI) =		0.6		

Notes: nm = not measurable, "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.
Ci_c = Calcite concretion score; Ci_p = Calcite presence score; and Embed. = Embededness

Table F.7: Pebble Counts and Calcite Measurements at RG_LIDSL, August/September 2020

RG_LIDSL-5				
26-Aug-2020				
Pebble	**Concreted Status**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	1	12	-
2	0	1	11	-
3	0	1	14.5	-
4	0	1	12.5	-
5	0	1	11.5	-
6	0	1	12	-
7	0	0	8.7	-
8	0	0	9.8	-
9	0	0	6.2	-
10	0	1	9	0.25
11	0	1	9.8	-
12	0	1	12.8	-
13	0	1	15.5	-
14	0	1	10.4	-
15	0	0	8.2	-
16	0	1	11	-
17	0	1	14.5	-
18	0	1	9.6	-
19	0	1	13.3	-
20	0	1	10.7	0
21	0	1	11.2	-
22	0	0	6.2	-
23	0	1	15.3	-
24	0	1	11.8	-
25	0	1	9.4	-
26	0	1	12.5	-
27	0	1	6.5	-
28	0	1	8.5	-
29	0	0	15.5	-
30	0	0	10.5	0.25
31	0	0	7.2	-
32	0	0	8.5	-
33	0	1	19.5	-
34	0	1	18.4	-
35	0	1	12	-
36	0	0	8.5	-
37	0	1	15.2	-
38	0	0	8.6	-
39	0	0	11.3	-
40	0	0	10	0
41	0	1	10.5	-
42	0	0	9.8	-
43	0	0	7.7	-
44	0	0	11	-
45	0	0	7.3	-
46	0	0	9.8	-
47	0	0	7.5	-
48	0	0	10	-
49	0	0	8.7	-
50	0	0	9.4	0
51	0	0	5.4	-
52	0	0	8.3	-
53	0	0	8.3	-
54	0	0	6.4	-
55	0	0	10	-
56	0	1	26	-
57	0	0	6.5	-
58	0	1	10	-
59	0	1	15.4	-
60	0	1	8.5	0.25
61	0	1	10.7	-
62	0	1	12	-
63	0	0	7.5	-
64	0	1	27	-
65	0	1	18	-
66	0	1	11.3	-
67	0	0	7.7	-
68	0	0	7.6	-
69	0	1	15.5	-
70	0	1	10.5	0.25
71	0	0	6.4	-
72	0	1	16	-
73	0	1	10	-
74	0	1	16	-
75	0	1	13	-
76	0	0	11	-
77	0	0	6.7	-
78	0	0	11.5	-
79	0	0	8.5	-
80	0	0	7	0.25
81	0	0	12.5	-
82	0	1	10.6	-
83	0	0	4.6	-
84	0	0	8.4	-
85	0	0	13	-
86	0	0	10.8	-
87	0	1	15	-
88	0	1	11.5	-
89	0	0	4.8	-
90	0	0	10.5	0.25
91	0	1	14	-
92	0	0	5.2	-
93	0	0	9.5	-
94	0	0	5.3	-
95	0	0	6	-
96	0	0	7	-
97	0	0	9	-
98	0	0	8	-
99	0	0	6.6	-
100	0	0	8.5	0.5
Average Ci_c, Ci_p and Embed. =	0	0.47	-	0.2
Calcite Index (CI) =		0.47		

Notes: nm = not measurable, "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.
Ci_c = Calcite concretion score; Ci_p = Calcite presence score; and Embed. = Embededness

Table F.8: Pebble Counts and Calcite Measurements at RG_LIDCOM, August/September 2020

RG_LIDCOM-1				
31-Aug-2020				
Pebble	**Concreted Status**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	5.8	-
2	0	0	7.9	-
3	0	0	4.6	-
4	0	0	5.3	-
5	0	1	14.1	-
6	0	0	17.2	-
7	0	1	6.5	-
8	0	0	10.1	-
9	0	0	22.3	-
10	0	0	4.1	0
11	0	0	9.8	-
12	0	0	12.2	-
13	0	0	9.9	-
14	0	0	5.8	-
15	0	0	13.1	-
16	0	0	8.8	-
17	0	0	12.4	-
18	0	0	8.7	-
19	0	0	13.4	-
20	0	0	23.2	0.75
21	0	0	7.1	-
22	0	0	16.8	-
23	0	0	8.2	-
24	0	0	7.9	-
25	0	0	10.1	-
26	0	0	12.9	-
27	0	0	10.6	-
28	0	0	9.7	-
29	0	0	7.8	-
30	0	0	6.7	0.5
31	0	0	4.9	-
32	0	0	15.2	-
33	0	0	6	-
34	0	1	4.7	-
35	0	0	4.2	-
36	0	0	6.1	-
37	0	0	16.7	-
38	0	0	5.9	-
39	0	0	11.1	-
40	0	0	24.5	0.75
41	0	0	6.2	-
42	0	0	4	-
43	0	0	18.7	-
44	0	0	17	-
45	0	0	6.9	-
46	0	0	11	-
47	0	0	8.2	-
48	0	0	15	-
49	0	0	7.5	-
50	0	0	7.5	0.5
51	0	0	6.8	-
52	0	0	10.3	-
53	0	0	4.2	-
54	0	0	7	-
55	0	0	20.5	-
56	0	0	10	-
57	0	0	4.1	-
58	0	0	12.2	-
59	0	1	11.7	-
60	0	1	12.8	0.5
61	0	0	4	-
62	0	0	11.8	-
63	0	0	13.7	-
64	0	1	5.4	-
65	0	1	10.3	-
66	0	1	6.7	-
67	0	0	8.8	-
68	0	0	14.8	-
69	0	0	5.4	-
70	0	0	8.4	0.5
71	0	0	16.6	-
72	0	0	7	-
73	0	0	6	-
74	0	0	18.1	-
75	0	0	22.6	-
76	0	1	9.6	-
77	0	1	10.6	-
78	0	0	12.1	-
79	0	1	10	-
80	0	0	7.1	0
81	0	1	11.5	-
82	0	0	22	-
83	0	0	12.1	-
84	0	0	14.2	-
85	0	0	11.6	-
86	0	0	5.1	-
87	0	0	8.2	-
88	0	0	12.1	-
89	0	0	7.2	-
90	0	0	8.1	0.75
91	0	0	11	-
92	0	0	10.9	-
93	0	0	13.1	-
94	0	0	8	-
95	0	0	4.1	-
96	0	0	27.1	-
97	0	0	8	-
98	0	0	16.2	-
99	0	0	6.7	-
100	0	0	13.4	0.5
Average Ci_c, Ci_p and Embed. =	0	0.12	-	0.475
Calcite Index (CI) =		0.12		

Notes: nm = not measurable, "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.
Ci_c = Calcite concretion score; Ci_p = Calcite presence score; and Embed. = Embededness

Table F.9: Pebble Counts and Calcite Measurements at RG_LI8, August/September 2020

RG_LI8-1				
08-Sep-2020				
Pebble	**Concreted Status**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	8.2	-
2	0	0	14.8	-
3	0	0	10.4	-
4	0	0	18.5	-
5	0	0	14	-
6	0	0	8.2	-
7	0	0	10.6	-
8	0	0	9.4	-
9	0	0	7.3	-
10	0	0	6.4	0
11	0	0	12.5	-
12	0	0	14.2	-
13	0	0	19.8	-
14	0	0	11.2	-
15	0	0	9.5	-
16	0	0	7.5	-
17	0	0	9.3	-
18	0	0	8.5	-
19	0	0	8.8	-
20	0	0	8.3	0
21	0	0	14.1	-
22	0	0	9.3	-
23	0	0	9.5	-
24	0	0	10.2	-
25	0	0	11.4	-
26	0	0	8.9	-
27	0	0	9.9	-
28	0	0	16	-
29	0	0	10.8	-
30	0	0	12	0.5
31	0	0	7.9	-
32	0	0	6.7	-
33	0	0	9.5	-
34	0	0	7	-
35	0	0	12.5	-
36	0	0	11.5	-
37	0	0	8.5	-
38	0	0	10.5	-
39	0	0	17	-
40	0	0	14	0
41	0	0	4.7	-
42	0	0	12.4	-
43	0	0	7.9	-
44	0	0	9.3	-
45	0	0	8.8	-
46	0	0	7.7	-
47	0	0	11.3	-
48	0	0	11.7	-
49	0	0	9.5	-
50	0	0	10	0
51	0	0	16	-
52	0	0	6.7	-
53	0	0	10.9	-
54	0	0	8.5	-
55	0	0	9.2	-
56	0	0	17.1	-
57	0	0	16.7	-
58	0	0	12.4	-
59	0	0	13	-
60	0	0	12.5	0
61	0	0	9.1	-
62	0	0	14.3	-
63	0	0	3.6	-
64	0	0	9.5	-
65	0	0	8.5	-
66	0	0	17	-
67	0	0	11.1	-
68	0	0	12.2	-
69	0	0	15	-
70	0	0	6	0.5
71	0	0	9.7	-
72	0	0	11.8	-
73	0	0	7.3	-
74	0	0	15.9	-
75	0	0	11.3	-
76	0	0	8	-
77	0	0	7.9	-
78	0	0	10.5	-
79	0	0	18.5	-
80	0	0	10.7	0
81	0	0	15.4	-
82	0	0	9.5	-
83	0	0	6.4	-
84	0	0	11.8	-
85	0	0	12.6	-
86	0	0	8.9	-
87	0	0	18.2	-
88	0	0	15.6	-
89	0	0	10.5	-
90	0	0	7.5	0
91	0	0	8.7	-
92	0	0	14.1	-
93	0	0	6.9	-
94	0	0	7.3	-
95	0	0	13.4	-
96	0	0	14	-
97	0	0	11.6	-
98	0	0	18	-
99	0	0	14.7	-
100	0	0	8.8	0
Average Ci_c, Ci_p and Embed. =	0	0	-	0.1
Calcite Index (CI) =		0		

Notes: nm = not measurable, "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.
Ci_c = Calcite concretion score; Ci_p = Calcite presence score; and Embed. = Embededness

Table F.10: Pebble Counts and Calcite Measurements at RG_FRUL, August/September 2020

RG_FRUL-1				
29-Aug-2020				
Pebble	**Concreted Status**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	9.7	-
2	0	0	4.4	-
3	0	0	4.8	-
4	0	0	4.2	-
5	0	0	6.6	-
6	0	0	14.6	-
7	0	0	4.1	-
8	0	0	5.4	-
9	0	0	9.6	-
10	0	0	4.7	0.5
11	0	0	6.2	-
12	0	0	6.1	-
13	0	0	17.3	-
14	0	0	11.6	-
15	0	0	10.4	-
16	0	0	11.4	-
17	0	0	4.8	-
18	0	0	6.8	-
19	0	0	14.3	-
20	0	0	4.1	0
21	0	0	12	-
22	0	0	10.6	-
23	0	0	5.2	-
24	0	0	11.2	-
25	0	0	5.7	-
26	0	0	5.8	-
27	0	0	11.8	-
28	0	0	7.1	-
29	0	0	12.1	-
30	0	0	12.1	0.5
31	0	0	3.5	-
32	0	0	7.2	-
33	0	0	11.2	-
34	0	0	9.4	-
35	0	0	5.4	-
36	0	0	4.2	-
37	0	0	7	-
38	0	0	3.4	-
39	0	0	12.3	-
40	0	0	5.9	0.25
41	0	0	5.7	-
42	0	0	11.4	-
43	0	0	7.5	-
44	0	0	7.1	-
45	0	0	7	-
46	0	0	6.5	-
47	0	0	3.2	-
48	0	0	4	-
49	0	0	2.4	-
50	0	0	10.5	0
51	0	0	9.6	-
52	0	0	8.1	-
53	0	0	14	-
54	0	0	7.3	-
55	0	0	6.2	-
56	0	0	20	-
57	0	0	3.2	-
58	0	0	13.5	-
59	0	0	6.8	-
60	0	0	25	0.25
61	0	0	22	-
62	0	0	6.6	-
63	0	0	12.8	-
64	0	0	36.5	-
65	0	0	10.8	-
66	0	0	5	-
67	0	0	8.1	-
68	0	0	10.2	-
69	0	0	24	-
70	0	0	18	0.5
71	0	0	8.3	-
72	0	0	7.1	-
73	0	0	8.6	-
74	0	0	4.6	-
75	0	0	9.8	-
76	0	0	10	-
77	0	0	3.3	-
78	0	0	7.8	-
79	0	0	13.1	-
80	0	0	4.6	0
81	0	0	6.6	-
82	0	0	4.2	-
83	0	0	10.6	-
84	0	0	22	-
85	0	0	6.7	-
86	0	0	4.6	-
87	0	0	8.6	-
88	0	0	5	-
89	0	0	3.8	-
90	0	0	4.9	0
91	0	0	5.2	-
92	0	0	4.1	-
93	0	0	8.6	-
94	0	0	2.6	-
95	0	0	3.4	-
96	0	0	14	-
97	0	0	4.1	-
98	0	0	7.6	-
99	0	0	10	-
100	0	0	2.7	0
Average Ci_c, Ci_p and Embed. =	0	0	-	0.2
Calcite Index (CI) =		0		

Notes: nm = not measurable, "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.
Ci_c = Calcite concretion score; Ci_p = Calcite presence score; and Embed. = Embededness

Table F.11: Pebble Counts and Calcite Measurements at RG_FO23, August/September 2020

RG_FO23-1				
28-Aug-2020				
Pebble	**Concreted Status**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	1	6.8	-
2	0	1	14.5	-
3	0	1	14	-
4	0	0	2.6	-
5	0	1	4.5	-
6	0	1	20.5	-
7	0	1	7	-
8	0	1	7.8	-
9	0	1	9.4	-
10	0	1	6.3	0.5
11	0	0	4.6	-
12	0	1	8.4	-
13	0	1	6.6	-
14	0	1	2.5	-
15	0	1	16.1	-
16	0	1	5.1	-
17	0	1	34.5	-
18	0	1	10	-
19	0	1	7	-
20	0	1	18.1	0.25
21	0	1	10.5	-
22	0	1	9.4	-
23	0	1	12.5	-
24	0	1	7.6	-
25	0	1	10.6	-
26	0	1	10	-
27	0	0	3	-
28	0	1	22.9	-
29	0	1	13.2	-
30	0	1	6	0.5
31	0	1	12.8	-
32	0	1	36.5	-
33	0	0	4.4	-
34	0	1	11.3	-
35	0	0	8	-
36	0	0	6.7	-
37	0	0	6.3	-
38	0	0	5.2	-
39	0	1	5.8	-
40	0	1	14	0.25
41	0	0	6.6	-
42	0	1	25.5	-
43	0	0	3	-
44	0	1	21.5	-
45	0	1	7.8	-
46	0	1	12.7	-
47	0	0	7.8	-
48	0	1	7.7	-
49	0	0	6.3	-
50	0	1	11.4	0
51	0	0	4.2	-
52	0	1	37	-
53	0	0	12.5	-
54	0	1	29.5	-
55	0	0	26	-
56	0	0	8.3	-
57	0	0	9.2	-
58	0	0	4.2	-
59	0	0	8.5	-
60	0	0	18.5	0.5
61	0	0	9.2	-
62	0	0	13.3	-
63	0	0	17.7	-
64	0	0	9.2	-
65	0	0	9	-
66	0	0	7	-
67	0	0	10.6	-
68	0	0	7.4	-
69	0	0	6.1	-
70	0	0	6.1	0.5
71	0	0	5.7	-
72	0	0	3.8	-
73	0	0	7.2	-
74	0	0	10.4	-
75	0	0	2.5	-
76	0	0	5.8	-
77	0	1	17.8	-
78	0	0	4.4	-
79	0	0	5.5	-
80	0	1	13.8	0.25
81	0	0	9.3	-
82	0	0	12.6	-
83	0	1	6.9	-
84	0	1	13.5	-
85	0	1	36	-
86	0	0	5.1	-
87	0	0	5.3	-
88	0	1	4.9	-
89	0	0	7	-
90	0	0	21.5	0.5
91	0	1	18.5	-
92	0	0	5.7	-
93	0	0	3.3	-
94	0	1	10.6	-
95	0	1	9.8	-
96	0	1	30.5	-
97	1	1	12.1	-
98	1	1	7.8	-
99	1	1	13	-
100	0	1	18.5	0
Average Ci_c, Ci_p and Embed. =	0.03	0.54	-	0.325
Calcite Index (CI) =		0.57		

Notes: nm = not measurable, "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.
Ci_c = Calcite concretion score; Ci_p = Calcite presence score; and Embed. = Embededness

Table F.11: Pebble Counts and Calcite Measurements at RG_FO23, August/September 2020

RG_FO23-2				
28-Aug-2020				
Pebble	**Concreted Status**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	7.5	-
2	0	0	3	-
3	0	0	4.2	-
4	0	0	13.8	-
5	0	0	10.1	-
6	0	0	13.2	-
7	0	0	4.7	-
8	0	0	13	-
9	0	0	25.5	-
10	0	0	12.6	0.25
11	0	0	5.2	-
12	0	0	8.3	-
13	0	0	9.1	-
14	0	0	12.2	-
15	0	0	12.2	-
16	0	0	7.6	-
17	0	0	15	-
18	0	0	6.8	-
19	0	0	9.4	-
20	0	0	12.8	0
21	0	0	10.1	-
22	0	0	9.6	-
23	0	0	10.4	-
24	0	0	13.6	-
25	0	0	12.5	-
26	0	0	8.8	-
27	0	0	12	-
28	0	0	5.4	-
29	0	0	11.3	-
30	0	0	5	0
31	0	0	15.7	-
32	0	0	7.5	-
33	0	0	9.8	-
34	0	0	6.3	-
35	0	0	11.2	-
36	0	0	6.4	-
37	0	0	5.4	-
38	0	0	8.1	-
39	0	0	8.5	-
40	0	0	7.3	0
41	0	0	13.5	-
42	0	0	11.3	-
43	0	0	7.2	-
44	0	0	9.3	-
45	0	0	6.5	-
46	0	0	3.3	-
47	0	0	7.8	-
48	0	0	9.6	-
49	0	0	9.8	-
50	0	0	5.2	0
51	0	0	3.1	-
52	0	0	2.1	-
53	0	0	3.6	-
54	0	0	2	-
55	0	0	12.2	-
56	0	0	5.2	-
57	0	0	7.6	-
58	0	0	9.5	-
59	0	0	3.3	-
60	0	0	6	0.75
61	0	0	8.7	-
62	0	0	9.8	-
63	0	0	4.2	-
64	0	0	6.5	-
65	0	0	5.6	-
66	0	0	5	-
67	0	0	5.6	-
68	0	0	7	-
69	0	0	7	-
70	0	0	3	0
71	0	0	2.7	-
72	0	0	8	-
73	0	0	8.2	-
74	0	0	4.5	-
75	0	0	5.6	-
76	0	0	8.5	-
77	0	0	4	-
78	0	0	7.6	-
79	0	0	5.3	-
80	0	0	7	0
81	0	0	10	-
82	0	0	8.5	-
83	0	0	6.1	-
84	0	0	5.7	-
85	0	0	3.2	-
86	0	0	11.7	-
87	0	0	6.8	-
88	0	0	13.5	-
89	0	0	4.8	-
90	0	0	4.7	0
91	0	0	9.7	-
92	0	0	12.2	-
93	0	0	5.1	-
94	0	0	8.8	-
95	0	0	11	-
96	0	0	5.8	-
97	0	0	9.7	-
98	0	0	9.3	-
99	0	0	11	-
100	0	0	7	0
Average Ci_c, Ci_p and Embed. =	0	0	-	0.1
Calcite Index (CI) =		0		

Notes: nm = not measurable, "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.
Ci_c = Calcite concretion score; Ci_p = Calcite presence score; and Embed. = Embededness

Table F.11: Pebble Counts and Calcite Measurements at RG_FO23, August/September 2020

RG_FO23-3				
28-Aug-2020				
Pebble	**Concreted Status**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	4.4	-
2	0	0	10.3	-
3	0	0	6.4	-
4	0	0	8.2	-
5	0	0	4.3	-
6	0	0	1.4	-
7	0	0	4.2	-
8	0	0	6.8	-
9	0	1	16.5	-
10	0	0	11.8	0.25
11	0	0	5.2	-
12	0	0	5.4	-
13	0	0	7.3	-
14	0	0	14	-
15	0	0	17.1	-
16	0	0	5.3	-
17	0	0	10.8	-
18	0	0	14.7	-
19	0	0	4.4	-
20	0	0	10.2	0.5
21	0	0	10.2	-
22	0	0	14.8	-
23	0	0	13.4	-
24	0	0	14	-
25	0	0	2.8	-
26	0	0	17	-
27	0	0	3.8	-
28	0	0	14.2	-
29	0	0	18	-
30	0	0	10.6	0.5
31	0	0	5.3	-
32	0	0	2.2	-
33	0	0	4.3	-
34	0	0	5.2	-
35	0	0	21.5	-
36	0	0	15.5	-
37	0	0	3.7	-
38	0	0	10	-
39	0	0	25	-
40	0	0	25	0.5
41	0	0	13.8	-
42	0	0	8	-
43	0	0	7.3	-
44	0	0	2	-
45	0	0	16	-
46	0	0	29	-
47	0	0	1.8	-
48	0	0	5.3	-
49	0	0	21	-
50	0	0	9.1	0.25
51	0	0	5.3	-
52	0	0	7	-
53	0	0	18	-
54	0	0	25.5	-
55	0	0	5.8	-
56	0	0	15.8	-
57	0	0	13.8	-
58	0	0	13.5	-
59	0	0	7	-
60	0	0	20.5	0.25
61	0	0	6.1	-
62	0	0	14.8	-
63	0	0	15	-
64	0	0	16	-
65	0	0	5.3	-
66	0	0	8.1	-
67	0	0	4.5	-
68	0	0	11	-
69	0	0	5.2	-
70	0	0	12	0
71	0	0	7.1	-
72	0	0	3.2	-
73	0	0	10.3	-
74	0	0	4.4	-
75	0	0	15	-
76	0	0	14.2	-
77	0	0	6.5	-
78	0	0	10.1	-
79	0	0	7.2	-
80	0	0	5.3	0
81	0	0	4.8	-
82	0	0	10.9	-
83	0	0	5.4	-
84	0	0	4.4	-
85	0	0	5.3	-
86	0	0	5.8	-
87	0	0	1.4	-
88	0	0	2.8	-
89	0	0	5.4	-
90	0	0	6.8	0
91	0	0	5.9	-
92	0	0	2.7	-
93	0	0	11	-
94	0	0	7.4	-
95	0	0	3.1	-
96	0	0	3	-
97	0	0	4	-
98	0	0	10.2	-
99	0	0	7.2	-
100	0	0	24.5	0.25
Average Ci_c, Ci_p and Embed. =	0	0.01	-	0.25
Calcite Index (CI) =		0.01		

Notes: nm = not measurable, "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.
Ci_c = Calcite concretion score; Ci_p = Calcite presence score; and Embed. = Embededness

Table F.11: Pebble Counts and Calcite Measurements at RG_FO23, August/September 2020

RG_FO23-4				
28-Aug-2020				
Pebble	**Concreted Status**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	9.8	-
2	0	0	7.5	-
3	0	0	3.6	-
4	0	0	20.5	-
5	0	0	36	-
6	0	0	4.5	-
7	0	0	9.2	-
8	0	0	26.5	-
9	0	0	5.6	-
10	0	0	6	0
11	0	0	10.3	-
12	0	0	8.9	-
13	0	0	5.1	-
14	0	0	9.2	-
15	0	0	21.5	-
16	0	0	6.8	-
17	0	0	10	-
18	0	0	4.3	-
19	0	0	6	-
20	0	0	14.5	0.5
21	0	0	21.5	-
22	0	0	13.6	-
23	0	0	5.2	-
24	0	0	14.5	-
25	0	0	29	-
26	0	0	12.6	-
27	0	0	24.5	-
28	0	0	23	-
29	0	0	37	-
30	0	0	10.4	0
31	0	0	16	-
32	0	0	5.7	-
33	0	0	2.5	-
34	0	1	24	-
35	0	0	22	-
36	0	0	2.2	-
37	0	0	0.7	-
38	0	0	13.7	-
39	0	0	7.4	-
40	0	0	7	0.5
41	0	0	17	-
42	0	0	7.6	-
43	0	0	24.5	-
44	0	0	5.3	-
45	0	0	10.5	-
46	0	0	8.5	-
47	0	0	5.2	-
48	0	0	15.3	-
49	0	0	7.4	-
50	0	0	4.5	0
51	0	0	9.3	-
52	0	0	8.2	-
53	0	0	22	-
54	0	0	3.9	-
55	0	0	19	-
56	0	0	15.5	-
57	0	0	7.8	-
58	0	0	7.3	-
59	0	0	25	-
60	0	0	6.3	0
61	0	0	13.8	-
62	0	0	15.2	-
63	0	0	15.2	-
64	0	0	11	-
65	0	0	10.4	-
66	0	0	15	-
67	0	0	8	-
68	0	0	8	-
69	0	0	10.5	-
70	0	0	5.8	0
71	0	0	9	-
72	0	0	2.5	-
73	0	0	4.5	-
74	0	0	11.2	-
75	0	0	7.8	-
76	0	0	20	-
77	0	0	5.5	-
78	0	0	15.5	-
79	0	0	13	-
80	0	0	9.8	0.25
81	0	0	8.5	-
82	0	0	7.2	-
83	0	0	18.6	-
84	0	0	14	-
85	0	0	1.9	-
86	0	0	29.5	-
87	0	0	11	-
88	0	0	16.7	-
89	0	0	6.1	-
90	0	0	5.8	0.5
91	0	0	2.6	-
92	0	0	3	-
93	0	0	12.1	-
94	0	0	26	-
95	0	0	8.8	-
96	0	0	24	-
97	0	0	19.5	-
98	0	0	26.5	-
99	0	0	12.2	-
100	0	0	1.1	0
Average Ci_c, Ci_p and Embed. =	0	0.01	-	0.175
Calcite Index (CI) =		0.01		

Notes: nm = not measurable, "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.
Ci_c = Calcite concretion score; Ci_p = Calcite presence score; and Embed. = Embededness

Table F.11: Pebble Counts and Calcite Measurements at RG_FO23, August/September 2020

RG_FO23-5				
28-Aug-2020				
Pebble	**Concreted Status**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	3.5	-
2	0	0	8.6	-
3	0	0	3.6	-
4	0	0	8.7	-
5	0	0	3.1	-
6	0	0	5.9	-
7	0	0	3.4	-
8	0	0	6.8	-
9	0	0	14.4	-
10	0	0	7	0.5
11	0	0	14.4	-
12	0	0	8.6	-
13	0	0	12.5	-
14	0	0	6.7	-
15	0	0	7.4	-
16	0	0	20	-
17	0	0	12	-
18	0	0	13.4	-
19	0	1	35	-
20	0	0	10.8	0
21	0	0	9.2	-
22	0	0	16	-
23	0	0	14.7	-
24	0	0	9.7	-
25	0	0	11.3	-
26	0	0	2.7	-
27	0	0	13.6	-
28	0	0	7.4	-
29	0	0	22.5	-
30	0	0	12.8	0.25
31	0	1	18	-
32	0	0	9.8	-
33	0	0	5.3	-
34	0	1	30	-
35	0	0	5.7	-
36	0	0	4.8	-
37	0	0	12.3	-
38	0	0	4.4	-
39	0	0	5.5	-
40	0	0	9.3	0
41	0	0	4	-
42	0	0	4.5	-
43	0	1	24	-
44	0	0	10	-
45	0	0	11	-
46	0	0	4.8	-
47	0	0	19	-
48	0	0	10	-
49	0	0	3.1	-
50	0	0	6.5	0.5
51	0	1	29.5	-
52	0	0	19	-
53	0	0	12.5	-
54	0	0	5	-
55	0	0	7	-
56	0	0	5.7	-
57	0	0	9.2	-
58	0	0	9.8	-
59	0	0	29	-
60	0	0	9.4	0.5
61	0	0	7.1	-
62	0	0	26	-
63	0	1	2.9	-
64	0	0	6.4	-
65	0	0	6.9	-
66	0	0	26	-
67	0	1	5.8	-
68	0	0	4.2	-
69	0	0	7	-
70	0	0	4	0.75
71	0	0	16.5	-
72	0	1	7.7	-
73	0	0	6	-
74	0	0	12.6	-
75	0	0	7.6	-
76	0	0	9.3	-
77	0	0	5	-
78	0	0	10	-
79	0	0	16.5	-
80	0	0	22	0.25
81	0	0	44	-
82	0	1	7.5	-
83	0	0	5	-
84	0	0	13	-
85	0	0	10.2	-
86	0	0	4	-
87	0	0	13.2	-
88	0	0	27	-
89	0	1	14.2	-
90	0	0	-	0
91	0	0	57	-
92	0	0	12.3	-
93	0	0	7	-
94	0	0	6.6	-
95	0	0	18	-
96	0	0	14.3	-
97	0	0	10.5	-
98	0	0	8.5	-
99	0	1	19.5	-
100	0	1	58	0.5
Average Ci_c, Ci_p and Embed. =	0	0.12	-	0.325
Calcite Index (CI) =		0.12		

Notes: nm = not measurable, "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.
Ci_c = Calcite concretion score; Ci_p = Calcite presence score; and Embed. = Embededness

Table F.12: Hess Sample Collection from Fording River, August to September 2020

Replicate				1	2	3	4	5	6	7	8	9	10
Reference	RG_LI24	Date		31-Aug-20	31-Aug-20	31-Aug-20	31-Aug-20	01-Sep-20	-	-	-	-	-
		UTM 11U	Easting	662087	662114	662188	662217	662224	-	-	-	-	-
			Northing	5538375	5538390	5538394	5538393	5538420	-	-	-	-	-
		Depth (cm)		0.16	0.22	0.18	0.20	0.18	-	-	-	-	-
		Velocity (m/s)		0.266	0.270	0.322	0.315	0.275	-	-	-	-	-
	RG_SLINE	Date		31-Aug-20	31-Aug-20	31-Aug-20	31-Aug-20	31-Aug-20	-	-	-	-	-
		UTM 11U	Easting	661076	661072	661135	661184	661188	-	-	-	-	-
			Northing	5531416	5531421	5531373	5531342	5531334	-	-	-	-	-
		Depth (cm)		0.23	0.25	0.20	0.28	0.24	-	-	-	-	-
		Velocity (m/s)		0.195	0.334	0.271	0.300	0.248	-	-	-	-	-
Mine-Exposed	RG_LILC3	Date		27-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20
		UTM 11U	Easting	659850	659857	659875	659880	659894	659903	659927	659933	659949	659965
			Northing	5531717	5531721	5531747	5531753	5531778	5531792	5531830	5531838	5531853	5531873
		Depth (cm)		0.19	0.20	0.28	0.19	0.19	0.22	0.14	0.18	0.24	0.22
		Velocity (m/s)		0.471	0.410	0.308	0.257	0.348	0.239	0.321	0.335	0.288	0.407
	RG_LIDSL	Date		25-Aug-20	25-Aug-20	25-Aug-20	25-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20
		UTM 11U	Easting	659259	659265	659293	659300	659312	659315	659332	659340	659355	659359
			Northing	5530519	5530534	5530581	5530592	5530618	5530628	5530668	5530678	5530712	5530727
		Depth (cm)		0.17	0.14	0.20	0.24	0.22	0.28	0.25	0.23	0.26	0.19
		Velocity (m/s)		0.418	0.351	0.322	0.252	0.423	0.314	0.291	0.292	0.226	0.350

Note: "-" indicates no data available.

Table F.13: Supporting Measures Associated with 3-Minute Kick and Sweep Benthic Invertebrate Community Sampling at Line Creek and Fording River, August/September 2020

Waterbody	Biological Area Code	Sample Details				
		Sample ID: RG_SLINE_R1_2020-08-31				
Reference (Line Creek)	RG_SLINE	Date		31-Aug-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time		9:00	1	18	0.444
		UTM	Easting	661080	2	20	0.461
			Northing	5531418	3	26	0.264
		Bankfull Width (m)		5.5	4	30	0.469
		Wetted Width (m)		5	5	30	0.264
		Total Kick Distance (m)		20			
		Sampling Time (min)		3			
		Full Transect?		Yes			
		# Transects		3			
		Sample ID: RG_SLINE_R2_2020-08-31				
		Date		31-Aug-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time		11:00	1	21	0.182
		UTM	Easting	661132	2	16	0.846
			Northing	5531380	3	24	0.212
		Bankfull Width (m)		9.5	4	18	0.649
		Wetted Width (m)		8.1	5	21	0.321
		Total Kick Distance (m)		20			
		Sampling Time (min)		3			
		Full Transect?		Yes			
		# Transects		3			
		Sample ID: RG_SLINE_R3_2020-08-31				
		Date		31-Aug-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time		13:30	1	27	0.817
		UTM	Easting	661191	2	23	0.175
			Northing	5531337	3	25	0.084
		Bankfull Width (m)		8	4	30	0.131
		Wetted Width (m)		7.2	5	22	0.0559
		Total Kick Distance (m)		25			
		Sampling Time (min)		3			
		Full Transect?		Yes			
		# Transects		2			
		Sample ID: RG_LI24_R1_2020-08-31				
		Date		31-Aug-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time		9:15	1	11	0.421
		UTM	Easting	662084	2	10	0.367
			Northing	5538370	3	13	0.337
		Bankfull Width (m)		10.05	4	12	0.468
		Wetted Width (m)		6.16	5	14	0.357
		Total Kick Distance (m)		22.5			
		Sampling Time (min)		3			
		Full Transect?		Yes			
		# Transects		5			
		Sample ID: RG_LI24_R2_2020-08-31				
		Date		31-Aug-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time		11:09	1	15	0.38
		UTM	Easting	662123	2	10	0.467
			Northing	5538389	3	10	0.268
		Bankfull Width (m)		5.73	4	13	0.367
		Wetted Width (m)		3.28	5	10	0.236
		Total Kick Distance (m)		20			
		Sampling Time (min)		3			
		Full Transect?		Yes			
		# Transects		5			
		Sample ID: RG_LI24_R3_2020-08-31				
		Date		31-Aug-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time		12:40	1	9	0.68
		UTM	Easting	662165	2	10	0.385
			Northing	5538411	3	10	0.323
		Bankfull Width (m)		12.85	4	16	0.452
		Wetted Width (m)		5.4	5	10	0.303
		Total Kick Distance (m)		15			
		Sampling Time (min)		3			
		Full Transect?		Yes			
		# Transects		6			

Table F.13: Supporting Measures Associated with 3-Minute Kick and Sweep Benthic Invertebrate Community Sampling at Line Creek and Fording River, August/September 2020

Waterbody	Biological Area Code	Sample Details				
Reference (Line Creek)	RG_LI24	**Sample ID: RG_LI24_R4_2020-08-31**				
		Date	31-Aug-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time	14:36	1	12	0.277
		UTM Easting	662205	2	16	0.489
		UTM Northing	5538393	3	17	0.682
		Bankfull Width (m)	7.1	4	13	0.303
		Wetted Width (m)	3.05	5	7	0.4
		Total Kick Distance (m)	12.5			
		Sampling Time (min)	3			
		Full Transect?	Yes			
		# Transects	5			
		Sample ID: RG_LI24_R5_2020-08-31				
		Date	1-Sep-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time	9:25	1	10	0.055
		UTM Easting	662221	2	17	0.219
		UTM Northing	5538429	3	19	0.17
		Bankfull Width (m)	7.1	4	21	0.436
		Wetted Width (m)	3.05	5	21	0.128
		Total Kick Distance (m)	15			
		Sampling Time (min)	3			
		Full Transect?	Yes			
		# Transects	5			
Mine-exposed (Line Creek)	RG_LILC3	**Sample ID: RG_LILC3_R1_2020-08-27**				
		Date	27-Aug-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time	8:48	1	8	0.615
		UTM Easting	659849	2	10	0.542
		UTM Northing	5531716	3	13	0.497
		Bankfull Width (m)	9.1	4	14	1.068
		Wetted Width (m)	8.8	5	25	1.078
		Total Kick Distance (m)	20			
		Sampling Time (min)	3			
		Full Transect?	Yes			
		# Transects	2			
		Sample ID: RG_LILC3_R2_2020-08-27				
		Date	27-Aug-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time	10:15	1	21	0.711
		UTM Easting	659893	2	20	0.597
		UTM Northing	5531779	3	25	0.523
		Bankfull Width (m)	7	4	25	0.515
		Wetted Width (m)	6.8	5	21	0.635
		Total Kick Distance (m)	25			
		Sampling Time (min)	3			
		Full Transect?	Yes			
		# Transects	3			
		Sample ID: RG_LILC3_R3_2020-08-27				
		Date	27-Aug-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time	11:45	1	10	0.418
		UTM Easting	659926	2	10	0.425
		UTM Northing	5531830	3	15	0.497
		Bankfull Width (m)	9.5	4	20	0.634
		Wetted Width (m)	9	5	32	0.988
		Total Kick Distance (m)	25			
		Sampling Time (min)	3			
		Full Transect?	Yes			
		# Transects	1			
		Sample ID: RG_LILC3_R4_2020-08-27				
		Date	27-Aug-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time	12:45	1	7	0.387
		UTM Easting	659962	2	16	0.117
		UTM Northing	5531868	3	20	0.49
		Bankfull Width (m)	12	4	28	0.819
		Wetted Width (m)	9	5	20	0.632
		Total Kick Distance (m)	20			
		Sampling Time (min)	3			
		Full Transect?	Yes			
		# Transects	1.5			

Table F.13: Supporting Measures Associated with 3-Minute Kick and Sweep Benthic Invertebrate Community Sampling at Line Creek and Fording River, August/September 2020

Waterbody	Biological Area Code	Sample Details				
Mine-exposed (Line Creek)	RG_LILC3	**Sample ID: RG_LILC3_R5_2020-08-27**				
		Date	27-Aug-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time	13:50	1	6	0.293
		UTM Easting	659967	2	9	0.145
		UTM Northing	5531892	3	17	0.63
		Bankfull Width (m)	12	4	25	0.495
		Wetted Width (m)	9	5	22	0.182
		Total Kick Distance (m)	20			
		Sampling Time (min)	3			
		Full Transect?	Yes			
		# Transects	2			
	RG_LIDSL	**Sample ID: RG_LIDSL_R1_2020-08-25**				
		Date	25-Aug-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time	11:25	1	13	0.348
		UTM Easting	659261	2	17	0.261
		UTM Northing	5530533	3	14	0.221
		Bankfull Width (m)	15	4	38	0.497
		Wetted Width (m)	10	5	42	0.614
		Total Kick Distance (m)	50			
		Sampling Time (min)	3			
		Full Transect?	Yes			
		# Transects	3			
		Sample ID: RG_LIDSL_R2_2020-08-25				
		Date	25-Aug-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time	15:00	1	13	0.329
		UTM Easting	659292	2	19	0.313
		UTM Northing	5530579	3	22	0.492
		Bankfull Width (m)	13	4	27	0.526
		Wetted Width (m)	11	5	28	0.42
		Total Kick Distance (m)	20			
		Sampling Time (min)	3			
		Full Transect?	Yes			
		# Transects	1			
		Sample ID: RG_LIDSL_R3_2020-08-26				
		Date	26-Aug-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time	8:20	1	20	0.47
		UTM Easting	659315	2	32	0.423
		UTM Northing	5530608	3	28	0.536
		Bankfull Width (m)	15	4	29	0.522
		Wetted Width (m)	12	5	21	0.465
		Total Kick Distance (m)	20			
		Sampling Time (min)	3			
		Full Transect?	Yes			
		# Transects	1			
		Sample ID: RG_LIDSL_R4_2020-08-26				
		Date	26-Aug-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time	9:50	1	19	0.531
		UTM Easting	659337	2	21	0.827
		UTM Northing	5530669	3	29	0.139
		Bankfull Width (m)	16	4	26	0.367
		Wetted Width (m)	14	5	15	0.16
		Total Kick Distance (m)	30			
		Sampling Time (min)	3			
		Full Transect?	Yes			
		# Transects	2			
		Sample ID: RG_LIDSL_R5_2020-08-26				
		Date	26-Aug-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time	10:50	1	11	0.455
		UTM Easting	659357	2	21	0.797
		UTM Northing	5530706	3	28	0.8
		Bankfull Width (m)	16	4	13	0.431
		Wetted Width (m)	14	5	15	0.52
		Total Kick Distance (m)	20			
		Sampling Time (min)	3			
		Full Transect?	Yes			
		# Transects	1			

Table F.13: Supporting Measures Associated with 3-Minute Kick and Sweep Benthic Invertebrate Community Sampling at Line Creek and Fording River, August/September 2020

Waterbody	Biological Area Code	Sample Details				
Mine-exposed (Line Creek)	RG_LIDCOM	**Sample ID: RG_LIDCOM_R1_2020-08-30**				
		Date	30-Aug-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time	15:30	1	28	0.166
		UTM Easting	658175	2	25	0.265
		UTM Northing	5529836	3	22	0.359
		Bankfull Width (m)	15	4	25	0.344
		Wetted Width (m)	14	5	29	0.213
		Total Kick Distance (m)	15			
		Sampling Time (min)	3			
		Full Transect?	No			
		# Transects	0.75			
	RG_LCUT	**Sample ID: RG_LCUT_R1_2020-09-01**				
		Date	1-Sep-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time	12:50	1	17	0.215
		UTM Easting	660113	2	25	0.263
		UTM Northing	5532141	3	23	0.489
		Bankfull Width (m)	16.3	4	25	0.385
		Wetted Width (m)	3.2	5	18	0.2
		Total Kick Distance (m)	21			
		Sampling Time (min)	3			
		Full Transect?	Yes			
		# Transects	7			
	RG_LI8	**Sample ID: RG_LI8_R1_2020-08-30**				
		Date	30-Aug-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time	10:00	1	40	0.706
		UTM Easting	655455	2	33	0.51
		UTM Northing	5528951	3	25	0.385
		Bankfull Width (m)	12	4	16	0.27
		Wetted Width (m)	9	5	18	0.155
		Total Kick Distance (m)	30			
		Sampling Time (min)	3			
		Full Transect?	Yes			
		# Transects	3			
		Sample ID: RG_LI8_R2_2020-08-30				
		Date	30-Aug-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time	11:45	1	19	0.518
		UTM Easting	655495	2	21	0.45
		UTM Northing	5528900	3	19	0.146
		Bankfull Width (m)	21	4	16	0.42
		Wetted Width (m)	11	5	37	0.249
		Total Kick Distance (m)	20			
		Sampling Time (min)	3			
		Full Transect?	Yes			
		# Transects	2			
		Sample ID: RG_LI8_R3_2020-08-30				
		Date	30-Aug-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time	13:30	1	22	0.526
		UTM Easting	655590	2	28	0.425
		UTM Northing	5528828	3	24	0.356
		Bankfull Width (m)	13	4	25	0.585
		Wetted Width (m)	11	5	24	0.183
		Total Kick Distance (m)	20			
		Sampling Time (min)	3			
		Full Transect?	Yes			
		# Transects	1.5			
	RG_LISP24	**Sample ID: RG_LISP24_R1_2020-09-01**				
		Date	1-Sep-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time	17:15	1	24	0.121
		UTM Easting	659674	2	43	0.45
		UTM Northing	5531168	3	42	0.508
		Bankfull Width (m)	19.7	4	29	0.431
		Wetted Width (m)	11.04	5	24	0.412
		Total Kick Distance (m)	20			
		Sampling Time (min)	3			
		Full Transect?	No			
		# Transects	4			

Table F.13: Supporting Measures Associated with 3-Minute Kick and Sweep Benthic Invertebrate Community Sampling at Line Creek and Fording River, August/September 2020

Waterbody	Biological Area Code	Sample Details				
Mine-exposed (Fording River)	RG_FO23	**Sample ID: RG_FO23_R1_2020-08-28**				
		Date	28-Aug-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time	9:15	1	19	0.074
		UTM Easting	652769	2	22	0.234
		UTM Northing	5528294	3	28	0.444
		Bankfull Width (m)	72	4	34	0.684
		Wetted Width (m)	29	5	41	0.588
		Total Kick Distance (m)	14			
		Sampling Time (min)	3			
		Full Transect?	No			
		# Transects	0.75			
		Sample ID: RG_FO23_R2_2020-08-28				
		Date	28-Aug-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time	11:39	1	27	0.692
		UTM Easting	652856	2	34	0.664
		UTM Northing	5528378	3	35	0.795
		Bankfull Width (m)	29	4	28	0.951
		Wetted Width (m)	29	5	21	0.713
		Total Kick Distance (m)	14			
		Sampling Time (min)	3			
		Full Transect?	Yes			
		# Transects	1			
		Sample ID: RG_FO23_R3_2020-08-28				
		Date	28-Aug-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time	14:35	1	23	0.389
		UTM Easting	652950	2	15	0.542
		UTM Northing	5528537	3	19	0.803
		Bankfull Width (m)	30	4	31	0.821
		Wetted Width (m)	27	5	45	0.886
		Total Kick Distance (m)	18			
		Sampling Time (min)	3			
		Full Transect?	No			
		# Transects	2			
		Sample ID: RG_FO23_R4_2020-08-28				
		Date	28-Aug-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time	16:43	1	29	0.586
		UTM Easting	652929	2	30	0.321
		UTM Northing	5528648	3	36	0.353
		Bankfull Width (m)	29	4	38	0.326
		Wetted Width (m)	21	5	50	0.89
		Total Kick Distance (m)	14			
		Sampling Time (min)	3			
		Full Transect?	No			
		# Transects	7			
		Sample ID: RG_FO23_R5_2020-08-28				
		Date	28-Aug-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time	17:40	1	17	0.551
		UTM Easting	652933	2	25	0.696
		UTM Northing	5528766	3	20	0.557
		Bankfull Width (m)	29	4	27	0.451
		Wetted Width (m)	21	5	24	0.394
		Total Kick Distance (m)	12			
		Sampling Time (min)	3			
		Full Transect?	No			
		# Transects	1			
	RG_FRUL	**Sample ID: RG_FRUL_R1_2020-08-29**				
		Date	29-Aug-2020	Replicate	Depth (cm)	Velocity (m/s)
		Time	11:40	1	18	0.283
		UTM Easting	654549	2	22	0.698
		UTM Northing	5530169	3	28	0.574
		Bankfull Width (m)	27	4	45	0.602
		Wetted Width (m)	15	5	55	0.696
		Total Kick Distance (m)	21			
		Sampling Time (min)	3			
		Full Transect?	No			
		# Transects	3			

Table F.14 Habitat Information Associated with Mine-exposed and Reference Areas Sampled during the Benthic Invertebrate Survey, August 2020

Station ID		Mine-exposed RG_FO23	Mine-exposed RG_FRUL	Mine-exposed RG_LCUT	Reference RG_LI24	Mine-exposed RG_LI8	Mine-exposed RG_LIDCOM	Mine-exposed RG_LIDSL	Mine-exposed RG_LILC3	Mine-exposed RG_LISP24	Reference RG_SLINE
Waterbody		Fording River	Fording River	Line Creek	Line Creek	Line Creek	Line Creek	Line Creek	Line Creek	Line Creek	South Line Creek
Date Sampled		2020-08-28	2020-08-29	2020-09-01	2020-08-31	2020-08-30	2020-08-30	2020-08-25	2020-08-27	2020-09-01	2020-08-31
Weather		clear, warm	overcast	partially cloudy	overcast	clear	ear but windy and smok	mostly clear	clear	overcast	cloudy, showers
Air Temperature (°C)		25	20	20	15	10	25	24	10	12	10
Zone 11 UTMs - E		652769	654549	660113	662084	655455	658175	659261	659849	659674	661080
Zone 11 UTMs - N		5528294	5530169	5532141	5538370	5528951	5529836	5530533	5531716	5531168	5531418
Samplers' Initials		KBa, MCa	KBa, MCa	KBa, MCa	KBa, MCa	DH, DK	DH, DK	DH, DK	DH, DK	KBa, MCa	DH, DK
Habitat Characteristics											
Surrounding Land Use		forest, mining	forest, mining	mining	forest, mining	forest, logging	forest, mining	forest, logging	mining	mining	forest, logging
Length of Reach Assessed (m)		100	100	30	30	100	30	100	100	50	100
Substrate	% Bedrock	0	0	0	0	0	0	0	0	0	0
	% Boulder	25	35	15	20	5	5	0	15	30	20
	% Cobble	55	40	40	30	65	70	80	60	55	40
	% Gravel	15	20	30	40	10	10	10	15	10	20
	% Sand	2	5	10	5	10	10	10	10	5	20
	% Fines	3	0	5	5	10	5	0	0	0	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 (%)		0	0	0	1-25	1-25	1-25	0	0	0	1-25
Streamside Vegetation		ferns and grasses	shrubs	shrubs	deciduous trees	ferns and grasses, shrubs, deciduous trees	ferns and grasses, shrubs	ferns and grasses, shrubs, deciduous trees	ferns and grasses, shrubs, deciduous trees	ferns and grasses	ferns and grasses, shrubs, deciduous trees
Dominant Vegetation		Coniferous trees	Coniferous trees	Coniferous trees	Coniferous trees	deciduous trees	Ferns/grass	Coniferous trees	ferns/grass	Coniferous trees	Coniferous trees
Macrophyte Coverage (%)		0	0	0	0	0	0	0	0	0	0
Dominant Macrophyte		-	-	-	-	-	-	-	-	-	-
Periphyton Cover (1-5)		3 - Rocks have noticeable slippery feel, patches of thicker green to brown algae (1-5 mm thick)	2 - Rocks slightly slippery, yellow-brown to light green colour, (0.5-1 mm thick)	3 - Rocks have noticeable slippery feel, patches of thicker green to brown algae (1-5 mm thick)	2 - Rocks slightly slippery, yellow-brown to light green colour, (0.5-1 mm thick)	2 - Rocks slightly slippery, yellow-brown to light green colour, (0.5-1 mm thick)	4 - Rocks are very slippery, numerous clumps (5-20 mm thick)	3 - Rocks have noticeable slippery feel, patches of thicker green to brown algae (1-5 mm thick)	4 - Rocks are very slippery, numerous clumps (5-20 mm thick)	3 - Rocks have noticeable slippery feel, patches of thicker green to brown algae (1-5 mm thick)	2 - Rocks slightly slippery, yellow-brown to light green colour, (0.5-1 mm thick)
Comments		-	-	-	-	-	-	-	man made banks	downstream of AWTF contingency pond	logging nearby; potential dustfall?

Notes: "-" indicates no data available.

APPENDIX G

LAB REPORTS

WATER CHEMISTRY

ALS Laboratory Report L2420788

(Finalized March 4, 2020)

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 25-FEB-20
Report Date: 04-MAR-20 15:23 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2420788

Project P.O. #: VPO00616180
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: REGIONAL EFFECTS
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2420788-1	L2420788-2	L2420788-3	L2420788-4	
	Description	WS	WS	WS	WS	
	Sampled Date	24-FEB-20	24-FEB-20	24-FEB-20	24-FEB-20	
	Sampled Time	10:14	12:30	14:20	17:00	
	Client ID	RG_LIDCOM_WS_20200224-1014	RG_LISP24_WS_20200224-1230	RG_LILC3_WS_20200224-1420	RG_FBLANK_WS_20200224_1700	
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	851	1020	1200	<2.0	
	Hardness (as CaCO3) (mg/L)	498	608	731	<0.50	
	pH (pH)	8.32	8.33	8.25	5.29	
	ORP (mV)	494	397	500	400	
	Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	<1.0	
	Total Dissolved Solids (mg/L)	662 DLHC	806 DLHC	1010 DLHC	<10	
	Turbidity (NTU)	0.15	0.13	0.19	<0.10	
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0	3.0	1.4	
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	184	193	218	<1.0	
	Alkalinity, Carbonate (as CaCO3) (mg/L)	5.2	7.0	<1.0	<1.0	
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	
	Alkalinity, Total (as CaCO3) (mg/L)	189	200	218	<1.0	
	Ammonia as N (mg/L)	<0.0050	<0.0050	<0.0050	0.0225 RRV	
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.25 DLHC	<0.050	
	Chloride (Cl) (mg/L)	16.0	22.4	29.5 DLHC	<0.50	
	Fluoride (F) (mg/L)	0.219	0.219	0.13 DLHC	<0.020	
	Ion Balance (%)	99.7	99.9	97.9	0.0	
	Nitrate (as N) (mg/L)	8.26	10.8	14.7 DLHC	<0.0050	
	Nitrite (as N) (mg/L)	<0.0010	0.0023	<0.0050 DLHC	<0.0010	
	Total Kjeldahl Nitrogen (mg/L)	<0.25 TKNI	<0.25 TKNI	<0.25 TKNI	<0.050	
	Orthophosphate-Dissolved (as P) (mg/L)	0.0020	0.0015	0.0014	<0.0010	
	Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	
	Sulfate (SO4) (mg/L)	265	347	446 DLHC	<0.30	
	Anion Sum (meq/L)	10.3	12.6	15.5	<0.10	
	Cation Sum (meq/L)	10.3	12.6	15.2	<0.10	
	Cation - Anion Balance (%)	-0.1	0.0	-1.1	0.0	
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	0.62	0.69	0.84	<0.50	
	Total Organic Carbon (mg/L)	0.55	0.68	0.80	<0.50	
Total Metals	Aluminum (Al)-Total (mg/L)	<0.0030	<0.0030	0.0031	<0.0030	
	Antimony (Sb)-Total (mg/L)	0.00014	0.00020	0.00027	<0.00010	
	Arsenic (As)-Total (mg/L)	0.00014	0.00014	0.00014	<0.00010	
	Barium (Ba)-Total (mg/L)	0.0895	0.0724	0.0739	<0.00010	
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020	<0.020	
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Boron (B)-Total (mg/L)	0.012	0.014	0.017	<0.010	
	Cadmium (Cd)-Total (ug/L)	0.0708	0.0889	0.135	<0.0050	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2420788-1	L2420788-2	L2420788-3	L2420788-4	
	Description	WS	WS	WS	WS	
	Sampled Date	24-FEB-20	24-FEB-20	24-FEB-20	24-FEB-20	
	Sampled Time	10:14	12:30	14:20	17:00	
	Client ID	RG_LIDCOM_WS_20200224-1014	RG_LISP24_WS_20200224-1230	RG_LILC3_WS_20200224-1420	RG_FBLANK_WS_20200224_1700	
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	126	148	181	<0.050	
	Chromium (Cr)-Total (mg/L)	0.00027	0.00011	0.00011	<0.00010	
	Cobalt (Co)-Total (ug/L)	<0.10	<0.10	0.15	<0.10	
	Copper (Cu)-Total (mg/L)	0.00054	<0.00050	<0.00050	<0.00050	
	Iron (Fe)-Total (mg/L)	<0.010	0.015	0.041	<0.010	
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Lithium (Li)-Total (mg/L)	0.0309	0.0422	0.0565	<0.0010	
	Magnesium (Mg)-Total (mg/L)	53.8	73.1	88.9	<0.10	
	Manganese (Mn)-Total (mg/L)	0.00096	0.0107	0.0288	<0.00010	
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Molybdenum (Mo)-Total (mg/L)	0.00257	0.00403	0.00489	<0.000050	
	Nickel (Ni)-Total (mg/L)	0.00241	0.00476	0.00674	<0.00050	
	Potassium (K)-Total (mg/L)	1.17	1.57	1.91	<0.050	
	Selenium (Se)-Total (ug/L)	32.6	38.6	50.5	<0.050	
	Silicon (Si)-Total (mg/L)	2.24	2.13	2.19	<0.10	
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Total (mg/L)	7.96	10.7	13.7	<0.050	
	Strontium (Sr)-Total (mg/L)	0.250	0.256	0.284	<0.00020	
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Uranium (U)-Total (mg/L)	0.00331	0.00444	0.00533	<0.000010	
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Zinc (Zn)-Total (mg/L)	0.0058	0.0044	0.0046	<0.0030	
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	
	Antimony (Sb)-Dissolved (mg/L)	0.00014	0.00019	0.00026	<0.00010	
	Arsenic (As)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Barium (Ba)-Dissolved (mg/L)	0.0872	0.0693	0.0737	<0.00010	
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020	<0.020	
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Boron (B)-Dissolved (mg/L)	0.011	0.012	0.014	<0.010	
	Cadmium (Cd)-Dissolved (ug/L)	0.0698	0.0902	0.120	<0.0050	
	Calcium (Ca)-Dissolved (mg/L)	115	136	160	<0.050	
	Chromium (Cr)-Dissolved (mg/L)	0.00016	0.00015	0.00012	<0.00010	
	Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10	0.12	<0.10	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2420788-1	L2420788-2	L2420788-3	L2420788-4	
	Description	WS	WS	WS	WS	
	Sampled Date	24-FEB-20	24-FEB-20	24-FEB-20	24-FEB-20	
	Sampled Time	10:14	12:30	14:20	17:00	
	Client ID	RG_LIDCOM_WS_20200224-1014	RG_LISP24_WS_20200224-1230	RG_LILC3_WS_20200224-1420	RG_FBLANK_WS_20200224_1700	
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020	0.00025	0.00029	<0.00020	
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Lithium (Li)-Dissolved (mg/L)	0.0292	0.0400	0.0505	<0.0010	
	Magnesium (Mg)-Dissolved (mg/L)	51.5	65.3	80.3	<0.10	
	Manganese (Mn)-Dissolved (mg/L)	0.00062	0.00895	0.0260	<0.00010	
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
	Molybdenum (Mo)-Dissolved (mg/L)	0.00258	0.00408	0.00486	<0.000050	
	Nickel (Ni)-Dissolved (mg/L)	0.00229	0.00443	0.00642	<0.00050	
	Potassium (K)-Dissolved (mg/L)	1.26	1.65	2.04	<0.050	
	Selenium (Se)-Dissolved (ug/L)	34.9	40.3	50.8	<0.050	
	Silicon (Si)-Dissolved (mg/L)	2.17	2.05	2.01	<0.050	
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Dissolved (mg/L)	7.62	9.95	12.5	<0.050	
	Strontium (Sr)-Dissolved (mg/L)	0.232	0.242	0.268	<0.00020	
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Uranium (U)-Dissolved (mg/L)	0.00332	0.00428	0.00519	<0.000010	
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Zinc (Zn)-Dissolved (mg/L)	0.0030	0.0035	0.0039	<0.0010	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2420788-4
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2420788-4
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2420788-4
Matrix Spike	Potassium (K)-Dissolved	MS-B	L2420788-4
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2420788-4
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2420788-4
Matrix Spike	Uranium (U)-Dissolved	MS-B	L2420788-4
Matrix Spike	Barium (Ba)-Total	MS-B	L2420788-1, -2, -3, -4
Matrix Spike	Calcium (Ca)-Total	MS-B	L2420788-1, -2, -3, -4
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2420788-1, -2, -3, -4
Matrix Spike	Sodium (Na)-Total	MS-B	L2420788-1, -2, -3, -4
Matrix Spike	Strontium (Sr)-Total	MS-B	L2420788-1, -2, -3, -4
Matrix Spike	Uranium (U)-Total	MS-B	L2420788-1, -2, -3, -4

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". 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.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

Reference Information

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-IC-N-CL Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

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 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL Water Oxidation redution potential by elect. ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL Water Phosphorus (P)-Total APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

Reference Information

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL	Water	Orthophosphate-Dissolved (as P)	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL	Water	Total Kjeldahl Nitrogen	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

REGIONAL EFFECTS

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour 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.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5007366								
WG3282133-5 LCS								
Acidity (as CaCO3)			103.6		%		85-115	25-FEB-20
WG3282133-8 LCS								
Acidity (as CaCO3)			103.9		%		85-115	25-FEB-20
WG3282133-4 MB								
Acidity (as CaCO3)			<1.0		mg/L		2	25-FEB-20
WG3282133-7 MB								
Acidity (as CaCO3)			<1.0		mg/L		2	25-FEB-20
ALK-MAN-CL	**Water**							
Batch R5007559								
WG3282166-8 LCS								
Alkalinity, Total (as CaCO3)			100.9		%		85-115	25-FEB-20
WG3282166-7 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	25-FEB-20
BE-D-L-CCMS-VA	**Water**							
Batch R5011370								
WG3282530-2 LCS								
Beryllium (Be)-Dissolved			95.3		%		80-120	28-FEB-20
WG3282530-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	28-FEB-20
BE-T-L-CCMS-VA	**Water**							
Batch R5011112								
WG3283184-3 DUP		**L2420788-1**						
Beryllium (Be)-Total		<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	28-FEB-20
WG3283184-2 LCS								
Beryllium (Be)-Total			99.0		%		80-120	28-FEB-20
WG3283184-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	28-FEB-20
WG3283184-4 MS		**L2420788-2**						
Beryllium (Be)-Total			92.9		%		70-130	28-FEB-20
BR-L-IC-N-CL	**Water**							
Batch R5007847								
WG3282278-10 LCS								
Bromide (Br)			95.7		%		85-115	25-FEB-20
WG3282278-9 MB								
Bromide (Br)			<0.050		mg/L		0.05	25-FEB-20
C-DIS-ORG-LOW-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-LOW-CL	**Water**							
Batch R5011785								
WG3284367-6 LCS								
Dissolved Organic Carbon			100.7		%		80-120	29-FEB-20
WG3284367-5 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	29-FEB-20
C-TOT-ORG-LOW-CL	**Water**							
Batch R5011785								
WG3284367-6 LCS								
Total Organic Carbon			101.2		%		80-120	29-FEB-20
WG3284367-5 MB								
Total Organic Carbon			<0.50		mg/L		0.5	29-FEB-20
CL-IC-N-CL	**Water**							
Batch R5007847								
WG3282278-10 LCS								
Chloride (Cl)			99.8		%		90-110	25-FEB-20
WG3282278-9 MB								
Chloride (Cl)			<0.50		mg/L		0.5	25-FEB-20
EC-L-PCT-CL	**Water**							
Batch R5007559								
WG3282166-8 LCS								
Conductivity (@ 25C)			95.8		%		90-110	25-FEB-20
WG3282166-7 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	25-FEB-20
F-IC-N-CL	**Water**							
Batch R5007847								
WG3282278-10 LCS								
Fluoride (F)			107.2		%		90-110	25-FEB-20
WG3282278-9 MB								
Fluoride (F)			<0.020		mg/L		0.02	25-FEB-20
HG-D-CVAA-VA	**Water**							
Batch R5009194								
WG3282552-6 LCS								
Mercury (Hg)-Dissolved			97.8		%		80-120	27-FEB-20
WG3282552-5 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	27-FEB-20
HG-T-U-CVAF-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-U-CVAF-VA	**Water**							
Batch R5011496								
WG3284100-2 LCS								
Mercury (Hg)-Total			99.2		%		80-120	28-FEB-20
WG3284100-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	28-FEB-20
MET-D-CCMS-VA	**Water**							
Batch R5011370								
WG3282530-2 LCS								
Aluminum (Al)-Dissolved			102.8		%		80-120	28-FEB-20
Antimony (Sb)-Dissolved			101.0		%		80-120	28-FEB-20
Arsenic (As)-Dissolved			98.7		%		80-120	28-FEB-20
Barium (Ba)-Dissolved			101.5		%		80-120	28-FEB-20
Bismuth (Bi)-Dissolved			105.1		%		80-120	28-FEB-20
Boron (B)-Dissolved			96.3		%		80-120	28-FEB-20
Cadmium (Cd)-Dissolved			101.1		%		80-120	28-FEB-20
Calcium (Ca)-Dissolved			98.8		%		80-120	28-FEB-20
Chromium (Cr)-Dissolved			101.6		%		80-120	28-FEB-20
Cobalt (Co)-Dissolved			100.0		%		80-120	28-FEB-20
Copper (Cu)-Dissolved			97.9		%		80-120	28-FEB-20
Iron (Fe)-Dissolved			102.5		%		80-120	28-FEB-20
Lead (Pb)-Dissolved			98.2		%		80-120	28-FEB-20
Lithium (Li)-Dissolved			96.4		%		80-120	28-FEB-20
Magnesium (Mg)-Dissolved			99.2		%		80-120	28-FEB-20
Manganese (Mn)-Dissolved			99.7		%		80-120	28-FEB-20
Molybdenum (Mo)-Dissolved			97.7		%		80-120	28-FEB-20
Nickel (Ni)-Dissolved			99.2		%		80-120	28-FEB-20
Potassium (K)-Dissolved			106.2		%		80-120	28-FEB-20
Selenium (Se)-Dissolved			105.7		%		80-120	28-FEB-20
Silicon (Si)-Dissolved			97.4		%		60-140	28-FEB-20
Silver (Ag)-Dissolved			103.2		%		80-120	28-FEB-20
Sodium (Na)-Dissolved			104.1		%		80-120	28-FEB-20
Strontium (Sr)-Dissolved			98.6		%		80-120	28-FEB-20
Thallium (Tl)-Dissolved			99.2		%		80-120	28-FEB-20
Tin (Sn)-Dissolved			100.0		%		80-120	28-FEB-20
Titanium (Ti)-Dissolved			102.2		%		80-120	28-FEB-20
Uranium (U)-Dissolved			98.2		%		80-120	28-FEB-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5011370								
WG3282530-2 LCS								
Vanadium (V)-Dissolved			101.5		%		80-120	28-FEB-20
Zinc (Zn)-Dissolved			95.5		%		80-120	28-FEB-20
WG3282530-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	28-FEB-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	28-FEB-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	28-FEB-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	28-FEB-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	28-FEB-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	28-FEB-20
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	28-FEB-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	28-FEB-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	28-FEB-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	28-FEB-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	28-FEB-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	28-FEB-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	28-FEB-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	28-FEB-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	28-FEB-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	28-FEB-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	28-FEB-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	28-FEB-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	28-FEB-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	28-FEB-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	28-FEB-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	28-FEB-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	28-FEB-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	28-FEB-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	28-FEB-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	28-FEB-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	28-FEB-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	28-FEB-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	28-FEB-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	28-FEB-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5011522								
WG3284151-2 LCS								
Aluminum (Al)-Dissolved			105.7		%		80-120	28-FEB-20
Antimony (Sb)-Dissolved			105.1		%		80-120	28-FEB-20
Arsenic (As)-Dissolved			102.7		%		80-120	28-FEB-20
Barium (Ba)-Dissolved			101.5		%		80-120	28-FEB-20
Bismuth (Bi)-Dissolved			105.0		%		80-120	28-FEB-20
Boron (B)-Dissolved			105.2		%		80-120	28-FEB-20
Cadmium (Cd)-Dissolved			100.4		%		80-120	28-FEB-20
Calcium (Ca)-Dissolved			100.4		%		80-120	28-FEB-20
Chromium (Cr)-Dissolved			102.7		%		80-120	28-FEB-20
Cobalt (Co)-Dissolved			103.0		%		80-120	28-FEB-20
Copper (Cu)-Dissolved			100.0		%		80-120	28-FEB-20
Iron (Fe)-Dissolved			102.8		%		80-120	28-FEB-20
Lead (Pb)-Dissolved			101.1		%		80-120	28-FEB-20
Lithium (Li)-Dissolved			104.3		%		80-120	28-FEB-20
Magnesium (Mg)-Dissolved			103.8		%		80-120	28-FEB-20
Manganese (Mn)-Dissolved			104.6		%		80-120	28-FEB-20
Molybdenum (Mo)-Dissolved			101.0		%		80-120	28-FEB-20
Nickel (Ni)-Dissolved			101.7		%		80-120	28-FEB-20
Potassium (K)-Dissolved			107.7		%		80-120	28-FEB-20
Selenium (Se)-Dissolved			103.7		%		80-120	28-FEB-20
Silicon (Si)-Dissolved			104.1		%		60-140	28-FEB-20
Silver (Ag)-Dissolved			103.5		%		80-120	28-FEB-20
Sodium (Na)-Dissolved			110.6		%		80-120	28-FEB-20
Strontium (Sr)-Dissolved			101.8		%		80-120	28-FEB-20
Thallium (Tl)-Dissolved			100.6		%		80-120	28-FEB-20
Tin (Sn)-Dissolved			103.5		%		80-120	28-FEB-20
Titanium (Ti)-Dissolved			104.7		%		80-120	28-FEB-20
Uranium (U)-Dissolved			99.7		%		80-120	28-FEB-20
Vanadium (V)-Dissolved			104.2		%		80-120	28-FEB-20
Zinc (Zn)-Dissolved			97.7		%		80-120	28-FEB-20
WG3284151-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	28-FEB-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	28-FEB-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	28-FEB-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5011522								
WG3284151-1 MB		**NP**						
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	28-FEB-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	28-FEB-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	28-FEB-20
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	28-FEB-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	28-FEB-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	28-FEB-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	28-FEB-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	28-FEB-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	28-FEB-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	28-FEB-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	28-FEB-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	28-FEB-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	28-FEB-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	28-FEB-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	28-FEB-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	28-FEB-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	28-FEB-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	28-FEB-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	28-FEB-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	28-FEB-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	28-FEB-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	28-FEB-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	28-FEB-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	28-FEB-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	28-FEB-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	28-FEB-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	28-FEB-20
MET-T-CCMS-VA	**Water**							
Batch R5011112								
WG3283184-3 DUP		**L2420788-1**						
Aluminum (Al)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	28-FEB-20
Antimony (Sb)-Total		0.00014	0.00014		mg/L	2.5	20	28-FEB-20
Arsenic (As)-Total		0.00014	0.00011	J	mg/L	0.00003	0.0002	28-FEB-20
Barium (Ba)-Total		0.0895	0.0951		mg/L	6.0	20	28-FEB-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5011112								
WG3283184-3 DUP		**L2420788-1**						
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	28-FEB-20
Boron (B)-Total		0.012	0.013		mg/L	2.0	20	28-FEB-20
Cadmium (Cd)-Total		0.0000708	0.0000767		mg/L	8.0	20	28-FEB-20
Calcium (Ca)-Total		126	130		mg/L	3.0	20	28-FEB-20
Chromium (Cr)-Total		0.00027	0.00022		mg/L	19	20	28-FEB-20
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-FEB-20
Copper (Cu)-Total		0.00054	<0.00050	RPD-NA	mg/L	N/A	20	28-FEB-20
Iron (Fe)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	28-FEB-20
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	28-FEB-20
Lithium (Li)-Total		0.0309	0.0312		mg/L	0.9	20	28-FEB-20
Magnesium (Mg)-Total		53.8	54.4		mg/L	1.0	20	28-FEB-20
Manganese (Mn)-Total		0.00096	0.00111		mg/L	14	20	28-FEB-20
Molybdenum (Mo)-Total		0.00257	0.00269		mg/L	4.3	20	28-FEB-20
Nickel (Ni)-Total		0.00241	0.00247		mg/L	2.5	20	28-FEB-20
Potassium (K)-Total		1.17	1.18		mg/L	0.9	20	28-FEB-20
Selenium (Se)-Total		0.0326	0.0327		mg/L	0.3	20	28-FEB-20
Silicon (Si)-Total		2.24	2.28		mg/L	1.8	20	28-FEB-20
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	28-FEB-20
Sodium (Na)-Total		7.96	7.96		mg/L	0.0	20	28-FEB-20
Strontium (Sr)-Total		0.250	0.253		mg/L	1.2	20	28-FEB-20
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	28-FEB-20
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-FEB-20
Titanium (Ti)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	28-FEB-20
Uranium (U)-Total		0.00331	0.00338		mg/L	2.3	20	28-FEB-20
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	28-FEB-20
Zinc (Zn)-Total		0.0058	0.0058		mg/L	0.4	20	28-FEB-20
WG3283184-2 LCS								
Aluminum (Al)-Total			106.1		%		80-120	28-FEB-20
Antimony (Sb)-Total			101.1		%		80-120	28-FEB-20
Arsenic (As)-Total			102.2		%		80-120	28-FEB-20
Barium (Ba)-Total			101.3		%		80-120	28-FEB-20
Bismuth (Bi)-Total			112.9		%		80-120	28-FEB-20
Boron (B)-Total			102.7		%		80-120	28-FEB-20
Cadmium (Cd)-Total			100.2		%		80-120	28-FEB-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5011112								
WG3283184-2 LCS								
Calcium (Ca)-Total			99.5		%		80-120	28-FEB-20
Chromium (Cr)-Total			100.4		%		80-120	28-FEB-20
Cobalt (Co)-Total			99.7		%		80-120	28-FEB-20
Copper (Cu)-Total			97.8		%		80-120	28-FEB-20
Iron (Fe)-Total			105.7		%		80-120	28-FEB-20
Lead (Pb)-Total			101.0		%		80-120	28-FEB-20
Lithium (Li)-Total			99.3		%		80-120	28-FEB-20
Magnesium (Mg)-Total			97.2		%		80-120	28-FEB-20
Manganese (Mn)-Total			100.6		%		80-120	28-FEB-20
Molybdenum (Mo)-Total			96.1		%		80-120	28-FEB-20
Nickel (Ni)-Total			96.9		%		80-120	28-FEB-20
Potassium (K)-Total			101.8		%		80-120	28-FEB-20
Selenium (Se)-Total			96.2		%		80-120	28-FEB-20
Silicon (Si)-Total			104.9		%		80-120	28-FEB-20
Silver (Ag)-Total			97.4		%		80-120	28-FEB-20
Sodium (Na)-Total			106.6		%		80-120	28-FEB-20
Strontium (Sr)-Total			99.3		%		80-120	28-FEB-20
Thallium (Tl)-Total			98.4		%		80-120	28-FEB-20
Tin (Sn)-Total			97.7		%		80-120	28-FEB-20
Titanium (Ti)-Total			91.4		%		80-120	28-FEB-20
Uranium (U)-Total			100.6		%		80-120	28-FEB-20
Vanadium (V)-Total			101.3		%		80-120	28-FEB-20
Zinc (Zn)-Total			88.6		%		80-120	28-FEB-20
WG3283184-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	28-FEB-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	28-FEB-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	28-FEB-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	28-FEB-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	28-FEB-20
Boron (B)-Total			<0.010		mg/L		0.01	28-FEB-20
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	28-FEB-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	28-FEB-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	28-FEB-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	28-FEB-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5011112								
WG3283184-1 MB								
Copper (Cu)-Total			<0.00050		mg/L		0.0005	28-FEB-20
Iron (Fe)-Total			<0.010		mg/L		0.01	28-FEB-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	28-FEB-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	28-FEB-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	28-FEB-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	28-FEB-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	28-FEB-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	28-FEB-20
Potassium (K)-Total			<0.050		mg/L		0.05	28-FEB-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	28-FEB-20
Silicon (Si)-Total			<0.10		mg/L		0.1	28-FEB-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	28-FEB-20
Sodium (Na)-Total			<0.050		mg/L		0.05	28-FEB-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	28-FEB-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	28-FEB-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	28-FEB-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	28-FEB-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	28-FEB-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	28-FEB-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	28-FEB-20
WG3283184-4 MS		**L2420788-2**						
Aluminum (Al)-Total			100.5		%		70-130	28-FEB-20
Antimony (Sb)-Total			94.8		%		70-130	28-FEB-20
Arsenic (As)-Total			104.3		%		70-130	28-FEB-20
Barium (Ba)-Total			N/A	MS-B	%		-	28-FEB-20
Bismuth (Bi)-Total			88.8		%		70-130	28-FEB-20
Boron (B)-Total			97.0		%		70-130	28-FEB-20
Cadmium (Cd)-Total			102.8		%		70-130	28-FEB-20
Calcium (Ca)-Total			N/A	MS-B	%		-	28-FEB-20
Chromium (Cr)-Total			101.7		%		70-130	28-FEB-20
Cobalt (Co)-Total			97.4		%		70-130	28-FEB-20
Copper (Cu)-Total			94.6		%		70-130	28-FEB-20
Iron (Fe)-Total			100.7		%		70-130	28-FEB-20
Lead (Pb)-Total			91.0		%		70-130	28-FEB-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5011112								
WG3283184-4 MS		**L2420788-2**						
Lithium (Li)-Total			99.8		%		70-130	28-FEB-20
Magnesium (Mg)-Total			N/A	MS-B	%		-	28-FEB-20
Manganese (Mn)-Total			104.0		%		70-130	28-FEB-20
Molybdenum (Mo)-Total			93.6		%		70-130	28-FEB-20
Nickel (Ni)-Total			93.8		%		70-130	28-FEB-20
Potassium (K)-Total			113.6		%		70-130	28-FEB-20
Selenium (Se)-Total			100.7		%		70-130	28-FEB-20
Silicon (Si)-Total			95.4		%		70-130	28-FEB-20
Silver (Ag)-Total			91.8		%		70-130	28-FEB-20
Sodium (Na)-Total			N/A	MS-B	%		-	28-FEB-20
Strontium (Sr)-Total			N/A	MS-B	%		-	28-FEB-20
Thallium (Tl)-Total			91.2		%		70-130	28-FEB-20
Tin (Sn)-Total			96.2		%		70-130	28-FEB-20
Titanium (Ti)-Total			101.5		%		70-130	28-FEB-20
Uranium (U)-Total			N/A	MS-B	%		-	28-FEB-20
Vanadium (V)-Total			103.0		%		70-130	28-FEB-20
Zinc (Zn)-Total			92.3		%		70-130	28-FEB-20
NH3-L-F-CL	**Water**							
Batch R5010147								
WG3282406-34 LCS								
Ammonia as N			103.6		%		85-115	26-FEB-20
WG3282406-33 MB								
Ammonia as N			<0.0050		mg/L		0.005	26-FEB-20
NO2-L-IC-N-CL	**Water**							
Batch R5007847								
WG3282278-10 LCS								
Nitrite (as N)			101.0		%		90-110	25-FEB-20
WG3282278-9 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	25-FEB-20
NO3-L-IC-N-CL	**Water**							
Batch R5007847								
WG3282278-10 LCS								
Nitrate (as N)			105.6		%		90-110	25-FEB-20
WG3282278-9 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	25-FEB-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ORP-CL	**Water**							
Batch R5012746								
WG3285369-1 CRM		**CL-ORP**						
ORP			223		mV		210-230	29-FEB-20
Batch R5013929								
WG3285836-3 CRM		**CL-ORP**						
ORP			221		mV		210-230	03-MAR-20
P-T-L-COL-CL	**Water**							
Batch R5007590								
WG3282018-10 LCS								
Phosphorus (P)-Total			100.6		%		80-120	26-FEB-20
WG3282018-9 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	26-FEB-20
PH-CL	**Water**							
Batch R5007559								
WG3282166-8 LCS								
pH			7.06		pH		6.9-7.1	25-FEB-20
PO4-DO-L-COL-CL	**Water**							
Batch R5006027								
WG3281522-11 DUP		**L2420788-2**						
Orthophosphate-Dissolved (as P)		0.0015	0.0016		mg/L	6.5	20	25-FEB-20
WG3281522-10 LCS								
Orthophosphate-Dissolved (as P)			107.0		%		80-120	25-FEB-20
WG3281522-9 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	25-FEB-20
SO4-IC-N-CL	**Water**							
Batch R5007847								
WG3282278-10 LCS								
Sulfate (SO4)			100.9		%		90-110	25-FEB-20
WG3282278-9 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	25-FEB-20
SOLIDS-TDS-CL	**Water**							
Batch R5011295								
WG3282720-9 DUP		**L2420788-2**						
Total Dissolved Solids		806	801		mg/L	0.6	20	27-FEB-20
WG3282720-5 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-CL	**Water**							
Batch R5011295								
WG3282720-5 LCS								
Total Dissolved Solids			103.6		%		85-115	27-FEB-20
WG3282720-8 LCS								
Total Dissolved Solids			102.0		%		85-115	27-FEB-20
WG3282720-4 MB								
Total Dissolved Solids			<10		mg/L		10	27-FEB-20
WG3282720-7 MB								
Total Dissolved Solids			<10		mg/L		10	27-FEB-20
TKN-L-F-CL	**Water**							
Batch R5011319								
WG3283713-3 DUP		**L2420788-4**						
Total Kjeldahl Nitrogen		<0.050	<0.050	RPD-NA	mg/L	N/A	20	28-FEB-20
WG3283713-2 LCS								
Total Kjeldahl Nitrogen			89.3		%		75-125	28-FEB-20
WG3283713-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	28-FEB-20
WG3283713-4 MS		**L2420788-4**						
Total Kjeldahl Nitrogen			102.5		%		70-130	28-FEB-20
TSS-L-CL	**Water**							
Batch R5011232								
WG3282888-5 LCS								
Total Suspended Solids			97.8		%		85-115	27-FEB-20
WG3282888-8 LCS								
Total Suspended Solids			97.6		%		85-115	27-FEB-20
WG3282888-4 MB								
Total Suspended Solids			<1.0		mg/L		1	27-FEB-20
WG3282888-7 MB								
Total Suspended Solids			<1.0		mg/L		1	27-FEB-20
TURBIDITY-CL	**Water**							
Batch R5010697								
WG3283203-9 DUP		**L2420788-4**						
Turbidity		<0.10	<0.10	RPD-NA	NTU	N/A	15	27-FEB-20
WG3283203-5 LCS								
Turbidity			103.0		%		85-115	27-FEB-20
WG3283203-8 LCS								
Turbidity			103.5		%		85-115	27-FEB-20
WG3283203-4 MB								
Turbidity			<0.10		NTU		0.1	27-FEB-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TURBIDITY-CL	**Water**							
Batch R5010697								
WG3283203-7 MB								
Turbidity			<0.10		NTU		0.1	27-FEB-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	24-FEB-20 10:14	29-FEB-20 15:00	0.25	125	hours	EHTR-FM
	2	24-FEB-20 12:30	29-FEB-20 15:00	0.25	122	hours	EHTR-FM
	3	24-FEB-20 14:20	29-FEB-20 15:00	0.25	121	hours	EHTR-FM
	4	24-FEB-20 17:00	03-MAR-20 08:30	0.25	184	hours	EHTR-FM
pH							
	1	24-FEB-20 10:14	25-FEB-20 15:00	0.25	29	hours	EHTR-FM
	2	24-FEB-20 12:30	25-FEB-20 15:00	0.25	26	hours	EHTR-FM
	3	24-FEB-20 14:20	25-FEB-20 15:00	0.25	25	hours	EHTR-FM
	4	24-FEB-20 17:00	25-FEB-20 15:00	0.25	22	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2420788 were received on 25-FEB-20 08:40.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes 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 pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID: Regional Effects Program | TURNAROUND TIME: Regular

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	Cait Good			Lab Contact	Lyuda Shvets			Email 1:	cait.good@teck.com	X	X	X
Email	cait.good@teck.com			Email	Lyudmyla.Shvets@ALSGlobal.com			Email 2:	carlie.meyer@teck.com	X	X	X
Address	421 Pine Avenue			Address	2559 29 Street NE			Email 3:		X	X	X
								Email 4:	teckcoal@equisonline.com			X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:	kbatchelar@minnow.ca	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada					
Phone Number	250-425-8202			Phone Number	403-407-1800			PO number	VPO00616180			

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.	HG-T-U-CVAF-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-D-CVAF-VA	TECKCOAL-MET-D-VA	TECKCOAL-MET-T-VA	TECKCOAL-ROUTINE-VA				
FIL								N	N	N	N	N	N	N				
PRESERV								NONE	NONE	H2SO4	NONE	NONE	HNO3	NONE				
RG_LIDCOM_WS_20200224_1014	RG_LIDCOM	WS	No	24-Feb-20	10:14:00 AM	G	7	1	1	1	1	1	1	1				
RG_LISP24_WS_20200224_1230	RG_LISP24	WS	No	24-Feb-20	12:30:00 PM	G	7	1	1	1	1	1	1	1				
RG_LILC3_WS_20200224_1420	RG_LILC3	WS	No	24-Feb-20	2:20:00 PM	G	7	1	1	1	1	1	1	1				
RG_FBLANK_WS_20200224_1700	RG_FBLANK	WS	No	24-Feb-20	5:00:00 PM	G	7	1	1	1	1	1	1	1				
		WS	No			G												
		WS	No			G												
		WS	No			G												
		WS	No			G												
		WS	No			G												
		WS	No			G												

L2420788-COFC

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME

Regular (default) X	Sampler's Name	Mia Otto	Mobile #	250-464-9531	
Priority (2-3 business days) - 50% surcharge					
Emergency (1 Business Day) - 100% surcharge	Sampler's Signature		Date/Time	February 24, 2020	
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

DK 2/25 08:40

1°C

WATER CHEMISTRY

ALS Laboratory Report L2421373

(Finalized March 4, 2020)

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 26-FEB-20
Report Date: 04-MAR-20 16:45 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2421373

Project P.O. #: VPO00616180
Job Reference: Regional Effects Program
C of C Numbers: Regional Effects
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2421373-1	L2421373-2	L2421373-3		
	Description	WS	WS	WS		
	Sampled Date	25-FEB-20	25-FEB-20	25-FEB-20		
	Sampled Time	10:30	12:30	14:35		
	Client ID	RG_FRUL_WS_20200225-1030	RG_FO23_WS_20200225-1230	RG_LI8_WS_20200225-1435		
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	775	761	795		
	Hardness (as CaCO3) (mg/L)	448	441	437		
	pH (pH)	8.29	8.33	8.38		
	ORP (mV)	453	355	333		
	Total Suspended Solids (mg/L)	1.3	2.5	1.0		
	Total Dissolved Solids (mg/L)	570	549	582		
	Turbidity (NTU)	0.13	0.41	0.23		
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0	<1.0		
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	200	192	168		
	Alkalinity, Carbonate (as CaCO3) (mg/L)	2.2	3.8	8.6		
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0		
	Alkalinity, Total (as CaCO3) (mg/L)	203	196	176		
	Ammonia as N (mg/L)	<0.0050	<0.0050	<0.0050		
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050		
	Chloride (Cl) (mg/L)	1.93	4.97	14.3		
	Fluoride (F) (mg/L)	0.112	0.131	0.259		
	Ion Balance (%)	99.7	99.8	98.0		
	Nitrate (as N) (mg/L)	11.4	9.88	6.96		
	Nitrite (as N) (mg/L)	0.0022	0.0026	0.0020		
	Total Kjeldahl Nitrogen (mg/L)	<0.050	<0.25 TKNI	<0.050		
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	0.0016		
	Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020	<0.0020		
	Sulfate (SO4) (mg/L)	202	204	231		
	Anion Sum (meq/L)	9.12	9.01	9.24		
	Cation Sum (meq/L)	9.09	8.99	9.06		
	Cation - Anion Balance (%)	-0.2	-0.1	-1.0		
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.15	1.08	0.96		
	Total Organic Carbon (mg/L)	1.23	0.97	0.91		
Total Metals	Aluminum (Al)-Total (mg/L)	0.0044	0.0057	<0.0030		
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	0.00015		
	Arsenic (As)-Total (mg/L)	0.00010	<0.00010	0.00010		
	Barium (Ba)-Total (mg/L)	0.104	0.0962	0.0800		
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020		
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050		
	Boron (B)-Total (mg/L)	<0.010	<0.010	0.011		
	Cadmium (Cd)-Total (ug/L)	0.0105	0.0235	0.0605		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2421373-1	L2421373-2	L2421373-3		
	Description	WS	WS	WS		
	Sampled Date	25-FEB-20	25-FEB-20	25-FEB-20		
	Sampled Time	10:30	12:30	14:35		
	Client ID	RG_FRUL_WS_20200225-1030	RG_FO23_WS_20200225-1230	RG_LI8_WS_20200225-1435		
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	108	102	110		
	Chromium (Cr)-Total (mg/L)	0.00013	0.00012	0.00018		
	Cobalt (Co)-Total (ug/L)	<0.10	<0.10	<0.10		
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050		
	Iron (Fe)-Total (mg/L)	0.011	<0.010	<0.010		
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050		
	Lithium (Li)-Total (mg/L)	0.0171	0.0181	0.0270		
	Magnesium (Mg)-Total (mg/L)	48.6	44.3	47.3		
	Manganese (Mn)-Total (mg/L)	0.00076	0.00094	0.00046		
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	<0.00050		
	Molybdenum (Mo)-Total (mg/L)	0.000939	0.00121	0.00263		
	Nickel (Ni)-Total (mg/L)	<0.00050	0.00068	0.00193		
	Potassium (K)-Total (mg/L)	1.15	1.07	1.07		
	Selenium (Se)-Total (ug/L)	49.8	43.5	29.0		
	Silicon (Si)-Total (mg/L)	2.43	2.32	2.32		
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Total (mg/L)	2.46	3.61	6.84		
	Strontium (Sr)-Total (mg/L)	0.167	0.191	0.234		
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Total (mg/L)	0.00215	0.00235	0.00315		
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050		
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030		
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD		
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD		
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030		
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	0.00011		
	Arsenic (As)-Dissolved (mg/L)	<0.00010	<0.00010	0.00011		
	Barium (Ba)-Dissolved (mg/L)	0.102	0.0972	0.0792		
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020		
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Cadmium (Cd)-Dissolved (ug/L)	0.0099	0.0101	0.0311		
	Calcium (Ca)-Dissolved (mg/L)	106	103	103		
	Chromium (Cr)-Dissolved (mg/L)	0.00010	0.00016	0.00014		
	Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10	<0.10		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2421373-1	L2421373-2	L2421373-3		
	Description	WS	WS	WS		
	Sampled Date	25-FEB-20	25-FEB-20	25-FEB-20		
	Sampled Time	10:30	12:30	14:35		
	Client ID	RG_FRUL_WS_20200225-1030	RG_FO23_WS_20200225-1230	RG_LI8_WS_20200225-1435		
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	0.00041	0.00045	0.00038		
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Lithium (Li)-Dissolved (mg/L)	0.0153	0.0168	0.0230		
	Magnesium (Mg)-Dissolved (mg/L)	44.6	44.7	44.0		
	Manganese (Mn)-Dissolved (mg/L)	0.00013	0.00023	0.00024		
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050		
	Molybdenum (Mo)-Dissolved (mg/L)	0.000785	0.00114	0.00243		
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	0.00066	0.00185		
	Potassium (K)-Dissolved (mg/L)	1.06	1.02	1.01		
	Selenium (Se)-Dissolved (ug/L)	56.3	48.5	33.8		
	Silicon (Si)-Dissolved (mg/L)	2.20	2.15	2.16		
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Dissolved (mg/L)	2.54	3.81	6.89		
	Strontium (Sr)-Dissolved (mg/L)	0.162	0.180	0.229		
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	0.00010		
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Dissolved (mg/L)	0.00212	0.00235	0.00313		
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Zinc (Zn)-Dissolved (mg/L)	0.0024	0.0010	0.0021		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2421373-1, -2, -3
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2421373-1, -2, -3
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2421373-1, -2, -3
Matrix Spike	Selenium (Se)-Dissolved	MS-B	L2421373-1, -2, -3
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2421373-1, -2, -3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2421373-1, -2, -3
Matrix Spike	Barium (Ba)-Total	MS-B	L2421373-1, -2, -3
Matrix Spike	Boron (B)-Total	MS-B	L2421373-1, -2, -3
Matrix Spike	Calcium (Ca)-Total	MS-B	L2421373-1, -2, -3
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2421373-1, -2, -3
Matrix Spike	Manganese (Mn)-Total	MS-B	L2421373-1, -2, -3
Matrix Spike	Potassium (K)-Total	MS-B	L2421373-1, -2, -3
Matrix Spike	Sodium (Na)-Total	MS-B	L2421373-1, -2, -3
Matrix Spike	Strontium (Sr)-Total	MS-B	L2421373-1, -2, -3
Matrix Spike	Nitrate (as N)	MS-B	L2421373-1, -2, -3
Matrix Spike	Sulfate (SO4)	MS-B	L2421373-1, -2, -3

Qualifiers for Individual Parameters Listed:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". 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.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon

Reference Information

and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-IC-N-CL Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

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 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL Water Oxidation redution potential by elect. ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

Reference Information

P-T-L-COL-CL	Water	Phosphorus (P)-Total	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL	Water	Orthophosphate-Dissolved (as P)	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL	Water	Total Kjeldahl Nitrogen	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Regional Effects

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour 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.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5009766								
WG3282943-11 LCS								
Acidity (as CaCO3)			104.2		%		85-115	26-FEB-20
WG3282943-10 MB								
Acidity (as CaCO3)			1.0		mg/L		2	26-FEB-20
ALK-MAN-CL	**Water**							
Batch R5011266								
WG3283835-2 LCS								
Alkalinity, Total (as CaCO3)			98.6		%		85-115	27-FEB-20
WG3283835-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	27-FEB-20
BE-D-L-CCMS-VA	**Water**							
Batch R5011886								
WG3284108-2 LCS								
Beryllium (Be)-Dissolved			90.9		%		80-120	28-FEB-20
WG3284108-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	28-FEB-20
BE-T-L-CCMS-VA	**Water**							
Batch R5012114								
WG3284043-2 LCS								
Beryllium (Be)-Total			100.4		%		80-120	01-MAR-20
WG3284043-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	01-MAR-20
BR-L-IC-N-CL	**Water**							
Batch R5014266								
WG3285925-7 DUP		**L2421373-3**						
Bromide (Br)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	26-FEB-20
WG3285925-6 LCS								
Bromide (Br)			103.2		%		85-115	26-FEB-20
WG3285925-5 MB								
Bromide (Br)			<0.050		mg/L		0.05	26-FEB-20
WG3285925-8 MS		**L2421373-3**						
Bromide (Br)			95.1		%		75-125	26-FEB-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5011785								
WG3284367-14 LCS								
Dissolved Organic Carbon			101.0		%		80-120	29-FEB-20
WG3284367-13 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-LOW-CL	**Water**							
Batch R5011785								
WG3284367-13 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	29-FEB-20
C-TOT-ORG-LOW-CL	**Water**							
Batch R5011785								
WG3284367-14 LCS								
Total Organic Carbon			100.3		%		80-120	29-FEB-20
WG3284367-13 MB								
Total Organic Carbon			<0.50		mg/L		0.5	29-FEB-20
CL-IC-N-CL	**Water**							
Batch R5014266								
WG3285925-7 DUP		**L2421373-3**						
Chloride (Cl)		14.3	14.3		mg/L	0.2	20	26-FEB-20
WG3285925-6 LCS								
Chloride (Cl)			100.8		%		90-110	26-FEB-20
WG3285925-5 MB								
Chloride (Cl)			<0.50		mg/L		0.5	26-FEB-20
WG3285925-8 MS		**L2421373-3**						
Chloride (Cl)			104.1		%		75-125	26-FEB-20
EC-L-PCT-CL	**Water**							
Batch R5011266								
WG3283835-2 LCS								
Conductivity (@ 25C)			98.6		%		90-110	27-FEB-20
WG3283835-1 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	27-FEB-20
F-IC-N-CL	**Water**							
Batch R5014266								
WG3285925-7 DUP		**L2421373-3**						
Fluoride (F)		0.259	0.257		mg/L	1.0	20	26-FEB-20
WG3285925-6 LCS								
Fluoride (F)			101.8		%		90-110	26-FEB-20
WG3285925-5 MB								
Fluoride (F)			<0.020		mg/L		0.02	26-FEB-20
WG3285925-8 MS		**L2421373-3**						
Fluoride (F)			104.7		%		75-125	26-FEB-20
HG-D-CVAA-VA	**Water**							

Quality Control Report

Workorder: L2421373 Report Date: 04-MAR-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-CVAA-VA	**Water**							
Batch R5012397								
WG3284864-6 LCS								
Mercury (Hg)-Dissolved			98.4		%		80-120	02-MAR-20
WG3284864-5 MB								
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	02-MAR-20
HG-T-U-CVAF-VA	**Water**							
Batch R5012448								
WG3285164-2 LCS								
Mercury (Hg)-Total			94.0		%		80-120	02-MAR-20
WG3285164-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	02-MAR-20
MET-D-CCMS-VA	**Water**							
Batch R5011886								
WG3284108-2 LCS								
Aluminum (Al)-Dissolved			97.8		%		80-120	28-FEB-20
Antimony (Sb)-Dissolved			100.1		%		80-120	28-FEB-20
Arsenic (As)-Dissolved			100.6		%		80-120	28-FEB-20
Barium (Ba)-Dissolved			101.5		%		80-120	28-FEB-20
Bismuth (Bi)-Dissolved			101.9		%		80-120	28-FEB-20
Boron (B)-Dissolved			93.4		%		80-120	28-FEB-20
Cadmium (Cd)-Dissolved			99.8		%		80-120	28-FEB-20
Calcium (Ca)-Dissolved			98.1		%		80-120	28-FEB-20
Chromium (Cr)-Dissolved			99.98		%		80-120	28-FEB-20
Cobalt (Co)-Dissolved			99.9		%		80-120	28-FEB-20
Copper (Cu)-Dissolved			97.2		%		80-120	28-FEB-20
Iron (Fe)-Dissolved			88.4		%		80-120	28-FEB-20
Lead (Pb)-Dissolved			101.1		%		80-120	28-FEB-20
Lithium (Li)-Dissolved			87.2		%		80-120	28-FEB-20
Magnesium (Mg)-Dissolved			93.1		%		80-120	28-FEB-20
Manganese (Mn)-Dissolved			97.7		%		80-120	28-FEB-20
Molybdenum (Mo)-Dissolved			97.1		%		80-120	28-FEB-20
Nickel (Ni)-Dissolved			99.95		%		80-120	28-FEB-20
Potassium (K)-Dissolved			96.3		%		80-120	28-FEB-20
Selenium (Se)-Dissolved			102.4		%		80-120	28-FEB-20
Silicon (Si)-Dissolved			100.4		%		60-140	28-FEB-20
Silver (Ag)-Dissolved			97.0		%		80-120	28-FEB-20
Sodium (Na)-Dissolved			104.1		%		80-120	28-FEB-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5011886								
WG3284108-2 LCS								
Strontium (Sr)-Dissolved			96.9		%		80-120	28-FEB-20
Thallium (Tl)-Dissolved			102.9		%		80-120	28-FEB-20
Tin (Sn)-Dissolved			98.7		%		80-120	28-FEB-20
Titanium (Ti)-Dissolved			99.5		%		80-120	28-FEB-20
Uranium (U)-Dissolved			99.8		%		80-120	28-FEB-20
Vanadium (V)-Dissolved			98.8		%		80-120	28-FEB-20
Zinc (Zn)-Dissolved			97.8		%		80-120	28-FEB-20
WG3284108-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	28-FEB-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	28-FEB-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	28-FEB-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	28-FEB-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	28-FEB-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	28-FEB-20
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	28-FEB-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	28-FEB-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	28-FEB-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	28-FEB-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	28-FEB-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	28-FEB-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	28-FEB-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	28-FEB-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	28-FEB-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	28-FEB-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	28-FEB-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	28-FEB-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	28-FEB-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	28-FEB-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	28-FEB-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	28-FEB-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	28-FEB-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	28-FEB-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	28-FEB-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	28-FEB-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5011886								
WG3284108-1 MB		**NP**						
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	28-FEB-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	28-FEB-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	28-FEB-20
Batch R5012438								
WG3284108-1 MB		**NP**						
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	02-MAR-20
MET-T-CCMS-VA	**Water**							
Batch R5012114								
WG3284043-2 LCS								
Aluminum (Al)-Total			106.7		%		80-120	01-MAR-20
Antimony (Sb)-Total			110.6		%		80-120	01-MAR-20
Arsenic (As)-Total			104.6		%		80-120	01-MAR-20
Barium (Ba)-Total			103.5		%		80-120	01-MAR-20
Bismuth (Bi)-Total			106.4		%		80-120	01-MAR-20
Boron (B)-Total			104.4		%		80-120	01-MAR-20
Cadmium (Cd)-Total			104.9		%		80-120	01-MAR-20
Calcium (Ca)-Total			103.7		%		80-120	01-MAR-20
Chromium (Cr)-Total			107.8		%		80-120	01-MAR-20
Cobalt (Co)-Total			104.3		%		80-120	01-MAR-20
Copper (Cu)-Total			108.1		%		80-120	01-MAR-20
Iron (Fe)-Total			96.5		%		80-120	01-MAR-20
Lead (Pb)-Total			110.9		%		80-120	01-MAR-20
Lithium (Li)-Total			101.2		%		80-120	01-MAR-20
Magnesium (Mg)-Total			104.2		%		80-120	01-MAR-20
Manganese (Mn)-Total			105.3		%		80-120	01-MAR-20
Molybdenum (Mo)-Total			112.7		%		80-120	01-MAR-20
Nickel (Ni)-Total			107.5		%		80-120	01-MAR-20
Potassium (K)-Total			106.2		%		80-120	01-MAR-20
Selenium (Se)-Total			108.6		%		80-120	01-MAR-20
Silicon (Si)-Total			113.1		%		80-120	01-MAR-20
Silver (Ag)-Total			106.6		%		80-120	01-MAR-20
Sodium (Na)-Total			107.9		%		80-120	01-MAR-20
Strontium (Sr)-Total			107.5		%		80-120	01-MAR-20
Thallium (Tl)-Total			114.8		%		80-120	01-MAR-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5012114								
WG3284043-2 LCS								
Tin (Sn)-Total			108.2		%		80-120	01-MAR-20
Titanium (Ti)-Total			105.8		%		80-120	01-MAR-20
Uranium (U)-Total			104.1		%		80-120	01-MAR-20
Vanadium (V)-Total			107.4		%		80-120	01-MAR-20
Zinc (Zn)-Total			106.6		%		80-120	01-MAR-20
WG3284043-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	01-MAR-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	01-MAR-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	01-MAR-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	01-MAR-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	01-MAR-20
Boron (B)-Total			<0.010		mg/L		0.01	01-MAR-20
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	01-MAR-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	01-MAR-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	01-MAR-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	01-MAR-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	01-MAR-20
Iron (Fe)-Total			<0.010		mg/L		0.01	01-MAR-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	01-MAR-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	01-MAR-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	01-MAR-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	01-MAR-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	01-MAR-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	01-MAR-20
Potassium (K)-Total			<0.050		mg/L		0.05	01-MAR-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	01-MAR-20
Silicon (Si)-Total			<0.10		mg/L		0.1	01-MAR-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	01-MAR-20
Sodium (Na)-Total			<0.050		mg/L		0.05	01-MAR-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	01-MAR-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	01-MAR-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	01-MAR-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	01-MAR-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	01-MAR-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5012114								
WG3284043-1 MB								
Vanadium (V)-Total			<0.00050		mg/L		0.0005	01-MAR-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	01-MAR-20
NH3-L-F-CL	**Water**							
Batch R5011790								
WG3283918-10 LCS								
Ammonia as N			102.4		%		85-115	28-FEB-20
WG3283918-6 LCS								
Ammonia as N			101.4		%		85-115	28-FEB-20
WG3283918-5 MB								
Ammonia as N			<0.0050		mg/L		0.005	28-FEB-20
WG3283918-9 MB								
Ammonia as N			<0.0050		mg/L		0.005	28-FEB-20
NO2-L-IC-N-CL	**Water**							
Batch R5014266								
WG3285925-7 DUP		**L2421373-3**						
Nitrite (as N)		0.0020	0.0019		mg/L	5.1	20	26-FEB-20
WG3285925-6 LCS								
Nitrite (as N)			103.3		%		90-110	26-FEB-20
WG3285925-5 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	26-FEB-20
WG3285925-8 MS		**L2421373-3**						
Nitrite (as N)			104.6		%		75-125	26-FEB-20
NO3-L-IC-N-CL	**Water**							
Batch R5014266								
WG3285925-7 DUP		**L2421373-3**						
Nitrate (as N)		6.96	6.96		mg/L	0.0	20	26-FEB-20
WG3285925-6 LCS								
Nitrate (as N)			102.1		%		90-110	26-FEB-20
WG3285925-5 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	26-FEB-20
WG3285925-8 MS		**L2421373-3**						
Nitrate (as N)			N/A	MS-B	%		-	26-FEB-20
ORP-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ORP-CL	**Water**							
Batch R5013929								
WG3285836-6 CRM		**CL-ORP**						
ORP			219		mV		210-230	03-MAR-20
P-T-L-COL-CL	**Water**							
Batch R5012378								
WG3285009-10 LCS								
Phosphorus (P)-Total			98.6		%		80-120	02-MAR-20
WG3285009-9 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	02-MAR-20
PH-CL	**Water**							
Batch R5011266								
WG3283835-2 LCS								
pH			7.00		pH		6.9-7.1	27-FEB-20
PO4-DO-L-COL-CL	**Water**							
Batch R5008766								
WG3282263-8 LCS								
Orthophosphate-Dissolved (as P)			104.4		%		80-120	26-FEB-20
WG3282263-7 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	26-FEB-20
SO4-IC-N-CL	**Water**							
Batch R5014266								
WG3285925-7 DUP		**L2421373-3**						
Sulfate (SO4)		231	232		mg/L	0.2	20	26-FEB-20
WG3285925-6 LCS								
Sulfate (SO4)			102.1		%		90-110	26-FEB-20
WG3285925-5 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	26-FEB-20
WG3285925-8 MS		**L2421373-3**						
Sulfate (SO4)			N/A	MS-B	%		-	26-FEB-20
SOLIDS-TDS-CL	**Water**							
Batch R5016286								
WG3285402-5 LCS								
Total Dissolved Solids			99.5		%		85-115	03-MAR-15
WG3285402-4 MB								
Total Dissolved Solids			<10		mg/L		10	03-MAR-15
TKN-L-F-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-L-F-CL	**Water**							
Batch R5011319								
WG3283713-14 LCS								
Total Kjeldahl Nitrogen			84.3		%		75-125	28-FEB-20
WG3283713-13 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	28-FEB-20
TSS-L-CL	**Water**							
Batch R5016146								
WG3285388-2 LCS								
Total Suspended Solids			96.5		%		85-115	03-MAR-20
WG3285388-1 MB								
Total Suspended Solids			<1.0		mg/L		1	03-MAR-20
TURBIDITY-CL	**Water**							
Batch R5010697								
WG3283203-20 LCS								
Turbidity			102.5		%		85-115	27-FEB-20
WG3283203-19 MB								
Turbidity			<0.10		NTU		0.1	27-FEB-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	25-FEB-20 10:30	03-MAR-20 12:15	0.25	170	hours	EHTR-FM
	2	25-FEB-20 12:30	03-MAR-20 12:15	0.25	168	hours	EHTR-FM
	3	25-FEB-20 14:35	03-MAR-20 12:15	0.25	166	hours	EHTR-FM
pH							
	1	25-FEB-20 10:30	27-FEB-20 15:00	0.25	53	hours	EHTR-FM
	2	25-FEB-20 12:30	27-FEB-20 15:00	0.25	50	hours	EHTR-FM
	3	25-FEB-20 14:35	27-FEB-20 15:00	0.25	48	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2421373 were received on 26-FEB-20 08:50.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes 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 pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

Page 1 of 1

COC ID: Regional Effects Program | TURNAROUND TIME: Regular

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	Cait Good			Lab Contact	Lyuda Shvets			Email 1:	cait.good@teck.com	X	X	X
Email	cait.good@teck.com			Email	Lyudmyla.Shvets@ALSGlobal.com			Email 2:	carlie.meyer@teck.com	X	X	X
Address	421 Pine Avenue			Address	2559 29 Street NE			Email 3:		X	X	X
								Email 4:	teckcoal@equisonline.com			X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:	kbatchelar@minnow.ca	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada					
Phone Number	250-425-8202			Phone Number	403-407-1800			PO number	VPO00616180			

L2421373-COFC

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.	HG-T-U-CVAF-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-D-CVAF-VA	TECKCOAL-MET-D-VA	TECKCOAL-MET-T-VA	TECKCOAL-ROUTINE-VA
FILTER								N	Y	N	Y	Y	N	N
PRESERV.								Y	Y	H2SO4	NONE	Y	HNO3	NONE
RG_FRUL_WS_20200225-1030	RGFRUL	WS	No	25-Feb-20	10:30:00 AM	G	7	1	1	1	1	1	1	1
RG_FO23_WS_20200225-1230	RG_FO23	WS	No	25-Feb-20	12:30:00 PM	G	7	1	1	1	1	1	1	1
RG_LI8_WS_20200225-1435	RG_LI8	WS	No	25-Feb-20	2:35:00 PM	G	7	1	1	1	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								

PLS. use this COC

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS
RAEMP - VPO00552534

RELINQUISHED BY/AFFILIATION | DATE/TIME | DATE/TIME
2/26 850

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	Mia Otto	Mobile #	250-464-9531
Sampler's Signature		Date/Time	February 25, 2020

6°C

WATER CHEMISTRY

ALS Laboratory Report L2421763

(Finalized March 5, 2020)

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 27-FEB-20
Report Date: 05-MAR-20 14:23 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2421763

Project P.O. #: VPO00616180
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: Regional Eff
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2421763-1 WS 26-FEB-20 16:00 RG_TRIP_WS_20200226_1600	L2421763-2 WS 26-FEB-20 15:00 RG_LCUT_WS_20200226_1500	L2421763-3 WS 26-FEB-20 17:00 RG_RIVER_WS_20200226_1700	L2421763-4 WS 26-FEB-20 10:20 RG_SLINE_WS_20200226_1020	
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	<2.0	2000	404	406	
	Hardness (as CaCO3) (mg/L)		1320	217	222	
	pH (pH)	5.50	8.28	8.28	8.26	
	ORP (mV)	372	273	256	324	
	Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	<1.0	
	Total Dissolved Solids (mg/L)	<10	1970 DLHC	271 DLHC	269 DLHC	
	Turbidity (NTU)	<0.10	0.32	<0.10	0.20	
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	1.2	2.5	<1.0	<1.0	
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	<1.0	288	140	140	
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	
	Alkalinity, Total (as CaCO3) (mg/L)	<1.0	288	140	140	
	Ammonia as N (mg/L)	<0.0050	0.0102	<0.0050	<0.0050	
	Bromide (Br) (mg/L)	<0.050	<0.25 DLHC	<0.050	<0.050	
	Chloride (Cl) (mg/L)	<0.50	6.6 DLHC	0.67	0.67	
	Fluoride (F) (mg/L)	<0.020	0.17 DLHC	0.398	0.411	
	Ion Balance (%)	0.0	93.2	95.6	97.9	
	Nitrate (as N) (mg/L)	<0.0050	19.0 DLHC	0.115	0.113	
	Nitrite (as N) (mg/L)	<0.0010	0.0050 DLHC	<0.0010	<0.0010	
	Total Kjeldahl Nitrogen (mg/L)	<0.050	<0.25 TKNI	<0.050	<0.050	
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	0.0053	0.0024	0.0024	
	Phosphorus (P)-Total (mg/L)	<0.0020	0.0044	<0.0020	<0.0020	
	Sulfate (SO4) (mg/L)	<0.30	1020 DLHC	84.1	84.1	
	Anion Sum (meq/L)	<0.10	28.5	4.60	4.59	
	Cation Sum (meq/L)	<0.10	26.6	4.40	4.50	
	Cation - Anion Balance (%)	0.0	-3.5	-2.2	-1.0	
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)		1.06	<0.50	<0.50	
	Total Organic Carbon (mg/L)	<0.50	1.25	<0.50	<0.50	
Total Metals	Aluminum (Al)-Total (mg/L)	<0.0030	0.0038	<0.0030	<0.0030	
	Antimony (Sb)-Total (mg/L)	<0.00010	0.00049	<0.00010	<0.00010	
	Arsenic (As)-Total (mg/L)	<0.00010	<0.00070 DLB	<0.00050 DLB	<0.00050 DLB	
	Barium (Ba)-Total (mg/L)	<0.00010	0.0347	0.0420	0.0451	
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020	<0.020	
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Boron (B)-Total (mg/L)	<0.010	0.015	<0.010	<0.010	
	Cadmium (Cd)-Total (ug/L)	<0.0050	0.118	0.0273	0.0131	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2421763-1 WS 26-FEB-20 16:00 RG_TRIP_WS_20200226_1600	L2421763-2 WS 26-FEB-20 15:00 RG_LCUT_WS_20200226_1500	L2421763-3 WS 26-FEB-20 17:00 RG_RIVER_WS_20200226_1700	L2421763-4 WS 26-FEB-20 10:20 RG_SLINE_WS_20200226_1020	
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	<0.050	247	54.1	60.7	
	Chromium (Cr)-Total (mg/L)	<0.00010	0.00013	0.00014	0.00026	
	Cobalt (Co)-Total (ug/L)	<0.10	<0.10	<0.10	<0.10	
	Copper (Cu)-Total (mg/L)	<0.00050	<0.0010 DLB	<0.00050	<0.00050	
	Iron (Fe)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Lithium (Li)-Total (mg/L)	<0.0010	0.0401	0.0050	0.0055	
	Magnesium (Mg)-Total (mg/L)	<0.10	179	18.5	19.0	
	Manganese (Mn)-Total (mg/L)	<0.00010	<0.00090 DLB	<0.00020 DLB	<0.00020 DLB	
	Mercury (Hg)-Total (ug/L)	<0.00050	0.00073	<0.00050	<0.00050	
	Molybdenum (Mo)-Total (mg/L)	<0.000050	0.00411	0.00141	0.00146	
	Nickel (Ni)-Total (mg/L)	<0.00050	0.0147	<0.00050	<0.00050	
	Potassium (K)-Total (mg/L)	<0.050	2.40	0.387	0.402	
	Selenium (Se)-Total (ug/L)	<0.050	423	1.90	1.65	
	Silicon (Si)-Total (mg/L)	<0.10	2.35	2.21	2.24	
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Total (mg/L)	<0.050	4.01	1.11	1.11	
	Strontium (Sr)-Total (mg/L)	<0.00020	0.223	0.206	0.208	
	Thallium (Tl)-Total (mg/L)	<0.000010	0.000019	<0.000010	<0.000010	
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Uranium (U)-Total (mg/L)	<0.000010	0.0150	0.00178	0.00174	
	Vanadium (V)-Total (mg/L)	<0.00050	0.00068	0.00059	0.00059	
	Zinc (Zn)-Total (mg/L)	<0.0030	0.0066	0.0031	0.0094	
Dissolved Metals	Dissolved Mercury Filtration Location		FIELD	FIELD	FIELD	
	Dissolved Metals Filtration Location	LAB	FIELD	FIELD	FIELD	
	Aluminum (Al)-Dissolved (mg/L)		<0.0030	<0.0030	<0.0030	
	Antimony (Sb)-Dissolved (mg/L)		0.00042	<0.00010	<0.00010	
	Arsenic (As)-Dissolved (mg/L)		0.00021	0.00012	0.00011	
	Barium (Ba)-Dissolved (mg/L)		0.0339	0.0433	0.0426	
	Beryllium (Be)-Dissolved (ug/L)		<0.040 DLA	<0.020	<0.020	
	Bismuth (Bi)-Dissolved (mg/L)		<0.00010 DLA	<0.000050	<0.000050	
	Boron (B)-Dissolved (mg/L)		<0.020 DLA	<0.010	<0.010	
	Cadmium (Cd)-Dissolved (ug/L)		0.104	0.0171	0.0178	
	Calcium (Ca)-Dissolved (mg/L)	<0.050	249	56.9	58.0	
	Chromium (Cr)-Dissolved (mg/L)		<0.00020 DLA	0.00014	0.00015	
	Cobalt (Co)-Dissolved (ug/L)		<0.20 DLA	<0.10	<0.10	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2421763-1 WS 26-FEB-20 16:00 RG_TRIP_WS_20200226_1600	L2421763-2 WS 26-FEB-20 15:00 RG_LCUT_WS_20200226_1500	L2421763-3 WS 26-FEB-20 17:00 RG_RIVER_WS_20200226_1700	L2421763-4 WS 26-FEB-20 10:20 RG_SLINE_WS_20200226_1020	
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)		0.00086	<0.00020	0.00034	
	Iron (Fe)-Dissolved (mg/L)		<0.020 DLA	<0.010	<0.010	
	Lead (Pb)-Dissolved (mg/L)		<0.00010 DLA	0.000052	<0.000050	
	Lithium (Li)-Dissolved (mg/L)		0.0346	0.0041	0.0041	
	Magnesium (Mg)-Dissolved (mg/L)	<0.0050	169	18.3	18.8	
	Manganese (Mn)-Dissolved (mg/L)		0.00068	<0.00010	0.00030	
	Mercury (Hg)-Dissolved (mg/L)		<0.0000050	<0.0000050	<0.0000050	
	Molybdenum (Mo)-Dissolved (mg/L)		0.00394	0.00137	0.00143	
	Nickel (Ni)-Dissolved (mg/L)		0.0147	<0.00050	<0.00050	
	Potassium (K)-Dissolved (mg/L)	<0.050	2.18	0.385	0.385	
	Selenium (Se)-Dissolved (ug/L)		401	1.81	1.61	
	Silicon (Si)-Dissolved (mg/L)		2.09	2.07	2.07	
	Silver (Ag)-Dissolved (mg/L)		<0.000020 DLA	<0.000010	<0.000010	
	Sodium (Na)-Dissolved (mg/L)	<0.050	3.97	1.13	1.16	
	Strontium (Sr)-Dissolved (mg/L)		0.221	0.210	0.214	
	Thallium (Tl)-Dissolved (mg/L)		0.000022	<0.000010	<0.000010	
	Tin (Sn)-Dissolved (mg/L)		<0.00020 DLA	<0.00010	<0.00010	
	Titanium (Ti)-Dissolved (mg/L)		<0.010	<0.010	<0.010	
	Uranium (U)-Dissolved (mg/L)		0.0151	0.00180	0.00182	
	Vanadium (V)-Dissolved (mg/L)		<0.0010 DLA	<0.00050	<0.00050	
	Zinc (Zn)-Dissolved (mg/L)		0.0054	0.0035	0.0034	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2421763-2, -3, -4
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2421763-2, -3, -4
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2421763-2, -3, -4
Matrix Spike	Selenium (Se)-Dissolved	MS-B	L2421763-2, -3, -4
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2421763-2, -3, -4
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2421763-2, -3, -4
Matrix Spike	Barium (Ba)-Total	MS-B	L2421763-1, -2, -3, -4
Matrix Spike	Boron (B)-Total	MS-B	L2421763-1, -2, -3, -4
Matrix Spike	Calcium (Ca)-Total	MS-B	L2421763-1, -2, -3, -4
Matrix Spike	Cobalt (Co)-Total	MS-B	L2421763-1, -2, -3, -4
Matrix Spike	Lithium (Li)-Total	MS-B	L2421763-1, -2, -3, -4
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2421763-1, -2, -3, -4
Matrix Spike	Manganese (Mn)-Total	MS-B	L2421763-1, -2, -3, -4
Matrix Spike	Nickel (Ni)-Total	MS-B	L2421763-1, -2, -3, -4
Matrix Spike	Potassium (K)-Total	MS-B	L2421763-1, -2, -3, -4
Matrix Spike	Sodium (Na)-Total	MS-B	L2421763-1, -2, -3, -4
Matrix Spike	Strontium (Sr)-Total	MS-B	L2421763-1, -2, -3, -4
Matrix Spike	Uranium (U)-Total	MS-B	L2421763-1, -2, -3, -4

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
DLB	Detection Limit Raised. Analyte detected at comparable level in Method Blank.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". 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.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.

Reference Information

TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL Water Total Organic Carbon APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-IC-N-CL Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

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 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-CL Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Reference Information

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL	Water	Oxidation redution potential by elect.	ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL	Water	Phosphorus (P)-Total	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL	Water	Orthophosphate-Dissolved (as P)	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL	Water	Total Kjeldahl Nitrogen	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Regional Eff

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour 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.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5011277								
WG3283840-5 LCS								
Acidity (as CaCO3)			104.4		%		85-115	27-FEB-20
WG3283840-4 MB								
Acidity (as CaCO3)			<1.0		mg/L		2	27-FEB-20
ALK-MAN-CL	**Water**							
Batch R5012139								
WG3284823-5 LCS								
Alkalinity, Total (as CaCO3)			101.4		%		85-115	28-FEB-20
WG3284823-4 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	28-FEB-20
BE-D-L-CCMS-VA	**Water**							
Batch R5011886								
WG3284108-2 LCS								
Beryllium (Be)-Dissolved			90.9		%		80-120	28-FEB-20
WG3284108-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	28-FEB-20
BE-T-L-CCMS-VA	**Water**							
Batch R5012210								
WG3284256-2 LCS								
Beryllium (Be)-Total			93.3		%		80-120	01-MAR-20
WG3284256-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	01-MAR-20
BR-L-IC-N-CL	**Water**							
Batch R5011350								
WG3283912-6 LCS								
Bromide (Br)			102.7		%		85-115	27-FEB-20
WG3283912-5 MB								
Bromide (Br)			<0.050		mg/L		0.05	27-FEB-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5013546								
WG3285687-2 LCS								
Dissolved Organic Carbon			91.9		%		80-120	02-MAR-20
WG3285687-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	02-MAR-20
C-TOT-ORG-LOW-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-LOW-CL	**Water**							
Batch R5013546								
WG3285687-2 LCS								
Total Organic Carbon			91.5		%		80-120	02-MAR-20
WG3285687-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	02-MAR-20
CL-IC-N-CL	**Water**							
Batch R5011350								
WG3283912-6 LCS								
Chloride (Cl)			101.0		%		90-110	27-FEB-20
WG3283912-5 MB								
Chloride (Cl)			<0.50		mg/L		0.5	27-FEB-20
EC-L-PCT-CL	**Water**							
Batch R5012139								
WG3284823-5 LCS								
Conductivity (@ 25C)			100.3		%		90-110	28-FEB-20
WG3284823-4 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	28-FEB-20
F-IC-N-CL	**Water**							
Batch R5011350								
WG3283912-6 LCS								
Fluoride (F)			108.9		%		90-110	27-FEB-20
WG3283912-5 MB								
Fluoride (F)			<0.020		mg/L		0.02	27-FEB-20
HG-T-U-CVAF-VA	**Water**							
Batch R5012448								
WG3285164-2 LCS								
Mercury (Hg)-Total			94.0		%		80-120	02-MAR-20
WG3285164-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	02-MAR-20
MET-D-CCMS-CL	**Water**							
Batch R5011711								
WG3284348-2 LCS		**TMRM**						
Calcium (Ca)-Dissolved			105.4		%		80-120	29-FEB-20
Magnesium (Mg)-Dissolved			103.9		%		80-120	29-FEB-20
Potassium (K)-Dissolved			103.7		%		80-120	29-FEB-20
Sodium (Na)-Dissolved			106.2		%		80-120	29-FEB-20
WG3284348-1 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	29-FEB-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-CL	**Water**							
Batch R5011711								
WG3284348-1 MB								
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	29-FEB-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	29-FEB-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	29-FEB-20
WG3284348-4 MS		**L2421763-1**						
Calcium (Ca)-Dissolved			113.7		%		70-130	29-FEB-20
Magnesium (Mg)-Dissolved			117.4		%		70-130	29-FEB-20
Potassium (K)-Dissolved			120.5		%		70-130	29-FEB-20
Sodium (Na)-Dissolved			111.8		%		70-130	29-FEB-20
MET-D-CCMS-VA	**Water**							
Batch R5011886								
WG3284108-2 LCS								
Aluminum (Al)-Dissolved			97.8		%		80-120	28-FEB-20
Antimony (Sb)-Dissolved			100.1		%		80-120	28-FEB-20
Arsenic (As)-Dissolved			100.6		%		80-120	28-FEB-20
Barium (Ba)-Dissolved			101.5		%		80-120	28-FEB-20
Bismuth (Bi)-Dissolved			101.9		%		80-120	28-FEB-20
Boron (B)-Dissolved			93.4		%		80-120	28-FEB-20
Cadmium (Cd)-Dissolved			99.8		%		80-120	28-FEB-20
Calcium (Ca)-Dissolved			98.1		%		80-120	28-FEB-20
Chromium (Cr)-Dissolved			99.98		%		80-120	28-FEB-20
Cobalt (Co)-Dissolved			99.9		%		80-120	28-FEB-20
Copper (Cu)-Dissolved			97.2		%		80-120	28-FEB-20
Iron (Fe)-Dissolved			88.4		%		80-120	28-FEB-20
Lead (Pb)-Dissolved			101.1		%		80-120	28-FEB-20
Lithium (Li)-Dissolved			87.2		%		80-120	28-FEB-20
Magnesium (Mg)-Dissolved			93.1		%		80-120	28-FEB-20
Manganese (Mn)-Dissolved			97.7		%		80-120	28-FEB-20
Molybdenum (Mo)-Dissolved			97.1		%		80-120	28-FEB-20
Nickel (Ni)-Dissolved			99.95		%		80-120	28-FEB-20
Potassium (K)-Dissolved			96.3		%		80-120	28-FEB-20
Selenium (Se)-Dissolved			102.4		%		80-120	28-FEB-20
Silicon (Si)-Dissolved			100.4		%		60-140	28-FEB-20
Silver (Ag)-Dissolved			97.0		%		80-120	28-FEB-20
Sodium (Na)-Dissolved			104.1		%		80-120	28-FEB-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5011886								
WG3284108-2 LCS								
Strontium (Sr)-Dissolved			96.9		%		80-120	28-FEB-20
Thallium (Tl)-Dissolved			102.9		%		80-120	28-FEB-20
Tin (Sn)-Dissolved			98.7		%		80-120	28-FEB-20
Titanium (Ti)-Dissolved			99.5		%		80-120	28-FEB-20
Uranium (U)-Dissolved			99.8		%		80-120	28-FEB-20
Vanadium (V)-Dissolved			98.8		%		80-120	28-FEB-20
Zinc (Zn)-Dissolved			97.8		%		80-120	28-FEB-20
WG3284108-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	28-FEB-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	28-FEB-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	28-FEB-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	28-FEB-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	28-FEB-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	28-FEB-20
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	28-FEB-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	28-FEB-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	28-FEB-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	28-FEB-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	28-FEB-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	28-FEB-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	28-FEB-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	28-FEB-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	28-FEB-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	28-FEB-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	28-FEB-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	28-FEB-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	28-FEB-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	28-FEB-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	28-FEB-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	28-FEB-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	28-FEB-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	28-FEB-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	28-FEB-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	28-FEB-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5011886								
WG3284108-1 MB		**NP**						
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	28-FEB-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	28-FEB-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	28-FEB-20
Batch R5012438								
WG3284108-1 MB		**NP**						
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	02-MAR-20
Batch R5013867								
WG3285246-2 LCS								
Aluminum (Al)-Dissolved			101.5		%		80-120	02-MAR-20
Antimony (Sb)-Dissolved			100.9		%		80-120	02-MAR-20
Arsenic (As)-Dissolved			102.8		%		80-120	02-MAR-20
Barium (Ba)-Dissolved			104.5		%		80-120	02-MAR-20
Bismuth (Bi)-Dissolved			99.6		%		80-120	02-MAR-20
Boron (B)-Dissolved			89.3		%		80-120	02-MAR-20
Cadmium (Cd)-Dissolved			101.0		%		80-120	02-MAR-20
Calcium (Ca)-Dissolved			96.4		%		80-120	02-MAR-20
Chromium (Cr)-Dissolved			101.2		%		80-120	02-MAR-20
Cobalt (Co)-Dissolved			103.1		%		80-120	02-MAR-20
Copper (Cu)-Dissolved			100.1		%		80-120	02-MAR-20
Iron (Fe)-Dissolved			93.7		%		80-120	02-MAR-20
Lead (Pb)-Dissolved			95.9		%		80-120	02-MAR-20
Lithium (Li)-Dissolved			92.8		%		80-120	02-MAR-20
Magnesium (Mg)-Dissolved			105.8		%		80-120	02-MAR-20
Manganese (Mn)-Dissolved			105.9		%		80-120	02-MAR-20
Molybdenum (Mo)-Dissolved			103.5		%		80-120	02-MAR-20
Nickel (Ni)-Dissolved			102.2		%		80-120	02-MAR-20
Potassium (K)-Dissolved			99.1		%		80-120	02-MAR-20
Selenium (Se)-Dissolved			101.9		%		80-120	02-MAR-20
Silicon (Si)-Dissolved			100.5		%		60-140	02-MAR-20
Silver (Ag)-Dissolved			104.5		%		80-120	02-MAR-20
Sodium (Na)-Dissolved			108.8		%		80-120	02-MAR-20
Strontium (Sr)-Dissolved			104.0		%		80-120	02-MAR-20
Thallium (Tl)-Dissolved			99.2		%		80-120	02-MAR-20
Tin (Sn)-Dissolved			99.8		%		80-120	02-MAR-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5013867								
WG3285246-2 LCS								
Titanium (Ti)-Dissolved			100.3		%		80-120	02-MAR-20
Uranium (U)-Dissolved			97.8		%		80-120	02-MAR-20
Vanadium (V)-Dissolved			102.1		%		80-120	02-MAR-20
Zinc (Zn)-Dissolved			104.7		%		80-120	02-MAR-20
WG3285246-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	02-MAR-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	02-MAR-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	02-MAR-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	02-MAR-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	02-MAR-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	02-MAR-20
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	02-MAR-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	02-MAR-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	02-MAR-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	02-MAR-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	02-MAR-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	02-MAR-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	02-MAR-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	02-MAR-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	02-MAR-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	02-MAR-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	02-MAR-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	02-MAR-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	02-MAR-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	02-MAR-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	02-MAR-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	02-MAR-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	02-MAR-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	02-MAR-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	02-MAR-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	02-MAR-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	02-MAR-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	02-MAR-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	02-MAR-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5013867								
WG3285246-1 MB		**NP**						
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	02-MAR-20
MET-T-CCMS-VA	**Water**							
Batch R5012210								
WG3284256-2 LCS								
Aluminum (Al)-Total			95.9		%		80-120	01-MAR-20
Antimony (Sb)-Total			104.5		%		80-120	01-MAR-20
Arsenic (As)-Total			98.9		%		80-120	01-MAR-20
Barium (Ba)-Total			108.3		%		80-120	01-MAR-20
Bismuth (Bi)-Total			93.2		%		80-120	01-MAR-20
Boron (B)-Total			94.3		%		80-120	01-MAR-20
Cadmium (Cd)-Total			100.1		%		80-120	01-MAR-20
Calcium (Ca)-Total			96.5		%		80-120	01-MAR-20
Chromium (Cr)-Total			94.0		%		80-120	01-MAR-20
Cobalt (Co)-Total			96.1		%		80-120	01-MAR-20
Copper (Cu)-Total			97.1		%		80-120	01-MAR-20
Iron (Fe)-Total			94.6		%		80-120	01-MAR-20
Lead (Pb)-Total			92.8		%		80-120	01-MAR-20
Lithium (Li)-Total			95.2		%		80-120	01-MAR-20
Magnesium (Mg)-Total			95.3		%		80-120	01-MAR-20
Manganese (Mn)-Total			96.3		%		80-120	01-MAR-20
Molybdenum (Mo)-Total			103.3		%		80-120	01-MAR-20
Nickel (Ni)-Total			97.3		%		80-120	01-MAR-20
Potassium (K)-Total			98.6		%		80-120	01-MAR-20
Selenium (Se)-Total			98.1		%		80-120	01-MAR-20
Silicon (Si)-Total			98.6		%		80-120	01-MAR-20
Silver (Ag)-Total			98.4		%		80-120	01-MAR-20
Sodium (Na)-Total			104.1		%		80-120	01-MAR-20
Strontium (Sr)-Total			102.0		%		80-120	01-MAR-20
Thallium (Tl)-Total			93.6		%		80-120	01-MAR-20
Tin (Sn)-Total			98.9		%		80-120	01-MAR-20
Titanium (Ti)-Total			95.5		%		80-120	01-MAR-20
Uranium (U)-Total			92.6		%		80-120	01-MAR-20
Vanadium (V)-Total			98.7		%		80-120	01-MAR-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5012210								
WG3284256-2 LCS								
Zinc (Zn)-Total			100.8		%		80-120	01-MAR-20
WG3284256-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	01-MAR-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	01-MAR-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	01-MAR-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	01-MAR-20
Boron (B)-Total			<0.010		mg/L		0.01	01-MAR-20
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	01-MAR-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	01-MAR-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	01-MAR-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	01-MAR-20
Iron (Fe)-Total			<0.010		mg/L		0.01	01-MAR-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	01-MAR-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	01-MAR-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	01-MAR-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	01-MAR-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	01-MAR-20
Potassium (K)-Total			<0.050		mg/L		0.05	01-MAR-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	01-MAR-20
Silicon (Si)-Total			<0.10		mg/L		0.1	01-MAR-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	01-MAR-20
Sodium (Na)-Total			<0.050		mg/L		0.05	01-MAR-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	01-MAR-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	01-MAR-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	01-MAR-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	01-MAR-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	01-MAR-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	01-MAR-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	01-MAR-20
Batch R5012438								
WG3285147-2 LCS								
Aluminum (Al)-Total			104.7		%		80-120	02-MAR-20
Antimony (Sb)-Total			100.6		%		80-120	02-MAR-20
Arsenic (As)-Total			97.1		%		80-120	02-MAR-20
Barium (Ba)-Total			97.0		%		80-120	02-MAR-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5012438								
WG3285147-2 LCS								
Bismuth (Bi)-Total			97.1		%		80-120	02-MAR-20
Boron (B)-Total			107.3		%		80-120	02-MAR-20
Cadmium (Cd)-Total			98.2		%		80-120	02-MAR-20
Calcium (Ca)-Total			98.8		%		80-120	02-MAR-20
Chromium (Cr)-Total			96.1		%		80-120	02-MAR-20
Cobalt (Co)-Total			96.5		%		80-120	02-MAR-20
Copper (Cu)-Total			97.2		%		80-120	02-MAR-20
Iron (Fe)-Total			98.0		%		80-120	02-MAR-20
Lead (Pb)-Total			97.9		%		80-120	02-MAR-20
Lithium (Li)-Total			108.5		%		80-120	02-MAR-20
Magnesium (Mg)-Total			102.1		%		80-120	02-MAR-20
Manganese (Mn)-Total			99.2		%		80-120	02-MAR-20
Molybdenum (Mo)-Total			100.6		%		80-120	02-MAR-20
Nickel (Ni)-Total			97.7		%		80-120	02-MAR-20
Potassium (K)-Total			103.0		%		80-120	02-MAR-20
Selenium (Se)-Total			96.7		%		80-120	02-MAR-20
Silicon (Si)-Total			105.2		%		80-120	02-MAR-20
Silver (Ag)-Total			100.1		%		80-120	02-MAR-20
Sodium (Na)-Total			105.7		%		80-120	02-MAR-20
Strontium (Sr)-Total			98.8		%		80-120	02-MAR-20
Thallium (Tl)-Total			97.8		%		80-120	02-MAR-20
Tin (Sn)-Total			95.1		%		80-120	02-MAR-20
Titanium (Ti)-Total			98.0		%		80-120	02-MAR-20
Uranium (U)-Total			97.6		%		80-120	02-MAR-20
Vanadium (V)-Total			99.1		%		80-120	02-MAR-20
Zinc (Zn)-Total			100.1		%		80-120	02-MAR-20
WG3285147-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	02-MAR-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	02-MAR-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	02-MAR-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	02-MAR-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	02-MAR-20
Boron (B)-Total			<0.010		mg/L		0.01	02-MAR-20
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	02-MAR-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5012438								
WG3285147-1 MB								
Calcium (Ca)-Total			<0.050		mg/L		0.05	02-MAR-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	02-MAR-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	02-MAR-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	02-MAR-20
Iron (Fe)-Total			<0.010		mg/L		0.01	02-MAR-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	02-MAR-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	02-MAR-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	02-MAR-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	02-MAR-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	02-MAR-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	02-MAR-20
Potassium (K)-Total			<0.050		mg/L		0.05	02-MAR-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	02-MAR-20
Silicon (Si)-Total			<0.10		mg/L		0.1	02-MAR-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	02-MAR-20
Sodium (Na)-Total			<0.050		mg/L		0.05	02-MAR-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	02-MAR-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	02-MAR-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	02-MAR-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	02-MAR-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	02-MAR-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	02-MAR-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	02-MAR-20
NH3-L-F-CL	**Water**							
Batch R5013870								
WG3285100-2 LCS								
Ammonia as N			96.7		%		85-115	02-MAR-20
WG3285100-1 MB								
Ammonia as N			<0.0050		mg/L		0.005	02-MAR-20
NO2-L-IC-N-CL	**Water**							
Batch R5011350								
WG3283912-6 LCS								
Nitrite (as N)			99.5		%		90-110	27-FEB-20
WG3283912-5 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	27-FEB-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-L-IC-N-CL	**Water**							
Batch R5011350								
WG3283912-6 LCS								
Nitrate (as N)			102.4		%		90-110	27-FEB-20
WG3283912-5 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	27-FEB-20
ORP-CL	**Water**							
Batch R5016186								
WG3286563-3 CRM		**CL-ORP**						
ORP			228		mV		210-230	04-MAR-20
P-T-L-COL-CL	**Water**							
Batch R5012378								
WG3285009-18 LCS								
Phosphorus (P)-Total			100.1		%		80-120	02-MAR-20
WG3285009-22 LCS								
Phosphorus (P)-Total			100.1		%		80-120	02-MAR-20
WG3285009-17 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	02-MAR-20
WG3285009-21 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	02-MAR-20
PH-CL	**Water**							
Batch R5012139								
WG3284823-5 LCS								
pH			7.06		pH		6.9-7.1	28-FEB-20
PO4-DO-L-COL-CL	**Water**							
Batch R5011200								
WG3283310-7 DUP		**L2421763-1**						
Orthophosphate-Dissolved (as P)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	27-FEB-20
WG3283310-6 LCS								
Orthophosphate-Dissolved (as P)			99.4		%		80-120	27-FEB-20
WG3283310-5 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	27-FEB-20
SO4-IC-N-CL	**Water**							
Batch R5011350								
WG3283912-6 LCS								
Sulfate (SO4)			100.4		%		90-110	27-FEB-20
WG3283912-5 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-N-CL	**Water**							
Batch R5011350								
WG3283912-5 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	27-FEB-20
SOLIDS-TDS-CL	**Water**							
Batch R5016286								
WG3285402-14 LCS								
Total Dissolved Solids			102.9		%		85-115	03-MAR-20
WG3285402-13 MB								
Total Dissolved Solids			<10		mg/L		10	03-MAR-20
TKN-L-F-CL	**Water**							
Batch R5011718								
WG3284263-3 DUP		**L2421763-1**						
Total Kjeldahl Nitrogen		<0.050	<0.050	RPD-NA	mg/L	N/A	20	29-FEB-20
WG3284263-2 LCS								
Total Kjeldahl Nitrogen			91.1		%		75-125	29-FEB-20
WG3284263-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	29-FEB-20
WG3284263-4 MS		**L2421763-1**						
Total Kjeldahl Nitrogen			111.6		%		70-130	29-FEB-20
TSS-L-CL	**Water**							
Batch R5016146								
WG3285388-4 LCS								
Total Suspended Solids			98.1		%		85-115	03-MAR-20
WG3285388-3 MB								
Total Suspended Solids			<1.0		mg/L		1	03-MAR-20
TURBIDITY-CL	**Water**							
Batch R5011666								
WG3284082-2 LCS								
Turbidity			105.5		%		85-115	28-FEB-20
WG3284082-1 MB								
Turbidity			<0.10		NTU		0.1	28-FEB-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	26-FEB-20 16:00	04-MAR-20 09:15	0.25	161	hours	EHTR-FM
	2	26-FEB-20 15:00	04-MAR-20 09:15	0.25	162	hours	EHTR-FM
	3	26-FEB-20 17:00	04-MAR-20 09:15	0.25	160	hours	EHTR-FM
	4	26-FEB-20 10:20	04-MAR-20 09:15	0.25	167	hours	EHTR-FM
pH							
	1	26-FEB-20 16:00	28-FEB-20 15:00	0.25	47	hours	EHTR-FM
	2	26-FEB-20 15:00	28-FEB-20 15:00	0.25	48	hours	EHTR-FM
	3	26-FEB-20 17:00	28-FEB-20 15:00	0.25	46	hours	EHTR-FM
	4	26-FEB-20 10:20	28-FEB-20 15:00	0.25	53	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2421763 were received on 27-FEB-20 09:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes 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 pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID: **Regional Effects Program** | TURNAROUND TIME: Regular

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	Cait Good			Lab Contact	Lyuda Shvets			Email 1:	cait.good@teck.com	X	X	X
Email	cait.good@teck.com			Email	Lyudmyla.Shvets@ALSGlobal.com			Email 2:	carlie.meyer@teck.com	X	X	X
Address	421 Pine Avenue			Address	2559 29 Street NE			Email 3:	teckcoal@equisonline.com			X
								Email 4:	kbatchelar@minnow.ca	X	X	X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:				
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada					
Phone Number	250-425-8202			Phone Number	403-407-1800			PO number	VPO00616180			

SAMPLE DETAILS

L2421763-COFC

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.	HG-T-U-CVAF-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-D-CVAF-VA	TECKCOAL-MET-D-VA	TECKCOAL-MET-T-VA	TECKCOAL-ROUTINE-VA
FIL								N	Y*	N	Y>	Y=	N	N
PRESERV								NONE	Y H2SO4	H2SO4	HCl	HNO3	HNO3	NONE
RG_TRIP_WS_20200226_1600	RG_TRIP	WS	No	2020/02/26	16:00:00	G	4	1		1			1	1
RG_LCUT_WS_20200226_1500	RG_LCUT	WS	No	2020/02/26	15:00:00	G	7	1	1	1	1	1	1	1
RG_DUP_WS_20200226_1700	RG_DUP	WS	No	2020/02/26	17:00:00	G	7	1	1	1	1	1	1	1
RG_SLINE_WS_20200226_1020	RG_SLINE	WS	No	2020/02/26	10:20:00	G	7	1	1	1	1	1	1	1
		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
			NK	2/27 0900

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	MIA OTTO	Mobile #	250 464 9531
Sampler's Signature	MMA	Date/Time	26 Feb 2020 17:00

8°C

WATER CHEMISTRY

ALS Laboratory Report L2441677

(Finalized May 8, 2020)

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 29-APR-20
Report Date: 08-MAY-20 16:36 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2441677

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: Regional Effects
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2441677-1	L2441677-2	L2441677-3	L2441677-4	L2441677-5
Description	WS	WS	WS	WS	WS
Sampled Date	27-APR-20	27-APR-20	27-APR-20	28-APR-20	28-APR-20
Sampled Time	11:07	13:25	15:50	08:30	13:05
Client ID	RG_LCUT_WS_20200427-1107	RG_LILC3_WS_20200427-1325	RG_FO23_WS_20200427-1550	RG_LI24_WS_20200428-0830	RG_SLINE_WS_20200428-1305
Grouping / **Analyte**					
WATER					
Physical Tests					
Conductivity (@ 25C) (uS/cm)	959	912	659	255	295
Hardness (as CaCO3) (mg/L)	614	575	415	164	189
pH (pH)	8.13	8.22	8.39	8.26	8.34
ORP (mV)	346	337	307	326	372
Total Suspended Solids (mg/L)	4.3	<1.0	8.0	1.9	1.2
Total Dissolved Solids (mg/L)	786	737	478	177	209
Turbidity (NTU)	1.15	0.59	4.01	0.13	0.42
Anions and Nutrients					
Acidity (as CaCO3) (mg/L)	5.6	2.5	<1.0	<1.0	<1.0
Alkalinity, Bicarbonate (as CaCO3) (mg/L)	214	205	179	121	144
Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	6.8	<1.0	2.0
Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3) (mg/L)	214	205	186	121	146
Ammonia as N (mg/L)	0.0111	0.0192	0.0338	0.0407	0.0246
Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl) (mg/L)	8.13	11.8	3.22	<0.50	<0.50
Fluoride (F) (mg/L)	0.209	0.210	0.168	0.318	0.323
Ion Balance (%)	103	104	101	106	102
Nitrate (as N) (mg/L)	17.1	13.0	9.50	0.197	0.0841
Nitrite (as N) (mg/L)	<0.0010	0.0021	0.0055	<0.0010	<0.0010
Total Kjeldahl Nitrogen (mg/L)	<0.050 TKNI	<0.050 TKNI	<0.050 TKNI	0.083	0.075
Orthophosphate-Dissolved (as P) (mg/L)	0.0023	0.0014	<0.0010	0.0021	0.0025
Phosphorus (P)-Total (mg/L)	0.0082	0.0030	0.0104	<0.0020	0.0022
Sulfate (SO4) (mg/L)	319	296	188	34.7	38.3
Anion Sum (meq/L)	12.4	11.5	8.41	3.17	3.73
Cation Sum (meq/L)	12.7	12.0	8.47	3.35	3.82
Cation - Anion Balance (%)	1.4	1.9	0.3	2.8	1.2
Organic / Inorganic Carbon					
Dissolved Organic Carbon (mg/L)	<0.50	<0.50	0.99	<0.50	0.85
Total Organic Carbon (mg/L)	<0.50	<0.50	1.16	<0.50	0.74
Total Metals					
Aluminum (Al)-Total (mg/L)	0.0108	0.0092	0.0842	0.0063	0.0093
Antimony (Sb)-Total (mg/L)	0.00039	0.00035	0.00017	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00031	0.00028	0.00031	0.00024	0.00023
Barium (Ba)-Total (mg/L)	0.0374	0.0439	0.0878	0.0349	0.0348
Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020	<0.020	<0.020
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total (mg/L)	0.019	0.018	<0.010	<0.010	<0.010
Cadmium (Cd)-Total (ug/L)	0.424	0.239	0.0430	0.0069	0.0164

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2441677-6				
	Description	WS				
	Sampled Date	28-APR-20				
	Sampled Time	14:00				
	Client ID	RG_RIVER_WS_2 0200428-1400				
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	294				
	Hardness (as CaCO3) (mg/L)	184				
	pH (pH)	8.35				
	ORP (mV)	321				
	Total Suspended Solids (mg/L)	<1.0				
	Total Dissolved Solids (mg/L)	198				
	Turbidity (NTU)	0.49				
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	138				
	Alkalinity, Carbonate (as CaCO3) (mg/L)	2.8				
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Total (as CaCO3) (mg/L)	141				
	Ammonia as N (mg/L)	0.0071				
	Bromide (Br) (mg/L)	<0.050				
	Chloride (Cl) (mg/L)	<0.50				
	Fluoride (F) (mg/L)	0.338				
	Ion Balance (%)	103				
	Nitrate (as N) (mg/L)	0.0855				
	Nitrite (as N) (mg/L)	<0.0010				
	Total Kjeldahl Nitrogen (mg/L)	0.101				
	Orthophosphate-Dissolved (as P) (mg/L)	0.0027 RRV				
	Phosphorus (P)-Total (mg/L)	0.0021 RRV				
	Sulfate (SO4) (mg/L)	38.2				
	Anion Sum (meq/L)	3.63				
	Cation Sum (meq/L)	3.72				
	Cation - Anion Balance (%)	1.3				
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	0.73				
	Total Organic Carbon (mg/L)	0.79				
Total Metals	Aluminum (Al)-Total (mg/L)	0.0093				
	Antimony (Sb)-Total (mg/L)	<0.00010				
	Arsenic (As)-Total (mg/L)	0.00024				
	Barium (Ba)-Total (mg/L)	0.0354				
	Beryllium (Be)-Total (ug/L)	<0.020				
	Bismuth (Bi)-Total (mg/L)	<0.000050				
	Boron (B)-Total (mg/L)	<0.010				
	Cadmium (Cd)-Total (ug/L)	0.0160				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2441677-1	L2441677-2	L2441677-3	L2441677-4	L2441677-5
Description	WS	WS	WS	WS	WS
Sampled Date	27-APR-20	27-APR-20	27-APR-20	28-APR-20	28-APR-20
Sampled Time	11:07	13:25	15:50	08:30	13:05
Client ID	RG_LCUT_WS_20200427-1107	RG_LILC3_WS_20200427-1325	RG_FO23_WS_20200427-1550	RG_LI24_WS_20200428-0830	RG_SLINE_WS_20200428-1305
Grouping / **Analyte**					
WATER					
Total Metals Calcium (Ca)-Total (mg/L)	130	120	90.1	40.0	44.1
Chromium (Cr)-Total (mg/L)	0.00017	0.00016	0.00023	0.00020	0.00018
Cobalt (Co)-Total (ug/L)	0.15	0.15	0.17	<0.10	<0.10
Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Iron (Fe)-Total (mg/L)	0.016	0.060	0.134	<0.010	<0.010
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	0.000103	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	0.0621	0.0543	0.0205	0.0031	0.0040
Magnesium (Mg)-Total (mg/L)	61.8	56.6	40.5	10.6	14.6
Manganese (Mn)-Total (mg/L)	0.00058	0.0151	0.00992	0.00015	0.00030
Mercury (Hg)-Total (ug/L)	0.00065	<0.00050	0.00108	<0.00050	0.00058
Molybdenum (Mo)-Total (mg/L)	0.00220	0.00275	0.00136	0.000756	0.00103
Nickel (Ni)-Total (mg/L)	0.0102	0.00817	0.00239	0.00068	0.00052
Potassium (K)-Total (mg/L)	1.87	1.83	1.40	0.283	0.404
Selenium (Se)-Total (ug/L)	62.4	47.9	39.5	1.54	1.02
Silicon (Si)-Total (mg/L)	2.15	2.06	2.12	1.54	2.03
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	9.71	9.52	3.03	1.24	0.838
Strontium (Sr)-Total (mg/L)	0.249	0.225	0.153	0.147	0.165
Thallium (Tl)-Total (mg/L)	0.000018	0.000013	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Total (mg/L)	0.00484	0.00428	0.00224	0.00115	0.00141
Vanadium (V)-Total (mg/L)	0.00064	0.00064	0.00090	0.00080	0.00064
Zinc (Zn)-Total (mg/L)	0.0153	0.0099	<0.0030	<0.0030	<0.0030
Dissolved Metals Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Antimony (Sb)-Dissolved (mg/L)	0.00039	0.00035	0.00016	<0.00010	<0.00010
Arsenic (As)-Dissolved (mg/L)	0.00013	0.00012	0.00011	0.00016	0.00012
Barium (Ba)-Dissolved (mg/L)	0.0376	0.0452	0.0869	0.0369	0.0376
Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020	<0.020	<0.020
Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Dissolved (mg/L)	0.018	0.017	<0.010	<0.010	<0.010
Cadmium (Cd)-Dissolved (ug/L)	0.424	0.247	0.0207	0.0068	0.0167
Calcium (Ca)-Dissolved (mg/L)	142	135	98.6	47.9	50.5
Chromium (Cr)-Dissolved (mg/L)	0.00011	0.00011	<0.00010	0.00016	0.00014
Cobalt (Co)-Dissolved (ug/L)	0.11	0.11	<0.10	<0.10	<0.10

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2441677-6				
	Description	WS				
	Sampled Date	28-APR-20				
	Sampled Time	14:00				
	Client ID	RG_RIVER_WS_2 0200428-1400				
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	43.3				
	Chromium (Cr)-Total (mg/L)	0.00019				
	Cobalt (Co)-Total (ug/L)	<0.10				
	Copper (Cu)-Total (mg/L)	<0.00050				
	Iron (Fe)-Total (mg/L)	<0.010				
	Lead (Pb)-Total (mg/L)	<0.000050				
	Lithium (Li)-Total (mg/L)	0.0040				
	Magnesium (Mg)-Total (mg/L)	14.4				
	Manganese (Mn)-Total (mg/L)	0.00034				
	Mercury (Hg)-Total (ug/L)	<0.00050				
	Molybdenum (Mo)-Total (mg/L)	0.00103				
	Nickel (Ni)-Total (mg/L)	<0.00050				
	Potassium (K)-Total (mg/L)	0.406				
	Selenium (Se)-Total (ug/L)	0.963				
	Silicon (Si)-Total (mg/L)	2.06				
	Silver (Ag)-Total (mg/L)	<0.000010				
	Sodium (Na)-Total (mg/L)	0.836				
	Strontium (Sr)-Total (mg/L)	0.166				
	Thallium (Tl)-Total (mg/L)	<0.000010				
	Tin (Sn)-Total (mg/L)	<0.00010				
	Titanium (Ti)-Total (mg/L)	<0.010				
	Uranium (U)-Total (mg/L)	0.00143				
	Vanadium (V)-Total (mg/L)	0.00062				
	Zinc (Zn)-Total (mg/L)	<0.0030				
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD				
	Dissolved Metals Filtration Location	FIELD				
	Aluminum (Al)-Dissolved (mg/L)	<0.0030				
	Antimony (Sb)-Dissolved (mg/L)	<0.00010				
	Arsenic (As)-Dissolved (mg/L)	0.00012				
	Barium (Ba)-Dissolved (mg/L)	0.0357				
	Beryllium (Be)-Dissolved (ug/L)	<0.020				
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050				
	Boron (B)-Dissolved (mg/L)	<0.010				
	Cadmium (Cd)-Dissolved (ug/L)	0.0133				
	Calcium (Ca)-Dissolved (mg/L)	48.8				
	Chromium (Cr)-Dissolved (mg/L)	0.00012				
	Cobalt (Co)-Dissolved (ug/L)	<0.10				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2441677-1	L2441677-2	L2441677-3	L2441677-4	L2441677-5
Description	WS	WS	WS	WS	WS
Sampled Date	27-APR-20	27-APR-20	27-APR-20	28-APR-20	28-APR-20
Sampled Time	11:07	13:25	15:50	08:30	13:05
Client ID	RG_LCUT_WS_20200427-1107	RG_LILC3_WS_20200427-1325	RG_FO23_WS_20200427-1550	RG_LI24_WS_20200428-0830	RG_SLINE_WS_20200428-1305
Grouping / **Analyte**					
WATER					
Dissolved Metals Copper (Cu)-Dissolved (mg/L)	0.00038	0.00031	0.00023	<0.00020	<0.00020
Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved (mg/L)	0.0614	0.0519	0.0192	0.0032	0.0040
Magnesium (Mg)-Dissolved (mg/L)	62.8	57.8	41.1	10.9	15.2
Manganese (Mn)-Dissolved (mg/L)	0.00011	0.00956	0.00148	<0.00010	<0.00010
Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Dissolved (mg/L)	0.00215	0.00274	0.00129	0.000753	0.00104
Nickel (Ni)-Dissolved (mg/L)	0.00984	0.00760	0.00188	0.00053	<0.00050
Potassium (K)-Dissolved (mg/L)	2.01	1.83	1.39	0.297	0.428
Selenium (Se)-Dissolved (ug/L)	64.2	52.1	41.6	1.48	1.13
Silicon (Si)-Dissolved (mg/L)	2.04	2.01	1.89	1.48	2.05
Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved (mg/L)	9.98	10.4	3.06	1.21	0.856
Strontium (Sr)-Dissolved (mg/L)	0.244	0.225	0.148	0.150	0.173
Thallium (Tl)-Dissolved (mg/L)	0.000020	0.000013	<0.000010	<0.000010	<0.000010
Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Dissolved (mg/L)	0.00458	0.00413	0.00221	0.00118	0.00143
Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Dissolved (mg/L)	0.0149	0.0094	0.0015	0.0023	0.0026

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2441677-6				
	Description	WS				
	Sampled Date	28-APR-20				
	Sampled Time	14:00				
	Client ID	RG_RIVER_WS_2 0200428-1400				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020				
	Iron (Fe)-Dissolved (mg/L)	<0.010				
	Lead (Pb)-Dissolved (mg/L)	<0.000050				
	Lithium (Li)-Dissolved (mg/L)	0.0040				
	Magnesium (Mg)-Dissolved (mg/L)	15.1				
	Manganese (Mn)-Dissolved (mg/L)	0.00011				
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050				
	Molybdenum (Mo)-Dissolved (mg/L)	0.000994				
	Nickel (Ni)-Dissolved (mg/L)	<0.00050				
	Potassium (K)-Dissolved (mg/L)	0.414				
	Selenium (Se)-Dissolved (ug/L)	1.13				
	Silicon (Si)-Dissolved (mg/L)	2.03				
	Silver (Ag)-Dissolved (mg/L)	<0.000010				
	Sodium (Na)-Dissolved (mg/L)	0.844				
	Strontium (Sr)-Dissolved (mg/L)	0.162				
	Thallium (Tl)-Dissolved (mg/L)	<0.000010				
	Tin (Sn)-Dissolved (mg/L)	<0.00010				
	Titanium (Ti)-Dissolved (mg/L)	<0.010				
	Uranium (U)-Dissolved (mg/L)	0.00142				
	Vanadium (V)-Dissolved (mg/L)	<0.00050				
	Zinc (Zn)-Dissolved (mg/L)	0.0024				

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2441677-1, -2, -3, -4, -5, -6
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2441677-1, -2, -3, -4, -5, -6
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2441677-1, -2, -3, -4, -5, -6
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2441677-1, -2, -3, -4, -5, -6
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2441677-1, -2, -3, -4, -5, -6
Matrix Spike	Barium (Ba)-Total	MS-B	L2441677-1, -2, -3, -4, -5, -6
Matrix Spike	Calcium (Ca)-Total	MS-B	L2441677-1, -2, -3, -4, -5, -6
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2441677-1, -2, -3, -4, -5, -6
Matrix Spike	Selenium (Se)-Total	MS-B	L2441677-1, -2, -3, -4, -5, -6
Matrix Spike	Sodium (Na)-Total	MS-B	L2441677-1, -2, -3, -4, -5, -6
Matrix Spike	Strontium (Sr)-Total	MS-B	L2441677-1, -2, -3, -4, -5, -6
Matrix Spike	Uranium (U)-Total	MS-B	L2441677-1, -2, -3, -4, -5, -6

Qualifiers for Individual Parameters Listed:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". 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.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by

Reference Information

subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-IC-N-CL Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

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 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL Water Oxidation redution potential by elect. ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL Water Phosphorus (P)-Total APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

Reference Information

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL	Water	Orthophosphate-Dissolved (as P)	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL	Water	Total Kjeldahl Nitrogen	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Regional Effects

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour 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.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5070437								
WG3316191-2 LCS								
Acidity (as CaCO3)			102.3		%		85-115	30-APR-20
WG3316191-1 MB								
Acidity (as CaCO3)			1.3		mg/L		2	30-APR-20
ALK-MAN-CL	**Water**							
Batch R5070501								
WG3316201-2 LCS								
Alkalinity, Total (as CaCO3)			101.2		%		85-115	30-APR-20
WG3316201-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	30-APR-20
BE-D-L-CCMS-VA	**Water**							
Batch R5076825								
WG3318005-2 LCS								
Beryllium (Be)-Dissolved			97.8		%		80-120	06-MAY-20
WG3318005-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	06-MAY-20
BE-T-L-CCMS-VA	**Water**							
Batch R5075459								
WG3316398-3 DUP		**L2441677-1**						
Beryllium (Be)-Total		<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	04-MAY-20
WG3316398-2 LCS								
Beryllium (Be)-Total			95.3		%		80-120	04-MAY-20
WG3316398-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	04-MAY-20
WG3316398-4 MS		**L2441677-2**						
Beryllium (Be)-Total			94.7		%		70-130	04-MAY-20
BR-L-IC-N-CL	**Water**							
Batch R5071238								
WG3316412-14 LCS								
Bromide (Br)			106.6		%		85-115	29-APR-20
WG3316412-13 MB								
Bromide (Br)			<0.050		mg/L		0.05	29-APR-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5074197								
WG3317224-3 DUP		**L2441677-6**						
Dissolved Organic Carbon		0.73	0.81		mg/L	11	20	03-MAY-20
WG3317224-2 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-LOW-CL	**Water**							
Batch R5074197								
WG3317224-2 LCS								
Dissolved Organic Carbon			92.9		%		80-120	03-MAY-20
WG3317224-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	03-MAY-20
WG3317224-4 MS		**L2441677-6**						
Dissolved Organic Carbon			100.4		%		70-130	03-MAY-20
C-TOT-ORG-LOW-CL	**Water**							
Batch R5074197								
WG3317224-3 DUP		**L2441677-6**						
Total Organic Carbon		0.79	0.85		mg/L	7.8	20	03-MAY-20
WG3317224-2 LCS								
Total Organic Carbon			92.6		%		80-120	03-MAY-20
WG3317224-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	03-MAY-20
WG3317224-4 MS		**L2441677-6**						
Total Organic Carbon			100.9		%		70-130	03-MAY-20
CL-IC-N-CL	**Water**							
Batch R5071238								
WG3316412-14 LCS								
Chloride (Cl)			101.9		%		90-110	29-APR-20
WG3316412-13 MB								
Chloride (Cl)			<0.50		mg/L		0.5	29-APR-20
EC-L-PCT-CL	**Water**							
Batch R5070501								
WG3316201-2 LCS								
Conductivity (@ 25C)			95.8		%		90-110	30-APR-20
WG3316201-1 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	30-APR-20
F-IC-N-CL	**Water**							
Batch R5071238								
WG3316412-14 LCS								
Fluoride (F)			96.1		%		90-110	29-APR-20
WG3316412-13 MB								
Fluoride (F)			<0.020		mg/L		0.02	29-APR-20
HG-D-CVAA-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-CVAA-VA	**Water**							
Batch R5070497								
WG3316670-2 LCS								
Mercury (Hg)-Dissolved			99.2		%		80-120	01-MAY-20
WG3316670-1 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	01-MAY-20
WG3316670-4 MS		**L2441677-1**						
Mercury (Hg)-Dissolved			98.4		%		70-130	01-MAY-20
HG-T-U-CVAF-VA	**Water**							
Batch R5073141								
WG3316922-10 LCS								
Mercury (Hg)-Total			96.2		%		80-120	02-MAY-20
WG3316922-2 LCS								
Mercury (Hg)-Total			90.0		%		80-120	02-MAY-20
WG3316922-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	02-MAY-20
WG3316922-9 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	02-MAY-20
MET-D-CCMS-VA	**Water**							
Batch R5076825								
WG3318005-2 LCS								
Aluminum (Al)-Dissolved			102.9		%		80-120	06-MAY-20
Antimony (Sb)-Dissolved			104.7		%		80-120	06-MAY-20
Arsenic (As)-Dissolved			98.7		%		80-120	06-MAY-20
Barium (Ba)-Dissolved			96.3		%		80-120	06-MAY-20
Bismuth (Bi)-Dissolved			101.7		%		80-120	06-MAY-20
Boron (B)-Dissolved			91.4		%		80-120	06-MAY-20
Cadmium (Cd)-Dissolved			98.4		%		80-120	06-MAY-20
Calcium (Ca)-Dissolved			97.9		%		80-120	06-MAY-20
Chromium (Cr)-Dissolved			100.6		%		80-120	06-MAY-20
Cobalt (Co)-Dissolved			100.0		%		80-120	06-MAY-20
Copper (Cu)-Dissolved			98.8		%		80-120	06-MAY-20
Iron (Fe)-Dissolved			99.3		%		80-120	06-MAY-20
Lead (Pb)-Dissolved			101.4		%		80-120	06-MAY-20
Lithium (Li)-Dissolved			94.9		%		80-120	06-MAY-20
Magnesium (Mg)-Dissolved			96.7		%		80-120	06-MAY-20
Manganese (Mn)-Dissolved			104.6		%		80-120	06-MAY-20
Molybdenum (Mo)-Dissolved			101.0		%		80-120	06-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5076825								
WG3318005-2 LCS								
Nickel (Ni)-Dissolved			98.9		%		80-120	06-MAY-20
Potassium (K)-Dissolved			102.7		%		80-120	06-MAY-20
Selenium (Se)-Dissolved			100.9		%		80-120	06-MAY-20
Silicon (Si)-Dissolved			94.9		%		60-140	06-MAY-20
Silver (Ag)-Dissolved			101.3		%		80-120	06-MAY-20
Sodium (Na)-Dissolved			101.5		%		80-120	06-MAY-20
Strontium (Sr)-Dissolved			98.6		%		80-120	06-MAY-20
Thallium (Tl)-Dissolved			99.8		%		80-120	06-MAY-20
Tin (Sn)-Dissolved			99.9		%		80-120	06-MAY-20
Titanium (Ti)-Dissolved			98.8		%		80-120	06-MAY-20
Uranium (U)-Dissolved			99.99		%		80-120	06-MAY-20
Vanadium (V)-Dissolved			102.9		%		80-120	06-MAY-20
Zinc (Zn)-Dissolved			97.1		%		80-120	06-MAY-20
WG3318005-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	06-MAY-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	06-MAY-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	06-MAY-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	06-MAY-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	06-MAY-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	06-MAY-20
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	06-MAY-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	06-MAY-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	06-MAY-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	06-MAY-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	06-MAY-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	06-MAY-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	06-MAY-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	06-MAY-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	06-MAY-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	06-MAY-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	06-MAY-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	06-MAY-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	06-MAY-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	06-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5076825								
WG3318005-1 MB		**NP**						
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	06-MAY-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	06-MAY-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	06-MAY-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	06-MAY-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	06-MAY-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	06-MAY-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	06-MAY-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	06-MAY-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	06-MAY-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	06-MAY-20
MET-T-CCMS-VA	**Water**							
Batch R5075459								
WG3316398-3 DUP		**L2441677-1**						
Aluminum (Al)-Total		0.0108	0.0078	J	mg/L	0.0030	0.006	04-MAY-20
Antimony (Sb)-Total		0.00039	0.00039		mg/L	0.2	20	04-MAY-20
Arsenic (As)-Total		0.00031	0.00030		mg/L	2.9	20	04-MAY-20
Barium (Ba)-Total		0.0374	0.0365		mg/L	2.4	20	04-MAY-20
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-MAY-20
Boron (B)-Total		0.019	0.019		mg/L	0.1	20	04-MAY-20
Cadmium (Cd)-Total		0.000424	0.000421		mg/L	0.8	20	04-MAY-20
Calcium (Ca)-Total		130	127		mg/L	1.8	20	04-MAY-20
Chromium (Cr)-Total		0.00017	0.00016		mg/L	11	20	04-MAY-20
Cobalt (Co)-Total		0.00015	0.00014		mg/L	5.3	20	04-MAY-20
Copper (Cu)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	04-MAY-20
Iron (Fe)-Total		0.016	<0.010	RPD-NA	mg/L	N/A	20	04-MAY-20
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	04-MAY-20
Lithium (Li)-Total		0.0621	0.0595		mg/L	4.3	20	04-MAY-20
Magnesium (Mg)-Total		61.8	60.3		mg/L	2.4	20	04-MAY-20
Manganese (Mn)-Total		0.00058	0.00052		mg/L	10	20	04-MAY-20
Molybdenum (Mo)-Total		0.00220	0.00220		mg/L	0.1	20	04-MAY-20
Nickel (Ni)-Total		0.0102	0.0102		mg/L	0.3	20	04-MAY-20
Potassium (K)-Total		1.87	1.95		mg/L	4.2	20	04-MAY-20
Selenium (Se)-Total		0.0624	0.0658		mg/L	5.2	20	04-MAY-20
Silicon (Si)-Total		2.15	2.16		mg/L	0.3	20	04-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5075459								
WG3316398-3 DUP		**L2441677-1**						
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	04-MAY-20
Sodium (Na)-Total		9.71	9.54		mg/L	1.7	20	04-MAY-20
Strontium (Sr)-Total		0.249	0.247		mg/L	0.9	20	04-MAY-20
Thallium (Tl)-Total		0.000018	0.000017		mg/L	1.1	20	04-MAY-20
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	04-MAY-20
Titanium (Ti)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	04-MAY-20
Uranium (U)-Total		0.00484	0.00478		mg/L	1.2	20	04-MAY-20
Vanadium (V)-Total		0.00064	0.00065		mg/L	0.5	20	04-MAY-20
Zinc (Zn)-Total		0.0153	0.0143		mg/L	6.7	20	04-MAY-20
WG3316398-2 LCS								
Aluminum (Al)-Total			102.1		%		80-120	04-MAY-20
Antimony (Sb)-Total			102.3		%		80-120	04-MAY-20
Arsenic (As)-Total			98.4		%		80-120	04-MAY-20
Barium (Ba)-Total			99.3		%		80-120	04-MAY-20
Bismuth (Bi)-Total			102.9		%		80-120	04-MAY-20
Boron (B)-Total			89.4		%		80-120	04-MAY-20
Cadmium (Cd)-Total			100.9		%		80-120	04-MAY-20
Calcium (Ca)-Total			98.1		%		80-120	04-MAY-20
Chromium (Cr)-Total			100.4		%		80-120	04-MAY-20
Cobalt (Co)-Total			98.2		%		80-120	04-MAY-20
Copper (Cu)-Total			98.9		%		80-120	04-MAY-20
Iron (Fe)-Total			101.2		%		80-120	04-MAY-20
Lead (Pb)-Total			102.4		%		80-120	04-MAY-20
Lithium (Li)-Total			96.5		%		80-120	04-MAY-20
Magnesium (Mg)-Total			100.5		%		80-120	04-MAY-20
Manganese (Mn)-Total			100.1		%		80-120	04-MAY-20
Molybdenum (Mo)-Total			100.6		%		80-120	04-MAY-20
Nickel (Ni)-Total			101.7		%		80-120	04-MAY-20
Potassium (K)-Total			102.4		%		80-120	04-MAY-20
Selenium (Se)-Total			95.8		%		80-120	04-MAY-20
Silicon (Si)-Total			97.2		%		80-120	04-MAY-20
Silver (Ag)-Total			103.8		%		80-120	04-MAY-20
Sodium (Na)-Total			101.5		%		80-120	04-MAY-20
Strontium (Sr)-Total			103.3		%		80-120	04-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5075459								
WG3316398-2 LCS								
Thallium (Tl)-Total			100.1		%		80-120	04-MAY-20
Tin (Sn)-Total			100.3		%		80-120	04-MAY-20
Titanium (Ti)-Total			97.3		%		80-120	04-MAY-20
Uranium (U)-Total			104.5		%		80-120	04-MAY-20
Vanadium (V)-Total			101.2		%		80-120	04-MAY-20
Zinc (Zn)-Total			99.6		%		80-120	04-MAY-20
WG3316398-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	04-MAY-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	04-MAY-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	04-MAY-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	04-MAY-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	04-MAY-20
Boron (B)-Total			<0.010		mg/L		0.01	04-MAY-20
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	04-MAY-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	04-MAY-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	04-MAY-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	04-MAY-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	04-MAY-20
Iron (Fe)-Total			<0.010		mg/L		0.01	04-MAY-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	04-MAY-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	04-MAY-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	04-MAY-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	04-MAY-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	04-MAY-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	04-MAY-20
Potassium (K)-Total			<0.050		mg/L		0.05	04-MAY-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	04-MAY-20
Silicon (Si)-Total			<0.10		mg/L		0.1	04-MAY-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	04-MAY-20
Sodium (Na)-Total			<0.050		mg/L		0.05	04-MAY-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	04-MAY-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	04-MAY-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	04-MAY-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	04-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5075459								
WG3316398-1 MB								
Uranium (U)-Total			<0.000010		mg/L		0.00001	04-MAY-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	04-MAY-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	04-MAY-20
WG3316398-4 MS		**L2441677-2**						
Aluminum (Al)-Total			96.6		%		70-130	04-MAY-20
Antimony (Sb)-Total			102.9		%		70-130	04-MAY-20
Arsenic (As)-Total			99.3		%		70-130	04-MAY-20
Barium (Ba)-Total			N/A	MS-B	%		-	04-MAY-20
Bismuth (Bi)-Total			92.4		%		70-130	04-MAY-20
Boron (B)-Total			96.8		%		70-130	04-MAY-20
Cadmium (Cd)-Total			97.5		%		70-130	04-MAY-20
Calcium (Ca)-Total			N/A	MS-B	%		-	04-MAY-20
Chromium (Cr)-Total			98.1		%		70-130	04-MAY-20
Cobalt (Co)-Total			94.0		%		70-130	04-MAY-20
Copper (Cu)-Total			90.4		%		70-130	04-MAY-20
Iron (Fe)-Total			95.5		%		70-130	04-MAY-20
Lead (Pb)-Total			92.1		%		70-130	04-MAY-20
Lithium (Li)-Total			89.3		%		70-130	04-MAY-20
Magnesium (Mg)-Total			N/A	MS-B	%		-	04-MAY-20
Manganese (Mn)-Total			92.9		%		70-130	04-MAY-20
Molybdenum (Mo)-Total			104.6		%		70-130	04-MAY-20
Nickel (Ni)-Total			93.3		%		70-130	04-MAY-20
Potassium (K)-Total			99.0		%		70-130	04-MAY-20
Selenium (Se)-Total			N/A	MS-B	%		-	04-MAY-20
Silicon (Si)-Total			91.8		%		70-130	04-MAY-20
Silver (Ag)-Total			102.5		%		70-130	04-MAY-20
Sodium (Na)-Total			N/A	MS-B	%		-	04-MAY-20
Strontium (Sr)-Total			N/A	MS-B	%		-	04-MAY-20
Thallium (Tl)-Total			89.7		%		70-130	04-MAY-20
Tin (Sn)-Total			100.9		%		70-130	04-MAY-20
Titanium (Ti)-Total			99.98		%		70-130	04-MAY-20
Uranium (U)-Total			N/A	MS-B	%		-	04-MAY-20
Vanadium (V)-Total			99.5		%		70-130	04-MAY-20
Zinc (Zn)-Total			92.2		%		70-130	04-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-L-F-CL	**Water**							
Batch R5077058								
WG3318147-15 DUP		**L2441677-6**						
Ammonia as N		0.0071	0.0074		mg/L	4.1	20	05-MAY-20
WG3318147-14 LCS								
Ammonia as N			105.0		%		85-115	05-MAY-20
WG3318147-13 MB								
Ammonia as N			<0.0050		mg/L		0.005	05-MAY-20
WG3318147-16 MS		**L2441677-6**						
Ammonia as N			124.3		%		75-125	05-MAY-20
NO2-L-IC-N-CL	**Water**							
Batch R5071238								
WG3316412-14 LCS								
Nitrite (as N)			104.0		%		90-110	29-APR-20
WG3316412-13 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	29-APR-20
NO3-L-IC-N-CL	**Water**							
Batch R5071238								
WG3316412-14 LCS								
Nitrate (as N)			101.4		%		90-110	29-APR-20
WG3316412-13 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	29-APR-20
ORP-CL	**Water**							
Batch R5076883								
WG3318255-5 CRM		**CL-ORP**						
ORP			221		mV		210-230	05-MAY-20
WG3318255-6 DUP		**L2441677-6**						
ORP		321	320	J	mV	0.8	15	05-MAY-20
P-T-L-COL-CL	**Water**							
Batch R5075803								
WG3317756-38 LCS								
Phosphorus (P)-Total			104.7		%		80-120	05-MAY-20
WG3317756-37 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	05-MAY-20
PH-CL	**Water**							
Batch R5070501								
WG3316201-2 LCS								
pH			6.97		pH		6.9-7.1	30-APR-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PO4-DO-L-COL-CL	**Water**							
Batch R5069864								
WG3315015-18 LCS								
Orthophosphate-Dissolved (as P)			106.4		%		80-120	29-APR-20
WG3315015-22 LCS								
Orthophosphate-Dissolved (as P)			106.0		%		80-120	29-APR-20
WG3315015-17 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	29-APR-20
WG3315015-21 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	29-APR-20
SO4-IC-N-CL	**Water**							
Batch R5071238								
WG3316412-14 LCS								
Sulfate (SO4)			104.3		%		90-110	29-APR-20
WG3316412-13 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	29-APR-20
SOLIDS-TDS-CL	**Water**							
Batch R5073077								
WG3316187-53 LCS								
Total Dissolved Solids			105.0		%		85-115	01-MAY-20
WG3316187-56 LCS								
Total Dissolved Solids			99.97		%		85-115	01-MAY-20
WG3316187-52 MB								
Total Dissolved Solids			<10		mg/L		10	01-MAY-20
WG3316187-55 MB								
Total Dissolved Solids			<10		mg/L		10	01-MAY-20
Batch R5075900								
WG3317134-10 LCS								
Total Dissolved Solids			99.1		%		85-115	04-MAY-20
WG3317134-4 LCS								
Total Dissolved Solids			99.4		%		85-115	04-MAY-20
WG3317134-3 MB								
Total Dissolved Solids			<10		mg/L		10	04-MAY-20
WG3317134-9 MB								
Total Dissolved Solids			<10		mg/L		10	04-MAY-20
TKN-L-F-CL	**Water**							
Batch R5079874								
WG3319610-11 LCS								
Total Kjeldahl Nitrogen			93.4		%		75-125	07-MAY-20
WG3319610-15 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-L-F-CL	**Water**							
Batch R5079874								
WG3319610-15 LCS								
Total Kjeldahl Nitrogen			97.4		%		75-125	07-MAY-20
WG3319610-19 LCS								
Total Kjeldahl Nitrogen			92.4		%		75-125	07-MAY-20
WG3319610-2 LCS								
Total Kjeldahl Nitrogen			93.0		%		75-125	07-MAY-20
WG3319610-23 LCS								
Total Kjeldahl Nitrogen			88.0		%		75-125	07-MAY-20
WG3319610-7 LCS								
Total Kjeldahl Nitrogen			94.1		%		75-125	07-MAY-20
WG3319610-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	07-MAY-20
WG3319610-10 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	07-MAY-20
WG3319610-14 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	07-MAY-20
WG3319610-18 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	07-MAY-20
WG3319610-22 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	07-MAY-20
WG3319610-6 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	07-MAY-20
TSS-L-CL	**Water**							
Batch R5073078								
WG3316216-8 LCS								
Total Suspended Solids			94.2		%		85-115	01-MAY-20
WG3316216-7 MB								
Total Suspended Solids			<1.0		mg/L		1	01-MAY-20
Batch R5077956								
WG3318330-2 LCS								
Total Suspended Solids			113.3		%		85-115	05-MAY-20
WG3318330-4 LCS								
Total Suspended Solids			109.6		%		85-115	05-MAY-20
WG3318330-1 MB								
Total Suspended Solids			<1.0		mg/L		1	05-MAY-20
WG3318330-3 MB								
Total Suspended Solids			<1.0		mg/L		1	05-MAY-20
TURBIDITY-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TURBIDITY-CL	**Water**							
Batch R5070162								
WG3315893-5 LCS								
Turbidity			104.5		%		85-115	30-APR-20
WG3315893-4 MB								
Turbidity			<0.10		NTU		0.1	30-APR-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	27-APR-20 11:07	05-MAY-20 18:15	0.25	199	hours	EHTR-FM
	2	27-APR-20 13:25	05-MAY-20 18:15	0.25	197	hours	EHTR-FM
	3	27-APR-20 15:50	05-MAY-20 18:15	0.25	194	hours	EHTR-FM
	4	28-APR-20 08:30	05-MAY-20 18:15	0.25	178	hours	EHTR-FM
	5	28-APR-20 13:05	05-MAY-20 18:15	0.25	173	hours	EHTR-FM
	6	28-APR-20 14:00	05-MAY-20 18:15	0.25	172	hours	EHTR-FM
pH							
	1	27-APR-20 11:07	30-APR-20 13:00	0.25	74	hours	EHTR-FM
	2	27-APR-20 13:25	30-APR-20 13:00	0.25	72	hours	EHTR-FM
	3	27-APR-20 15:50	30-APR-20 13:00	0.25	69	hours	EHTR-FM
	4	28-APR-20 08:30	30-APR-20 13:00	0.25	53	hours	EHTR-FM
	5	28-APR-20 13:05	30-APR-20 13:00	0.25	48	hours	EHTR-FM
	6	28-APR-20 14:00	30-APR-20 13:00	0.25	47	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2441677 were received on 29-APR-20 08:20.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes 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 pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID:	Regional Effects Program	TURNAROUND TIME:	Regular

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program/Line Creek LAEMP			Lab Name	ALS Calgary			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cait Good			Lab Contact	Lyuda Shvets			Email 1:	cait.good@teck.com	X	X	X
Email	cait.good@teck.com			Email	Lyudmyla.Shvets@ALSGlobal.com			Email 2:	carlie.meyer@teck.com	X	X	X
Address	421 Pine Avenue			Address	2559 29 Street NE			Email 3:	teckcoal@equisonline.com			X
								Email 4:	kbatchelar@minnow.ca	X	X	X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:				
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada					
Phone Number	250-425-8202			Phone Number	403-407-1800			PO number	VPO00689999			

L2441677-COFC

SAMPLE DETAILS								ANALYSIS REQUESTED										
								Filtered	N	Y	N	Y	Y	N	N			
								PRESERV	NONE	H2SO4	H2SO4	HCl	HNO3	HNO3	NONE			
Sample ID	Sample Location (sys loc code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	ANALYSIS	HG-T-U-CVAF-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-D-CVAF-VA	TECKCOAL-MET-D-VA	TECKCOAL-MET-T-VA	TECKCOAL-ROUTINE-VA			
RG_LCUT_WS_20200427-1107	RG_LCUT	WS	NO	27-Apr-20	11:07:00	G	7		X	X	X	X	X	X	X			
RG_LILC3_WS_20200427-1325	RG_LILC3	WS	NO	27-Apr-20	13:25:00	G	7		X	X	X	X	X	X	X			
RG_FO23_WS_20200427-1550	RG_F023	WS	NO	27-Apr-20	15:50:00	G	7		X	X	X	X	X	X	X			
RG_LI24_WS_20200428-0830	RG_LI24	WS	NO	28-Apr-20	8:30:00	G	7		X	X	X	X	X	X	X			
RG_SLINE_WS_20200428-1305	RG_SLINE	WS	NO	28-Apr-20	13:05:00	G	7		X	X	X	X	X	X	X			
RG_RIVER_WS_20200428-1400	RG_RIVER	WS	NO	28-Apr-20	14:00:00	G	7		X	X	X	X	X	X	X			

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
VPO00689999	Scott Gordon/Lotic Environmental	April 28, 2020		4/29/20

SERVICE REQUEST (rush - subject to availability)					
Regular (default)	X	Sampler's Name	Scott Gordon	Mobile #	780-385-0186
Priority (2-3 business days) - 50% surcharge					
Emergency (1 Business Day) - 100% surcharge		Sampler's Signature		Date/Time	April 28, 2020
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

WATER CHEMISTRY

ALS Laboratory Report L2442190

(Finalized May 9, 2020)

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 30-APR-20
Report Date: 09-MAY-20 16:25 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2442190

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: Regional Effects
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2442190-1	L2442190-3			
	Description	WS	WS			
	Sampled Date	29-APR-20	29-APR-20			
	Sampled Time	08:15	14:15			
	Client ID	RG_LISP24_WS_20200429-0815	RG_FRUL_WS_20200429-1415			
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	788	687			
	Hardness (as CaCO3) (mg/L)	485	435			
	pH (pH)	8.24	8.41			
	ORP (mV)	447	329			
	Total Suspended Solids (mg/L)	<1.0	3.9			
	Total Dissolved Solids (mg/L)	626 DLHC	525 DLHC			
	Turbidity (NTU)	0.47	1.96			
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	1.6	<1.0			
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	196	178			
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	6.4			
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Total (as CaCO3) (mg/L)	196	185			
	Ammonia as N (mg/L)	<0.0050	0.0624			
	Bromide (Br) (mg/L)	<0.050	<0.050			
	Chloride (Cl) (mg/L)	10.0	2.02			
	Fluoride (F) (mg/L)	0.235	0.161			
	Ion Balance (%)	104	106			
	Nitrate (as N) (mg/L)	9.26	10.1			
	Nitrite (as N) (mg/L)	<0.0010	0.0102			
	Total Kjeldahl Nitrogen (mg/L)	<0.050 TKNI	0.339 TKNI			
	Orthophosphate-Dissolved (as P) (mg/L)	0.0015	0.0017			
	Phosphorus (P)-Total (mg/L)	0.0026	0.0033			
	Sulfate (SO4) (mg/L)	229	184			
	Anion Sum (meq/L)	9.64	8.31			
	Cation Sum (meq/L)	10.1	8.83			
	Cation - Anion Balance (%)	2.1	3.0			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	0.62	1.45			
	Total Organic Carbon (mg/L)	0.77	1.58			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0050	0.0406			
	Antimony (Sb)-Total (mg/L)	0.00025	0.00015			
	Arsenic (As)-Total (mg/L)	0.00012	0.00013			
	Barium (Ba)-Total (mg/L)	0.0414	0.0923			
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020			
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050			
	Boron (B)-Total (mg/L)	0.014	<0.010			
	Cadmium (Cd)-Total (ug/L)	0.207	0.0262			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2442190-1	L2442190-3			
	Description	WS	WS			
	Sampled Date	29-APR-20	29-APR-20			
	Sampled Time	08:15	14:15			
	Client ID	RG_LISP24_WS_20200429-0815	RG_FRUL_WS_20200429-1415			
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	111	102			
	Chromium (Cr)-Total (mg/L)	0.00012	0.00016			
	Cobalt (Co)-Total (ug/L)	0.11	0.10			
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050			
	Iron (Fe)-Total (mg/L)	0.039	0.061			
	Lead (Pb)-Total (mg/L)	<0.000050	0.000060			
	Lithium (Li)-Total (mg/L)	0.0403	0.0192			
	Magnesium (Mg)-Total (mg/L)	46.6	40.9			
	Manganese (Mn)-Total (mg/L)	0.0123	0.00537			
	Mercury (Hg)-Total (ug/L)	<0.00050	0.00080			
	Molybdenum (Mo)-Total (mg/L)	0.00251	0.00120			
	Nickel (Ni)-Total (mg/L)	0.00546	0.00195			
	Potassium (K)-Total (mg/L)	1.35	1.33			
	Selenium (Se)-Total (ug/L)	37.5	46.4			
	Silicon (Si)-Total (mg/L)	2.15	2.05			
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Total (mg/L)	7.35	2.18			
	Strontium (Sr)-Total (mg/L)	0.215	0.144			
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010			
	Uranium (U)-Total (mg/L)	0.00335	0.00216			
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050			
	Zinc (Zn)-Total (mg/L)	0.0073	<0.0030			
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD			
	Dissolved Metals Filtration Location	FIELD	FIELD			
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030			
	Antimony (Sb)-Dissolved (mg/L)	0.00023	0.00014			
	Arsenic (As)-Dissolved (mg/L)	0.00012	0.00012			
	Barium (Ba)-Dissolved (mg/L)	0.0417	0.0972			
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020			
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050			
	Boron (B)-Dissolved (mg/L)	0.013	<0.010			
	Cadmium (Cd)-Dissolved (ug/L)	0.168	0.0219			
	Calcium (Ca)-Dissolved (mg/L)	110	98.8			
	Chromium (Cr)-Dissolved (mg/L)	0.00011	<0.00010			
	Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2442190-1	L2442190-3			
	Description	WS	WS			
	Sampled Date	29-APR-20	29-APR-20			
	Sampled Time	08:15	14:15			
	Client ID	RG_LISP24_WS_20200429-0815	RG_FRUL_WS_20200429-1415			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	0.00021	0.00020			
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010			
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	0.0409	0.0188			
	Magnesium (Mg)-Dissolved (mg/L)	50.7	45.8			
	Manganese (Mn)-Dissolved (mg/L)	0.00761	0.00118			
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050			
	Molybdenum (Mo)-Dissolved (mg/L)	0.00229	0.00117			
	Nickel (Ni)-Dissolved (mg/L)	0.00551	0.00183			
	Potassium (K)-Dissolved (mg/L)	1.39	1.32			
	Selenium (Se)-Dissolved (ug/L)	37.3	44.9			
	Silicon (Si)-Dissolved (mg/L)	2.06	1.82			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	7.89	2.23			
	Strontium (Sr)-Dissolved (mg/L)	0.203	0.146			
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010			
	Uranium (U)-Dissolved (mg/L)	0.00341	0.00206			
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050			
	Zinc (Zn)-Dissolved (mg/L)	0.0067	<0.0010			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Copper (Cu)-Total	DUP-H,J	L2442190-1, -3
Matrix Spike	Aluminum (Al)-Dissolved	MS-B	L2442190-1, -3
Matrix Spike	Cadmium (Cd)-Dissolved	MS-B	L2442190-1, -3
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2442190-1, -3
Matrix Spike	Cobalt (Co)-Dissolved	MS-B	L2442190-1, -3
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2442190-1, -3
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2442190-1, -3
Matrix Spike	Nickel (Ni)-Dissolved	MS-B	L2442190-1, -3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2442190-1, -3
Matrix Spike	Zinc (Zn)-Dissolved	MS-B	L2442190-1, -3
Matrix Spike	Barium (Ba)-Total	MS-B	L2442190-1, -3
Matrix Spike	Calcium (Ca)-Total	MS-B	L2442190-1, -3
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2442190-1, -3
Matrix Spike	Selenium (Se)-Total	MS-B	L2442190-1, -3
Matrix Spike	Strontium (Sr)-Total	MS-B	L2442190-1, -3

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DUP-H,J	Duplicate results outside ALS DQO, due to sample heterogeneity. Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". 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.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The

Reference Information

carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-IC-N-CL Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

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 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL Water Oxidation redution potential by elect. ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

Reference Information

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL Water Phosphorus (P)-Total APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL Water pH APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL Water Orthophosphate-Dissolved (as P) APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL Water Total Dissolved Solids APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL Water Total Kjeldahl Nitrogen APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL Water Total Suspended Solids APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL Water Turbidity APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Regional Effects

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour 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.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5072819								
WG3316794-17 LCS								
Acidity (as CaCO3)			102.4		%		85-115	01-MAY-20
WG3316794-16 MB								
Acidity (as CaCO3)			1.3		mg/L		2	01-MAY-20
ALK-MAN-CL	**Water**							
Batch R5072857								
WG3316798-14 LCS								
Alkalinity, Total (as CaCO3)			101.2		%		85-115	01-MAY-20
WG3316798-13 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	01-MAY-20
BE-D-L-CCMS-VA	**Water**							
Batch R5079908								
WG3318995-2 LCS								
Beryllium (Be)-Dissolved			98.2		%		80-120	07-MAY-20
WG3318995-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	07-MAY-20
BE-T-L-CCMS-VA	**Water**							
Batch R5079557								
WG3318226-2 LCS								
Beryllium (Be)-Total			102.5		%		80-120	07-MAY-20
WG3318226-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	07-MAY-20
BR-L-IC-N-CL	**Water**							
Batch R5075862								
WG3317875-6 LCS								
Bromide (Br)			103.3		%		85-115	01-MAY-20
WG3317875-5 MB								
Bromide (Br)			<0.050		mg/L		0.05	01-MAY-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5075198								
WG3317531-6 LCS								
Dissolved Organic Carbon			107.1		%		80-120	04-MAY-20
WG3317531-5 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	04-MAY-20
C-TOT-ORG-LOW-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-LOW-CL	**Water**							
Batch R5075198								
WG3317531-6 LCS								
Total Organic Carbon			109.8		%		80-120	04-MAY-20
WG3317531-5 MB								
Total Organic Carbon			<0.50		mg/L		0.5	04-MAY-20
CL-IC-N-CL	**Water**							
Batch R5075862								
WG3317875-6 LCS								
Chloride (Cl)			102.0		%		90-110	01-MAY-20
WG3317875-5 MB								
Chloride (Cl)			<0.50		mg/L		0.5	01-MAY-20
EC-L-PCT-CL	**Water**							
Batch R5072857								
WG3316798-14 LCS								
Conductivity (@ 25C)			101.5		%		90-110	01-MAY-20
WG3316798-13 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	01-MAY-20
F-IC-N-CL	**Water**							
Batch R5075862								
WG3317875-6 LCS								
Fluoride (F)			100.2		%		90-110	01-MAY-20
WG3317875-5 MB								
Fluoride (F)			<0.020		mg/L		0.02	01-MAY-20
HG-D-CVAA-VA	**Water**							
Batch R5075748								
WG3317744-6 LCS								
Mercury (Hg)-Dissolved			100.1		%		80-120	05-MAY-20
WG3317744-5 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	05-MAY-20
HG-T-U-CVAF-VA	**Water**							
Batch R5076259								
WG3318158-2 LCS								
Mercury (Hg)-Total			97.0		%		80-120	05-MAY-20
WG3318158-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	05-MAY-20
MET-D-CCMS-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5079908								
WG3318995-2 LCS								
Aluminum (Al)-Dissolved			105.9		%		80-120	07-MAY-20
Antimony (Sb)-Dissolved			90.4		%		80-120	07-MAY-20
Arsenic (As)-Dissolved			99.4		%		80-120	07-MAY-20
Barium (Ba)-Dissolved			101.2		%		80-120	07-MAY-20
Bismuth (Bi)-Dissolved			104.2		%		80-120	07-MAY-20
Boron (B)-Dissolved			88.1		%		80-120	07-MAY-20
Cadmium (Cd)-Dissolved			100.2		%		80-120	07-MAY-20
Calcium (Ca)-Dissolved			96.6		%		80-120	07-MAY-20
Chromium (Cr)-Dissolved			105.2		%		80-120	07-MAY-20
Cobalt (Co)-Dissolved			101.8		%		80-120	07-MAY-20
Copper (Cu)-Dissolved			100.7		%		80-120	07-MAY-20
Iron (Fe)-Dissolved			92.3		%		80-120	07-MAY-20
Lead (Pb)-Dissolved			94.8		%		80-120	07-MAY-20
Lithium (Li)-Dissolved			98.5		%		80-120	07-MAY-20
Magnesium (Mg)-Dissolved			101.4		%		80-120	07-MAY-20
Manganese (Mn)-Dissolved			102.8		%		80-120	07-MAY-20
Molybdenum (Mo)-Dissolved			93.6		%		80-120	07-MAY-20
Nickel (Ni)-Dissolved			102.1		%		80-120	07-MAY-20
Potassium (K)-Dissolved			99.5		%		80-120	07-MAY-20
Selenium (Se)-Dissolved			94.4		%		80-120	07-MAY-20
Silicon (Si)-Dissolved			97.2		%		60-140	07-MAY-20
Silver (Ag)-Dissolved			94.4		%		80-120	07-MAY-20
Sodium (Na)-Dissolved			107.2		%		80-120	07-MAY-20
Strontium (Sr)-Dissolved			95.4		%		80-120	07-MAY-20
Thallium (Tl)-Dissolved			99.3		%		80-120	07-MAY-20
Tin (Sn)-Dissolved			92.5		%		80-120	07-MAY-20
Titanium (Ti)-Dissolved			102.4		%		80-120	07-MAY-20
Uranium (U)-Dissolved			98.8		%		80-120	07-MAY-20
Vanadium (V)-Dissolved			103.7		%		80-120	07-MAY-20
Zinc (Zn)-Dissolved			98.1		%		80-120	07-MAY-20
WG3318995-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	07-MAY-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	07-MAY-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	07-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5079908								
WG3318995-1 MB		**NP**						
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	07-MAY-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	07-MAY-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	07-MAY-20
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	07-MAY-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	07-MAY-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	07-MAY-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	07-MAY-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	07-MAY-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	07-MAY-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	07-MAY-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	07-MAY-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	07-MAY-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	07-MAY-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	07-MAY-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	07-MAY-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	07-MAY-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	07-MAY-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	07-MAY-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	07-MAY-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	07-MAY-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	07-MAY-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	07-MAY-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	07-MAY-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	07-MAY-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	07-MAY-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	07-MAY-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	07-MAY-20
MET-T-CCMS-VA	**Water**							
Batch R5079557								
WG3318226-2 LCS								
Aluminum (Al)-Total			97.1		%		80-120	07-MAY-20
Antimony (Sb)-Total			103.5		%		80-120	07-MAY-20
Arsenic (As)-Total			98.8		%		80-120	07-MAY-20
Barium (Ba)-Total			100.9		%		80-120	07-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5079557								
WG3318226-2 LCS								
Bismuth (Bi)-Total			107.6		%		80-120	07-MAY-20
Boron (B)-Total			97.2		%		80-120	07-MAY-20
Cadmium (Cd)-Total			98.8		%		80-120	07-MAY-20
Calcium (Ca)-Total			105.7		%		80-120	07-MAY-20
Chromium (Cr)-Total			99.0		%		80-120	07-MAY-20
Cobalt (Co)-Total			99.5		%		80-120	07-MAY-20
Copper (Cu)-Total			98.3		%		80-120	07-MAY-20
Iron (Fe)-Total			96.4		%		80-120	07-MAY-20
Lead (Pb)-Total			107.4		%		80-120	07-MAY-20
Lithium (Li)-Total			106.1		%		80-120	07-MAY-20
Magnesium (Mg)-Total			98.1		%		80-120	07-MAY-20
Manganese (Mn)-Total			98.4		%		80-120	07-MAY-20
Molybdenum (Mo)-Total			104.5		%		80-120	07-MAY-20
Nickel (Ni)-Total			99.0		%		80-120	07-MAY-20
Potassium (K)-Total			104.1		%		80-120	07-MAY-20
Selenium (Se)-Total			103.2		%		80-120	07-MAY-20
Silicon (Si)-Total			103.3		%		80-120	07-MAY-20
Silver (Ag)-Total			103.4		%		80-120	07-MAY-20
Sodium (Na)-Total			102.3		%		80-120	07-MAY-20
Strontium (Sr)-Total			104.5		%		80-120	07-MAY-20
Thallium (Tl)-Total			108.1		%		80-120	07-MAY-20
Tin (Sn)-Total			102.2		%		80-120	07-MAY-20
Titanium (Ti)-Total			99.5		%		80-120	07-MAY-20
Uranium (U)-Total			100.6		%		80-120	07-MAY-20
Vanadium (V)-Total			101.5		%		80-120	07-MAY-20
Zinc (Zn)-Total			101.9		%		80-120	07-MAY-20
WG3318226-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	07-MAY-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	07-MAY-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	07-MAY-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	07-MAY-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	07-MAY-20
Boron (B)-Total			<0.010		mg/L		0.01	07-MAY-20
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	07-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5079557								
WG3318226-1 MB								
Calcium (Ca)-Total			<0.050		mg/L		0.05	07-MAY-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	07-MAY-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	07-MAY-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	07-MAY-20
Iron (Fe)-Total			<0.010		mg/L		0.01	07-MAY-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	07-MAY-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	07-MAY-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	07-MAY-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	07-MAY-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	07-MAY-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	07-MAY-20
Potassium (K)-Total			<0.050		mg/L		0.05	07-MAY-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	07-MAY-20
Silicon (Si)-Total			<0.10		mg/L		0.1	07-MAY-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	07-MAY-20
Sodium (Na)-Total			<0.050		mg/L		0.05	07-MAY-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	07-MAY-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	07-MAY-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	07-MAY-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	07-MAY-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	07-MAY-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	07-MAY-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	07-MAY-20
NH3-L-F-CL	**Water**							
Batch R5079535								
WG3318852-18 LCS								
Ammonia as N			102.6		%		85-115	06-MAY-20
WG3318852-17 MB								
Ammonia as N			<0.0050		mg/L		0.005	06-MAY-20
NO2-L-IC-N-CL	**Water**							
Batch R5075862								
WG3317875-6 LCS								
Nitrite (as N)			104.3		%		90-110	01-MAY-20
WG3317875-5 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	01-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-L-IC-N-CL	**Water**							
Batch R5075862								
WG3317875-6 LCS								
Nitrate (as N)			101.6		%		90-110	01-MAY-20
WG3317875-5 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	01-MAY-20
ORP-CL	**Water**							
Batch R5078862								
WG3319006-5 CRM		**CL-ORP**						
ORP			225		mV		210-230	06-MAY-20
P-T-L-COL-CL	**Water**							
Batch R5078337								
WG3318528-26 LCS								
Phosphorus (P)-Total			102.7		%		80-120	06-MAY-20
WG3318528-25 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	06-MAY-20
PH-CL	**Water**							
Batch R5072857								
WG3316798-14 LCS								
pH			6.97		pH		6.9-7.1	01-MAY-20
PO4-DO-L-COL-CL	**Water**							
Batch R5073856								
WG3316490-2 LCS								
Orthophosphate-Dissolved (as P)			104.5		%		80-120	01-MAY-20
WG3316490-1 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	01-MAY-20
SO4-IC-N-CL	**Water**							
Batch R5075862								
WG3317875-6 LCS								
Sulfate (SO4)			103.7		%		90-110	01-MAY-20
WG3317875-5 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	01-MAY-20
SOLIDS-TDS-CL	**Water**							
Batch R5078504								
WG3317745-11 LCS								
Total Dissolved Solids			101.0		%		85-115	05-MAY-20
WG3317745-2 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-CL	**Water**							
Batch R5078504								
WG3317745-2 LCS								
Total Dissolved Solids			104.4		%		85-115	05-MAY-20
WG3317745-1 MB								
Total Dissolved Solids			<10		mg/L		10	05-MAY-20
WG3317745-10 MB								
Total Dissolved Solids			<10		mg/L		10	05-MAY-20
TKN-L-F-CL	**Water**							
Batch R5080434								
WG3320325-10 LCS								
Total Kjeldahl Nitrogen			89.0		%		75-125	08-MAY-20
WG3320325-14 LCS								
Total Kjeldahl Nitrogen			90.1		%		75-125	08-MAY-20
WG3320325-18 LCS								
Total Kjeldahl Nitrogen			90.8		%		75-125	08-MAY-20
WG3320325-2 LCS								
Total Kjeldahl Nitrogen			92.9		%		75-125	08-MAY-20
WG3320325-22 LCS								
Total Kjeldahl Nitrogen			89.8		%		75-125	08-MAY-20
WG3320325-26 LCS								
Total Kjeldahl Nitrogen			94.6		%		75-125	08-MAY-20
WG3320325-6 LCS								
Total Kjeldahl Nitrogen			90.0		%		75-125	08-MAY-20
WG3320325-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-13 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-17 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-21 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-25 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-5 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-9 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
TSS-L-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TSS-L-CL	**Water**							
Batch R5078487								
WG3318455-6 LCS								
Total Suspended Solids			93.8		%		85-115	06-MAY-20
WG3318455-5 MB								
Total Suspended Solids			<1.0		mg/L		1	06-MAY-20
TURBIDITY-CL	**Water**							
Batch R5071139								
WG3316415-14 LCS								
Turbidity			103.0		%		85-115	01-MAY-20
WG3316415-13 MB								
Turbidity			<0.10		NTU		0.1	01-MAY-20
Batch R5073116								
WG3316918-2 LCS								
Turbidity			104.5		%		85-115	02-MAY-20
WG3316918-1 MB								
Turbidity			<0.10		NTU		0.1	02-MAY-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	29-APR-20 08:15	06-MAY-20 15:00	0.25	175	hours	EHTR-FM
	3	29-APR-20 14:15	06-MAY-20 15:00	0.25	169	hours	EHTR-FM
pH							
	1	29-APR-20 08:15	01-MAY-20 13:00	0.25	53	hours	EHTR-FM
	3	29-APR-20 14:15	01-MAY-20 13:00	0.25	47	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2442190 were received on 30-APR-20 09:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes 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 pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID: Regional Effects Program

TURNAROUND TIME: Regular

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program/Line Creek LAEMP			Lab Name	ALS Calgary			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cait Good			Lab Contact	Lyuda Shvets			Email 1:	cait.good@teck.com	X	X	X
Email	cait.good@teck.com			Email	Lyudmyla.Shvets@ALSGlobal.com			Email 2:	carlie.meyer@teck.com	X	X	X
Address	421 Pine Avenue			Address	2559 29 Street NE			Email 3:	teckcoal@equisonline.com			X
								Email 4:		X	X	X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:		X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada					
Phone Number	250-425-8202			Phone Number	403-407-1800			PO number	VPO00689999			

L2442190-COFC

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.	Filtered	HG-T-U-CVAF-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-D-CVAF-VA	TECKCOAL-MET-D-VA	TECKCOAL-MET-T-VA	TECKCOAL-ROUTINE-VA					
								Y/N	Y	Y	N	Y	Y	Y	N					
								PRESERV.	NONE	H2SO4	H2SO4	HCl	HNO3	HNO3	NONE					
								ANALYSIS												
RG_LISP24_WS_20200429-0815	RG_LISP24	WS	NO	29-Apr-20	8:15:00	G	7		X	X	X	X	X	X	X					
RG_LIDSL_WS_20200429-1050	RG_LIDSL	WS	NO	29-Apr-20	10:50:00	G	7		X	X	X	X	X	X	X					
RG_FRUL_WS_20200429-1415	RG_FRUL	WS	NO	29-Apr-20	14:15:00	G	7		X	X	X	X	X	X	X					

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
VPO00689999	Rick Smit/Lotic Environmental	April 29, 2020		

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		Date/Time	April 29, 2020
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

WATER CHEMISTRY

ALS Laboratory Report L2442346

(Finalized June 15, 2020)

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 30-APR-20
Report Date: 15-JUN-20 10:53 (MT)
Version: FINAL REV. 2

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2442346

Project P.O. #:	VPO00689999
Job Reference:	LINE CREEK OPERATIONS
C of C Numbers:	Line Creek Operation
Legal Site Desc:	

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2442346-1				
	Description	WS				
	Sampled Date	29-APR-20				
	Sampled Time	10:50				
	Client ID	LC_LCDSSLCC_WS_20200429-1050				
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	784				
	Hardness (as CaCO3) (mg/L)	447				
	pH (pH)	8.28				
	ORP (mV)	404				
	Total Suspended Solids (mg/L)	1.1				
	Total Dissolved Solids (mg/L)	651 DLHC				
	Turbidity (NTU)	0.42				
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	1.5				
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	196				
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Total (as CaCO3) (mg/L)	196				
	Ammonia as N (mg/L)	0.0127				
	Bromide (Br) (mg/L)	<0.050				
	Chloride (Cl) (mg/L)	10.3				
	Fluoride (F) (mg/L)	0.234				
	Ion Balance (%)	95.5				
	Nitrate (as N) (mg/L)	9.16				
	Nitrite (as N) (mg/L)	0.0039				
	Total Kjeldahl Nitrogen (mg/L)	<0.050 TKNI				
	Orthophosphate-Dissolved (as P) (mg/L)	0.0024				
	Phosphorus (P)-Total (mg/L)	0.0026				
	Sulfate (SO4) (mg/L)	232				
	Anion Sum (meq/L)	9.71				
	Cation Sum (meq/L)	9.27				
	Cation - Anion Balance (%)	-2.3				
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	0.52				
	Total Organic Carbon (mg/L)	0.61				
Total Metals	Aluminum (Al)-Total (mg/L)	<0.0030				
	Antimony (Sb)-Total (mg/L)	0.00026				
	Arsenic (As)-Total (mg/L)	0.00017				
	Barium (Ba)-Total (mg/L)	0.0517				
	Beryllium (Be)-Total (ug/L)	<0.020				
	Bismuth (Bi)-Total (mg/L)	<0.000050				
	Boron (B)-Total (mg/L)	0.015				
	Cadmium (Cd)-Total (ug/L)	0.142				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2442346-1				
	Description	WS				
	Sampled Date	29-APR-20				
	Sampled Time	10:50				
	Client ID	LC_LCDSSLCC_WS_20200429-1050				
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	108				
	Chromium (Cr)-Total (mg/L)	0.00022				
	Cobalt (Co)-Total (ug/L)	<0.10				
	Copper (Cu)-Total (mg/L)	<0.00050				
	Iron (Fe)-Total (mg/L)	0.023				
	Lead (Pb)-Total (mg/L)	<0.000050				
	Lithium (Li)-Total (mg/L)	0.0403				
	Magnesium (Mg)-Total (mg/L)	47.3				
	Manganese (Mn)-Total (mg/L)	0.00321				
	Mercury (Hg)-Total (ug/L)	<0.00050				
	Molybdenum (Mo)-Total (mg/L)	0.00244				
	Nickel (Ni)-Total (mg/L)	0.00466				
	Potassium (K)-Total (mg/L)	1.47				
	Selenium (Se)-Total (ug/L)	40.7				
	Silicon (Si)-Total (mg/L)	2.27				
	Silver (Ag)-Total (mg/L)	<0.000010				
	Sodium (Na)-Total (mg/L)	7.75				
	Strontium (Sr)-Total (mg/L)	0.215				
	Thallium (Tl)-Total (mg/L)	<0.000010				
	Tin (Sn)-Total (mg/L)	<0.00010				
	Titanium (Ti)-Total (mg/L)	<0.010				
	Uranium (U)-Total (mg/L)	0.00339				
	Vanadium (V)-Total (mg/L)	<0.00050				
	Zinc (Zn)-Total (mg/L)	0.0063				
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD				
	Dissolved Metals Filtration Location	LAB				
	Aluminum (Al)-Dissolved (mg/L)	<0.0030				
	Antimony (Sb)-Dissolved (mg/L)	0.00023				
	Arsenic (As)-Dissolved (mg/L)	0.00015				
	Barium (Ba)-Dissolved (mg/L)	0.0505				
	Beryllium (Be)-Dissolved (ug/L)	<0.020				
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050				
	Boron (B)-Dissolved (mg/L)	0.014				
	Cadmium (Cd)-Dissolved (ug/L)	0.128				
	Calcium (Ca)-Dissolved (mg/L)	104				
	Chromium (Cr)-Dissolved (mg/L)	0.00011				
	Cobalt (Co)-Dissolved (ug/L)	<0.10				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2442346-1				
	Description	WS				
	Sampled Date	29-APR-20				
	Sampled Time	10:50				
	Client ID	LC_LCDSSLCC_WS_20200429-1050				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020				
	Iron (Fe)-Dissolved (mg/L)	<0.010				
	Lead (Pb)-Dissolved (mg/L)	<0.000050				
	Lithium (Li)-Dissolved (mg/L)	0.0376				
	Magnesium (Mg)-Dissolved (mg/L)	45.5				
	Manganese (Mn)-Dissolved (mg/L)	0.00056				
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050				
	Molybdenum (Mo)-Dissolved (mg/L)	0.00227				
	Nickel (Ni)-Dissolved (mg/L)	0.00428				
	Potassium (K)-Dissolved (mg/L)	1.39				
	Selenium (Se)-Dissolved (ug/L)	44.2				
	Silicon (Si)-Dissolved (mg/L)	2.13				
	Silver (Ag)-Dissolved (mg/L)	<0.000010				
	Sodium (Na)-Dissolved (mg/L)	7.05				
	Strontium (Sr)-Dissolved (mg/L)	0.203				
	Thallium (Tl)-Dissolved (mg/L)	<0.000010				
	Tin (Sn)-Dissolved (mg/L)	<0.00010				
	Titanium (Ti)-Dissolved (mg/L)	<0.010				
	Uranium (U)-Dissolved (mg/L)	0.00331				
	Vanadium (V)-Dissolved (mg/L)	<0.00050				
	Zinc (Zn)-Dissolved (mg/L)	0.0049				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Sample Submission Listed:

Qualifier	Description
SFPL	Sample was Filtered and Preserved at the laboratory - D-MET SUBSAMPLED/FILTERED/PRESERVED AT THE LAB

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2442346-1
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2442346-1
Matrix Spike	Potassium (K)-Dissolved	MS-B	L2442346-1
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2442346-1
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2442346-1
Matrix Spike	Aluminum (Al)-Total	MS-B	L2442346-1
Matrix Spike	Barium (Ba)-Total	MS-B	L2442346-1
Matrix Spike	Calcium (Ca)-Total	MS-B	L2442346-1
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2442346-1
Matrix Spike	Manganese (Mn)-Total	MS-B	L2442346-1
Matrix Spike	Potassium (K)-Total	MS-B	L2442346-1
Matrix Spike	Sodium (Na)-Total	MS-B	L2442346-1
Matrix Spike	Strontium (Sr)-Total	MS-B	L2442346-1
Matrix Spike	Titanium (Ti)-Total	MS-B	L2442346-1

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". 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.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

Reference Information

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-IC-N-CL Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

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 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL Water Oxidation redution potential by elect. ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum

Reference Information

metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL Water Phosphorus (P)-Total APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL Water pH APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL Water Orthophosphate-Dissolved (as P) APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL Water Total Dissolved Solids APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL Water Total Kjeldahl Nitrogen APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL Water Total Suspended Solids APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL Water Turbidity APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Line Creek Operation

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour 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.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5072819								
WG3316794-23 LCS								
Acidity (as CaCO3)			95.8		%		85-115	01-MAY-20
WG3316794-22 MB								
Acidity (as CaCO3)			1.5		mg/L		2	01-MAY-20
ALK-MAN-CL	**Water**							
Batch R5072857								
WG3316798-20 LCS								
Alkalinity, Total (as CaCO3)			99.3		%		85-115	01-MAY-20
WG3316798-19 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	01-MAY-20
BE-D-L-CCMS-VA	**Water**							
Batch R5082419								
WG3322705-2 LCS								
Beryllium (Be)-Dissolved			107.0		%		80-120	13-MAY-20
WG3322705-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	13-MAY-20
BE-T-L-CCMS-VA	**Water**							
Batch R5082419								
WG3322698-3 DUP		**L2442346-1**						
Beryllium (Be)-Total		<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	13-MAY-20
WG3322698-2 LCS								
Beryllium (Be)-Total			104.2		%		80-120	13-MAY-20
WG3322698-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	13-MAY-20
BR-L-IC-N-CL	**Water**							
Batch R5075862								
WG3317875-10 LCS								
Bromide (Br)			101.7		%		85-115	01-MAY-20
WG3317875-9 MB								
Bromide (Br)			<0.050		mg/L		0.05	01-MAY-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5078339								
WG3317770-10 LCS								
Dissolved Organic Carbon			91.2		%		80-120	05-MAY-20
WG3317770-9 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	05-MAY-20
C-TOT-ORG-LOW-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-LOW-CL	**Water**							
Batch R5078339								
WG3317770-10 LCS								
Total Organic Carbon			102.0		%		80-120	05-MAY-20
WG3317770-9 MB								
Total Organic Carbon			<0.50		mg/L		0.5	05-MAY-20
CL-IC-N-CL	**Water**							
Batch R5075862								
WG3317875-10 LCS								
Chloride (Cl)			102.1		%		90-110	01-MAY-20
WG3317875-9 MB								
Chloride (Cl)			<0.50		mg/L		0.5	01-MAY-20
EC-L-PCT-CL	**Water**							
Batch R5072857								
WG3316798-20 LCS								
Conductivity (@ 25C)			97.8		%		90-110	01-MAY-20
WG3316798-19 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	01-MAY-20
F-IC-N-CL	**Water**							
Batch R5075862								
WG3317875-10 LCS								
Fluoride (F)			104.8		%		90-110	01-MAY-20
WG3317875-9 MB								
Fluoride (F)			<0.020		mg/L		0.02	01-MAY-20
HG-D-CVAA-VA	**Water**							
Batch R5075748								
WG3317744-14 LCS								
Mercury (Hg)-Dissolved			99.2		%		80-120	05-MAY-20
WG3317744-13 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	05-MAY-20
HG-T-U-CVAF-VA	**Water**							
Batch R5076259								
WG3318158-2 LCS								
Mercury (Hg)-Total			97.0		%		80-120	05-MAY-20
WG3318158-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	05-MAY-20
MET-D-CCMS-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5082419								
WG3322705-3 DUP		**L2442346-1**						
Aluminum (Al)-Dissolved		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	13-MAY-20
Antimony (Sb)-Dissolved		0.00023	0.00023		mg/L	1.7	20	13-MAY-20
Arsenic (As)-Dissolved		0.00015	0.00015		mg/L	1.8	20	13-MAY-20
Barium (Ba)-Dissolved		0.0505	0.0501		mg/L	0.8	20	13-MAY-20
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	13-MAY-20
Boron (B)-Dissolved		0.014	0.014		mg/L	1.3	20	13-MAY-20
Cadmium (Cd)-Dissolved		0.000128	0.000127		mg/L	1.2	20	13-MAY-20
Calcium (Ca)-Dissolved		104	105		mg/L	1.1	20	13-MAY-20
Chromium (Cr)-Dissolved		0.00011	0.00011		mg/L	1.7	20	13-MAY-20
Cobalt (Co)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	13-MAY-20
Copper (Cu)-Dissolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	13-MAY-20
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	13-MAY-20
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	13-MAY-20
Lithium (Li)-Dissolved		0.0376	0.0380		mg/L	1.0	20	13-MAY-20
Magnesium (Mg)-Dissolved		45.5	44.7		mg/L	1.8	20	13-MAY-20
Manganese (Mn)-Dissolved		0.00056	0.00055		mg/L	1.8	20	13-MAY-20
Molybdenum (Mo)-Dissolved		0.00227	0.00242		mg/L	6.3	20	13-MAY-20
Nickel (Ni)-Dissolved		0.00428	0.00435		mg/L	1.8	20	13-MAY-20
Potassium (K)-Dissolved		1.39	1.38		mg/L	0.5	20	13-MAY-20
Selenium (Se)-Dissolved		0.0442	0.0442		mg/L	0.1	20	13-MAY-20
Silicon (Si)-Dissolved		2.13	2.15		mg/L	0.9	20	13-MAY-20
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	13-MAY-20
Sodium (Na)-Dissolved		7.05	7.12		mg/L	1.1	20	13-MAY-20
Strontium (Sr)-Dissolved		0.203	0.210		mg/L	3.3	20	13-MAY-20
Thallium (Tl)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	13-MAY-20
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	13-MAY-20
Titanium (Ti)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	13-MAY-20
Uranium (U)-Dissolved		0.00331	0.00334		mg/L	1.1	20	13-MAY-20
Vanadium (V)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	13-MAY-20
Zinc (Zn)-Dissolved		0.0049	0.0049		mg/L	0.2	20	13-MAY-20
WG3322705-2 LCS								
Aluminum (Al)-Dissolved			101.6		%		80-120	13-MAY-20
Antimony (Sb)-Dissolved			98.3		%		80-120	13-MAY-20
Arsenic (As)-Dissolved			100.8		%		80-120	13-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5082419								
WG3322705-2 LCS								
Barium (Ba)-Dissolved			103.6		%		80-120	13-MAY-20
Bismuth (Bi)-Dissolved			103.5		%		80-120	13-MAY-20
Boron (B)-Dissolved			96.7		%		80-120	13-MAY-20
Cadmium (Cd)-Dissolved			98.2		%		80-120	13-MAY-20
Calcium (Ca)-Dissolved			103.2		%		80-120	13-MAY-20
Chromium (Cr)-Dissolved			100.1		%		80-120	13-MAY-20
Cobalt (Co)-Dissolved			99.6		%		80-120	13-MAY-20
Copper (Cu)-Dissolved			100.3		%		80-120	13-MAY-20
Iron (Fe)-Dissolved			103.4		%		80-120	13-MAY-20
Lead (Pb)-Dissolved			101.8		%		80-120	13-MAY-20
Lithium (Li)-Dissolved			100.8		%		80-120	13-MAY-20
Magnesium (Mg)-Dissolved			101.2		%		80-120	13-MAY-20
Manganese (Mn)-Dissolved			101.8		%		80-120	13-MAY-20
Molybdenum (Mo)-Dissolved			99.6		%		80-120	13-MAY-20
Nickel (Ni)-Dissolved			98.9		%		80-120	13-MAY-20
Potassium (K)-Dissolved			108.8		%		80-120	13-MAY-20
Selenium (Se)-Dissolved			102.0		%		80-120	13-MAY-20
Silicon (Si)-Dissolved			105.6		%		60-140	13-MAY-20
Silver (Ag)-Dissolved			98.9		%		80-120	13-MAY-20
Sodium (Na)-Dissolved			105.5		%		80-120	13-MAY-20
Strontium (Sr)-Dissolved			101.7		%		80-120	13-MAY-20
Thallium (Tl)-Dissolved			105.3		%		80-120	13-MAY-20
Tin (Sn)-Dissolved			98.0		%		80-120	13-MAY-20
Titanium (Ti)-Dissolved			95.6		%		80-120	13-MAY-20
Uranium (U)-Dissolved			99.5		%		80-120	13-MAY-20
Vanadium (V)-Dissolved			100.9		%		80-120	13-MAY-20
Zinc (Zn)-Dissolved			106.0		%		80-120	13-MAY-20
WG3322705-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	13-MAY-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	13-MAY-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	13-MAY-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	13-MAY-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	13-MAY-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	13-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5082419								
WG3322705-1 MB		**NP**						
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	13-MAY-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	13-MAY-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	13-MAY-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	13-MAY-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	13-MAY-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	13-MAY-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	13-MAY-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	13-MAY-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	13-MAY-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	13-MAY-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	13-MAY-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	13-MAY-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	13-MAY-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	13-MAY-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	13-MAY-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	13-MAY-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	13-MAY-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	13-MAY-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	13-MAY-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	13-MAY-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	13-MAY-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	13-MAY-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	13-MAY-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	13-MAY-20
MET-T-CCMS-VA	**Water**							
Batch R5082419								
WG3322698-3 DUP		**L2442346-1**						
Aluminum (Al)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	13-MAY-20
Antimony (Sb)-Total		0.00026	0.00026		mg/L	0.8	20	13-MAY-20
Arsenic (As)-Total		0.00017	0.00021		mg/L	19	20	13-MAY-20
Barium (Ba)-Total		0.0517	0.0507		mg/L	2.1	20	13-MAY-20
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	13-MAY-20
Boron (B)-Total		0.015	0.015		mg/L	0.7	20	13-MAY-20
Cadmium (Cd)-Total		0.000142	0.000142		mg/L	0.4	20	13-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5082419								
WG3322698-3 DUP		**L2442346-1**						
Calcium (Ca)-Total		108	108		mg/L	0.2	20	13-MAY-20
Chromium (Cr)-Total		0.00022	0.00025		mg/L	12	20	13-MAY-20
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	13-MAY-20
Copper (Cu)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	13-MAY-20
Iron (Fe)-Total		0.023	0.024		mg/L	0.9	20	13-MAY-20
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	13-MAY-20
Lithium (Li)-Total		0.0403	0.0395		mg/L	1.9	20	13-MAY-20
Magnesium (Mg)-Total		47.3	47.9		mg/L	1.3	20	13-MAY-20
Manganese (Mn)-Total		0.00321	0.00321		mg/L	0.1	20	13-MAY-20
Molybdenum (Mo)-Total		0.00244	0.00237		mg/L	3.3	20	13-MAY-20
Nickel (Ni)-Total		0.00466	0.00462		mg/L	0.9	20	13-MAY-20
Potassium (K)-Total		1.47	1.46		mg/L	0.5	20	13-MAY-20
Selenium (Se)-Total		0.0407	0.0405		mg/L	0.7	20	13-MAY-20
Silicon (Si)-Total		2.27	2.27		mg/L	0.4	20	13-MAY-20
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	13-MAY-20
Sodium (Na)-Total		7.75	7.59		mg/L	2.0	20	13-MAY-20
Strontium (Sr)-Total		0.215	0.214		mg/L	0.4	20	13-MAY-20
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	13-MAY-20
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	13-MAY-20
Titanium (Ti)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	13-MAY-20
Uranium (U)-Total		0.00339	0.00337		mg/L	0.6	20	13-MAY-20
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	13-MAY-20
Zinc (Zn)-Total		0.0063	0.0091	J	mg/L	0.0028	0.006	13-MAY-20
WG3322698-2 LCS								
Aluminum (Al)-Total			102.7		%		80-120	13-MAY-20
Antimony (Sb)-Total			102.5		%		80-120	13-MAY-20
Arsenic (As)-Total			98.8		%		80-120	13-MAY-20
Barium (Ba)-Total			101.8		%		80-120	13-MAY-20
Bismuth (Bi)-Total			101.7		%		80-120	13-MAY-20
Boron (B)-Total			96.0		%		80-120	13-MAY-20
Cadmium (Cd)-Total			97.6		%		80-120	13-MAY-20
Calcium (Ca)-Total			101.6		%		80-120	13-MAY-20
Chromium (Cr)-Total			98.1		%		80-120	13-MAY-20
Cobalt (Co)-Total			98.8		%		80-120	13-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5082419								
WG3322698-2 LCS								
Copper (Cu)-Total			99.9		%		80-120	13-MAY-20
Iron (Fe)-Total			102.0		%		80-120	13-MAY-20
Lead (Pb)-Total			101.1		%		80-120	13-MAY-20
Lithium (Li)-Total			99.5		%		80-120	13-MAY-20
Magnesium (Mg)-Total			100.2		%		80-120	13-MAY-20
Manganese (Mn)-Total			100.7		%		80-120	13-MAY-20
Molybdenum (Mo)-Total			101.2		%		80-120	13-MAY-20
Nickel (Ni)-Total			97.6		%		80-120	13-MAY-20
Potassium (K)-Total			107.6		%		80-120	13-MAY-20
Selenium (Se)-Total			96.5		%		80-120	13-MAY-20
Silicon (Si)-Total			103.1		%		80-120	13-MAY-20
Silver (Ag)-Total			100.3		%		80-120	13-MAY-20
Sodium (Na)-Total			105.1		%		80-120	13-MAY-20
Strontium (Sr)-Total			103.4		%		80-120	13-MAY-20
Thallium (Tl)-Total			103.7		%		80-120	13-MAY-20
Tin (Sn)-Total			99.6		%		80-120	13-MAY-20
Titanium (Ti)-Total			96.4		%		80-120	13-MAY-20
Uranium (U)-Total			101.2		%		80-120	13-MAY-20
Vanadium (V)-Total			99.96		%		80-120	13-MAY-20
Zinc (Zn)-Total			101.0		%		80-120	13-MAY-20
WG3322698-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	13-MAY-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	13-MAY-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	13-MAY-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	13-MAY-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	13-MAY-20
Boron (B)-Total			<0.010		mg/L		0.01	13-MAY-20
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	13-MAY-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	13-MAY-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	13-MAY-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	13-MAY-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	13-MAY-20
Iron (Fe)-Total			<0.010		mg/L		0.01	13-MAY-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	13-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5082419								
WG3322698-1 MB								
Lithium (Li)-Total			<0.0010		mg/L		0.001	13-MAY-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	13-MAY-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	13-MAY-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	13-MAY-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	13-MAY-20
Potassium (K)-Total			<0.050		mg/L		0.05	13-MAY-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	13-MAY-20
Silicon (Si)-Total			<0.10		mg/L		0.1	13-MAY-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	13-MAY-20
Sodium (Na)-Total			<0.050		mg/L		0.05	13-MAY-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	13-MAY-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	13-MAY-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	13-MAY-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	13-MAY-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	13-MAY-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	13-MAY-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	13-MAY-20
NH3-L-F-CL	**Water**							
Batch R5079535								
WG3318852-22 LCS								
Ammonia as N			106.8		%		85-115	06-MAY-20
WG3318852-21 MB								
Ammonia as N			<0.0050		mg/L		0.005	06-MAY-20
NO2-L-IC-N-CL	**Water**							
Batch R5075862								
WG3317875-10 LCS								
Nitrite (as N)			101.5		%		90-110	01-MAY-20
WG3317875-9 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	01-MAY-20
NO3-L-IC-N-CL	**Water**							
Batch R5075862								
WG3317875-10 LCS								
Nitrate (as N)			101.5		%		90-110	01-MAY-20
WG3317875-9 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	01-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ORP-CL	**Water**							
Batch R5078862								
WG3319006-9 CRM		**CL-ORP**						
ORP			230		mV		210-230	06-MAY-20
P-T-L-COL-CL	**Water**							
Batch R5078337								
WG3318528-30 LCS								
Phosphorus (P)-Total			103.5		%		80-120	06-MAY-20
WG3318528-29 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	06-MAY-20
PH-CL	**Water**							
Batch R5072857								
WG3316798-20 LCS								
pH			6.97		pH		6.9-7.1	01-MAY-20
PO4-DO-L-COL-CL	**Water**							
Batch R5073856								
WG3316490-10 LCS								
Orthophosphate-Dissolved (as P)			107.1		%		80-120	01-MAY-20
WG3316490-9 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	01-MAY-20
SO4-IC-N-CL	**Water**							
Batch R5075862								
WG3317875-10 LCS								
Sulfate (SO4)			103.7		%		90-110	01-MAY-20
WG3317875-9 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	01-MAY-20
SOLIDS-TDS-CL	**Water**							
Batch R5078504								
WG3317745-5 LCS								
Total Dissolved Solids			102.9		%		85-115	05-MAY-20
WG3317745-4 MB								
Total Dissolved Solids			<10		mg/L		10	05-MAY-20
TKN-L-F-CL	**Water**							
Batch R5080434								
WG3320325-10 LCS								
Total Kjeldahl Nitrogen			89.0		%		75-125	08-MAY-20
WG3320325-14 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-L-F-CL	**Water**							
Batch R5080434								
WG3320325-14 LCS								
Total Kjeldahl Nitrogen			90.1		%		75-125	08-MAY-20
WG3320325-18 LCS								
Total Kjeldahl Nitrogen			90.8		%		75-125	08-MAY-20
WG3320325-2 LCS								
Total Kjeldahl Nitrogen			92.9		%		75-125	08-MAY-20
WG3320325-22 LCS								
Total Kjeldahl Nitrogen			89.8		%		75-125	08-MAY-20
WG3320325-26 LCS								
Total Kjeldahl Nitrogen			94.6		%		75-125	08-MAY-20
WG3320325-6 LCS								
Total Kjeldahl Nitrogen			90.0		%		75-125	08-MAY-20
WG3320325-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-13 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-17 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-21 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-25 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-5 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-9 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
TSS-L-CL	**Water**							
Batch R5078487								
WG3318455-10 LCS								
Total Suspended Solids			95.1		%		85-115	06-MAY-20
WG3318455-9 MB								
Total Suspended Solids			<1.0		mg/L		1	06-MAY-20
TURBIDITY-CL	**Water**							
Batch R5073116								
WG3316918-11 LCS								
Turbidity			105.0		%		85-115	02-MAY-20
WG3316918-10 MB								
Turbidity			<0.10		NTU		0.1	02-MAY-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	29-APR-20 10:50	06-MAY-20 13:00	0.25	170	hours	EHTR-FM
pH							
	1	29-APR-20 10:50	01-MAY-20 13:00	0.25	50	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2442346 were received on 30-APR-20 09:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes 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 pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

Page 1 of 1

COC ID:	Line Creek Operations	TURNAROUND TIME:	Regular

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Line Creek Operations			Lab Name	ALS Calgary			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cait Good			Lab Contact	Lyuda Shvets			Email 1:	cait.good@teck.com	X	X	X
Email	cait.good@teck.com			Email	Lyudmyla.Shvets@ALSGlobal.com			Email 2:	carlie.meyer@teck.com	X	X	X
Address	421 Pine Avenue			Address	2559 29 Street NE			Email 3:	teckcoal@equisonline.com	[redacted]	[redacted]	X
								Email 4:	kbatchelar@minnow.ca	X	X	X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:	Carla.FroymanParker@teck.com	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada					
Phone Number	250-425-8202			Phone Number	403-407-1800			PO number	VPO00689999			

SAMPLE DETAILS — ANALYSIS REQUESTED

L2442346-COFC

Sample ID	Sample Location (sys loc code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	Filtered (Y/N)	Y	N	Y	Y	N	N				
								Preserv.	NONE	H2SO4	H2SO4	HCl	HNO3	HNO3	NONE			
								Analysis	HG-T-U-CVAF-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-D-CVAF-VA	TECKCOAL-MET-D-VA	TECKCOAL-MET-T-VA	TECKCOAL-ROUTINE-VA			
LC_LCDSSLC_WS_20200429-1050	LC_LCDSSLC	WS	NO	29-Apr-20	10:50:00	G	7		X	X	X	X	X	X	X			

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
VPO00689999	Scott Gordon/Lotic Environmental	April 29, 2020		

SERVICE REQUEST (rush - subject to availability)

Regular (default)	X	Sampler's Name	Scott Gordon	Mobile #	780-385-0168
Priority (2-3 business days) - 50% surcharge		Sampler's Signature	Scott Gordon	Date/Time	April 29, 2020
Emergency (1 Business Day) - 100% surcharge					
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

WATER CHEMISTRY

ALS Laboratory Report L2442697

(Finalized May 12, 2020)

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 01-MAY-20
Report Date: 12-MAY-20 11:30 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2442697

Project P.O. #:	VPO00689999
Job Reference:	Regional Effects Program
C of C Numbers:	Regional Effects Pro
Legal Site Desc:	

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2442697-1	L2442697-2	L2442697-3	L2442697-4	
	Description	WS	WS	WS	WS	
	Sampled Date	30-APR-20	30-APR-20	30-APR-20	30-APR-20	
	Sampled Time	08:25	10:30	12:00	12:30	
	Client ID	RG_LIDCOM_WS_20200430-0825	RG_LI8_WS_20200430-1030	RG_FBLANK_WS_20200430-1200	RG_TRIP_WS_20200430-1230	
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	710	635	<2.0	<2.0	
	Hardness (as CaCO3) (mg/L)	394	347	<0.50	<0.50	
	pH (pH)	8.31	8.37	5.46	5.39	
	ORP (mV)	312	360	414	438	
	Total Suspended Solids (mg/L)	3.5	7.2	<1.0	<1.0	
	Total Dissolved Solids (mg/L)	537 DLHC	465 DLHC	<10	<10	
	Turbidity (NTU)	1.18	1.60	<0.10	<0.10	
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0	1.0	1.2	
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	180	169	<1.0	<1.0	
	Alkalinity, Carbonate (as CaCO3) (mg/L)	4.2	6.2	<1.0	<1.0	
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	
	Alkalinity, Total (as CaCO3) (mg/L)	184	176	<1.0	<1.0	
	Ammonia as N (mg/L)	0.0063	0.0092	<0.0050	0.0058 RRV	
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	
	Chloride (Cl) (mg/L)	8.94	7.67	<0.50	<0.50	
	Fluoride (F) (mg/L)	0.217	0.234	<0.020	<0.020	
	Ion Balance (%)	95.8	93.5	0.0	0.0	
	Nitrate (as N) (mg/L)	7.62	6.50	<0.0050	<0.0050	
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	Total Kjeldahl Nitrogen (mg/L)	<0.050 TKNI	0.156 TKNI	<0.050	0.088 RRV	
	Orthophosphate-Dissolved (as P) (mg/L)	0.0026	0.0028	<0.0010	<0.0010	
	Phosphorus (P)-Total (mg/L)	0.0060 DLM	0.0060 DLM	<0.0020	<0.0020	
	Sulfate (SO4) (mg/L)	195	169	<0.30	<0.30	
	Anion Sum (meq/L)	8.55	7.71	<0.10	<0.10	
	Cation Sum (meq/L)	8.19	7.21	<0.10	<0.10	
	Cation - Anion Balance (%)	-2.1	-3.4	0.0	0.0	
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.69	1.39	<0.50		
	Total Organic Carbon (mg/L)	1.76	1.99	<0.50	<0.50	
Total Metals	Aluminum (Al)-Total (mg/L)	0.0233	0.0201	<0.0030	<0.0030	
	Antimony (Sb)-Total (mg/L)	0.00020	0.00017	<0.00010	<0.00010	
	Arsenic (As)-Total (mg/L)	0.00014	0.00013	<0.00010	<0.00010	
	Barium (Ba)-Total (mg/L)	0.0587	0.0507	<0.00010	<0.00010	
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020	<0.020	
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Boron (B)-Total (mg/L)	0.013	0.011	<0.010	<0.010	
	Cadmium (Cd)-Total (ug/L)	0.125	0.119	<0.0050	<0.0050	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2442697-1	L2442697-2	L2442697-3	L2442697-4	
	Description	WS	WS	WS	WS	
	Sampled Date	30-APR-20	30-APR-20	30-APR-20	30-APR-20	
	Sampled Time	08:25	10:30	12:00	12:30	
	Client ID	RG_LIDCOM_WS_20200430-0825	RG_LI8_WS_20200430-1030	RG_FBLANK_WS_20200430-1200	RG_TRIP_WS_20200430-1230	
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	99.8	88.0	<0.050	<0.050	
	Chromium (Cr)-Total (mg/L)	0.00016	0.00015	<0.00010	<0.00010	
	Cobalt (Co)-Total (ug/L)	<0.10	<0.10	<0.10	<0.10	
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Iron (Fe)-Total (mg/L)	0.045	0.036	<0.010	<0.010	
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Lithium (Li)-Total (mg/L)	0.0320	0.0271	<0.0010	<0.0010	
	Magnesium (Mg)-Total (mg/L)	40.9	34.9	<0.10	<0.10	
	Manganese (Mn)-Total (mg/L)	0.00841	0.00616	<0.00010	<0.00010	
	Mercury (Hg)-Total (ug/L)	0.00076	0.00125	<0.00050	<0.00050	
	Molybdenum (Mo)-Total (mg/L)	0.00210	0.00193	<0.000050	<0.000050	
	Nickel (Ni)-Total (mg/L)	0.00383	0.00315	<0.00050	<0.00050	
	Potassium (K)-Total (mg/L)	1.22	1.05	<0.050	<0.050	
	Selenium (Se)-Total (ug/L)	30.3	25.7	<0.050	<0.050	
	Silicon (Si)-Total (mg/L)	2.35	2.07	<0.10	<0.10	
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Total (mg/L)	6.56	5.44	<0.050	<0.050	
	Strontium (Sr)-Total (mg/L)	0.205	0.192	<0.00020	<0.00020	
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Uranium (U)-Total (mg/L)	0.00281	0.00246	<0.000010	<0.000010	
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Zinc (Zn)-Total (mg/L)	0.0052	0.0049	<0.0030	<0.0030	
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD		
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	LAB	
	Aluminum (Al)-Dissolved (mg/L)	0.0031	<0.0030	<0.0030		
	Antimony (Sb)-Dissolved (mg/L)	0.00019	0.00016	<0.00010		
	Arsenic (As)-Dissolved (mg/L)	0.00011	0.00012	<0.00010		
	Barium (Ba)-Dissolved (mg/L)	0.0616	0.0548	<0.00010		
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020		
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Boron (B)-Dissolved (mg/L)	0.011	<0.010	<0.010		
	Cadmium (Cd)-Dissolved (ug/L)	0.0987	0.0581	<0.0050		
	Calcium (Ca)-Dissolved (mg/L)	90.3	80.3	0.064 RRV	<0.050	
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10	<0.10		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2442697-1	L2442697-2	L2442697-3	L2442697-4	
	Description	WS	WS	WS	WS	
	Sampled Date	30-APR-20	30-APR-20	30-APR-20	30-APR-20	
	Sampled Time	08:25	10:30	12:00	12:30	
	Client ID	RG_LIDCOM_WS_20200430-0825	RG_LI8_WS_20200430-1030	RG_FBLANK_WS_20200430-1200	RG_TRIP_WS_20200430-1230	
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	0.00024	0.00020	<0.00020		
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Lithium (Li)-Dissolved (mg/L)	0.0314	0.0276	<0.0010		
	Magnesium (Mg)-Dissolved (mg/L)	40.9	35.6	<0.10	<0.0050	
	Manganese (Mn)-Dissolved (mg/L)	0.00291	0.00179	<0.00010		
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050		
	Molybdenum (Mo)-Dissolved (mg/L)	0.00205	0.00185	<0.000050		
	Nickel (Ni)-Dissolved (mg/L)	0.00362	0.00294	<0.00050		
	Potassium (K)-Dissolved (mg/L)	1.26	1.12	<0.050	<0.050	
	Selenium (Se)-Dissolved (ug/L)	28.7	23.9	<0.050		
	Silicon (Si)-Dissolved (mg/L)	2.01	1.78	<0.050		
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Dissolved (mg/L)	6.48	5.78	<0.050	<0.050	
	Strontium (Sr)-Dissolved (mg/L)	0.195	0.170	<0.00020		
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Dissolved (mg/L)	0.00273	0.00249	<0.000010		
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Zinc (Zn)-Dissolved (mg/L)	0.0042	0.0044	<0.0010		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Copper (Cu)-Total	DUP-H,J	L2442697-1, -2, -3, -4
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2442697-1, -2, -3
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2442697-1, -2, -3
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2442697-1, -2, -3
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2442697-1, -2, -3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2442697-1, -2, -3
Matrix Spike	Barium (Ba)-Total	MS-B	L2442697-1, -2, -3, -4
Matrix Spike	Calcium (Ca)-Total	MS-B	L2442697-1, -2, -3, -4
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2442697-1, -2, -3, -4
Matrix Spike	Selenium (Se)-Total	MS-B	L2442697-1, -2, -3, -4
Matrix Spike	Strontium (Sr)-Total	MS-B	L2442697-1, -2, -3, -4

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DUP-H,J	Duplicate results outside ALS DQO, due to sample heterogeneity. Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". 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.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon

Reference Information

dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-IC-N-CL Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

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 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-CL Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL Water Oxidation redution potential by elect. ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum

Reference Information

metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL Water Phosphorus (P)-Total APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL Water pH APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL Water Orthophosphate-Dissolved (as P) APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL Water Total Dissolved Solids APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL Water Total Kjeldahl Nitrogen APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL Water Total Suspended Solids APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL Water Turbidity APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Regional Effects Pro

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour 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.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5073316								
WG3316958-2 LCS								
Acidity (as CaCO3)			103.8		%		85-115	02-MAY-20
WG3316958-1 MB								
Acidity (as CaCO3)			1.2		mg/L		2	02-MAY-20
ALK-MAN-CL	**Water**							
Batch R5073319								
WG3316959-8 LCS								
Alkalinity, Total (as CaCO3)			103.1		%		85-115	02-MAY-20
WG3316959-7 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	02-MAY-20
BE-D-L-CCMS-VA	**Water**							
Batch R5079953								
WG3318997-3 DUP		**L2442697-1**						
Beryllium (Be)-Dissolved		<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	08-MAY-20
WG3318997-2 LCS								
Beryllium (Be)-Dissolved			93.7		%		80-120	08-MAY-20
WG3318997-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	08-MAY-20
WG3318997-4 MS		**L2442697-2**						
Beryllium (Be)-Dissolved			93.7		%		70-130	08-MAY-20
BE-T-L-CCMS-VA	**Water**							
Batch R5079557								
WG3318226-2 LCS								
Beryllium (Be)-Total			102.5		%		80-120	07-MAY-20
WG3318226-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	07-MAY-20
BR-L-IC-N-CL	**Water**							
Batch R5073340								
WG3316969-3 DUP		**L2442697-3**						
Bromide (Br)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	02-MAY-20
WG3316969-2 LCS								
Bromide (Br)			94.6		%		85-115	02-MAY-20
WG3316969-1 MB								
Bromide (Br)			<0.050		mg/L		0.05	02-MAY-20
WG3316969-4 MS		**L2442697-3**						
Bromide (Br)			87.5		%		75-125	02-MAY-20
C-DIS-ORG-LOW-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-LOW-CL	**Water**							
Batch R5080263								
WG3319952-6 LCS								
Dissolved Organic Carbon			94.7		%		80-120	07-MAY-20
WG3319952-5 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	07-MAY-20
C-TOT-ORG-LOW-CL	**Water**							
Batch R5080263								
WG3319952-3 DUP		**L2442697-4**						
Total Organic Carbon		<0.50	<0.50	RPD-NA	mg/L	N/A	20	07-MAY-20
WG3319952-2 LCS								
Total Organic Carbon			95.3		%		80-120	07-MAY-20
WG3319952-6 LCS								
Total Organic Carbon			106.5		%		80-120	07-MAY-20
WG3319952-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	07-MAY-20
WG3319952-5 MB								
Total Organic Carbon			<0.50		mg/L		0.5	07-MAY-20
WG3319952-4 MS		**L2442697-4**						
Total Organic Carbon			118.6		%		70-130	07-MAY-20
CL-IC-N-CL	**Water**							
Batch R5073340								
WG3316969-3 DUP		**L2442697-3**						
Chloride (Cl)		<0.50	<0.50	RPD-NA	mg/L	N/A	20	02-MAY-20
WG3316969-2 LCS								
Chloride (Cl)			102.5		%		90-110	02-MAY-20
WG3316969-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	02-MAY-20
WG3316969-4 MS		**L2442697-3**						
Chloride (Cl)			96.6		%		75-125	02-MAY-20
EC-L-PCT-CL	**Water**							
Batch R5073319								
WG3316959-8 LCS								
Conductivity (@ 25C)			95.0		%		90-110	02-MAY-20
WG3316959-7 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	02-MAY-20
F-IC-N-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-IC-N-CL	**Water**							
Batch R5073340								
WG3316969-3 DUP		**L2442697-3**						
Fluoride (F)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	02-MAY-20
WG3316969-2 LCS								
Fluoride (F)			102.1		%		90-110	02-MAY-20
WG3316969-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	02-MAY-20
WG3316969-4 MS		**L2442697-3**						
Fluoride (F)			104.9		%		75-125	02-MAY-20
HG-D-CVAA-VA	**Water**							
Batch R5075748								
WG3317744-19 DUP		**L2442697-1**						
Mercury (Hg)-Dissolved		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	05-MAY-20
WG3317744-18 LCS								
Mercury (Hg)-Dissolved			100.1		%		80-120	05-MAY-20
WG3317744-17 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	05-MAY-20
WG3317744-20 MS		**L2442697-2**						
Mercury (Hg)-Dissolved			96.7		%		70-130	05-MAY-20
HG-T-U-CVAF-VA	**Water**							
Batch R5078376								
WG3318770-2 LCS								
Mercury (Hg)-Total			90.6		%		80-120	06-MAY-20
WG3318770-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	06-MAY-20
MET-D-CCMS-CL	**Water**							
Batch R5075734								
WG3317471-6 LCS		**TMRM**						
Calcium (Ca)-Dissolved			94.5		%		80-120	04-MAY-20
Magnesium (Mg)-Dissolved			110.9		%		80-120	04-MAY-20
Potassium (K)-Dissolved			98.3		%		80-120	04-MAY-20
Sodium (Na)-Dissolved			97.8		%		80-120	04-MAY-20
WG3317471-5 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	04-MAY-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	04-MAY-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	04-MAY-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	04-MAY-20
MET-D-CCMS-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5079953								
WG3318997-3 DUP		**L2442697-1**						
Aluminum (Al)-Dissolved		0.0031	<0.0030	RPD-NA	mg/L	N/A	20	08-MAY-20
Antimony (Sb)-Dissolved		0.00019	0.00019		mg/L	3.0	20	08-MAY-20
Arsenic (As)-Dissolved		0.00011	<0.00010	RPD-NA	mg/L	N/A	20	08-MAY-20
Barium (Ba)-Dissolved		0.0616	0.0600		mg/L	2.8	20	08-MAY-20
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	08-MAY-20
Boron (B)-Dissolved		0.011	0.011		mg/L	1.7	20	08-MAY-20
Cadmium (Cd)-Dissolved		0.0000987	0.000104		mg/L	5.3	20	08-MAY-20
Calcium (Ca)-Dissolved		90.3	90.2		mg/L	0.1	20	08-MAY-20
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	08-MAY-20
Cobalt (Co)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	08-MAY-20
Copper (Cu)-Dissolved		0.00024	<0.00020	RPD-NA	mg/L	N/A	20	08-MAY-20
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	08-MAY-20
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	08-MAY-20
Lithium (Li)-Dissolved		0.0314	0.0309		mg/L	1.7	20	08-MAY-20
Magnesium (Mg)-Dissolved		40.9	40.4		mg/L	1.3	20	08-MAY-20
Manganese (Mn)-Dissolved		0.00291	0.00297		mg/L	2.0	20	08-MAY-20
Molybdenum (Mo)-Dissolved		0.00205	0.00199		mg/L	2.9	20	08-MAY-20
Nickel (Ni)-Dissolved		0.00362	0.00358		mg/L	1.3	20	08-MAY-20
Potassium (K)-Dissolved		1.26	1.23		mg/L	3.0	20	08-MAY-20
Selenium (Se)-Dissolved		0.0287	0.0282		mg/L	1.9	20	08-MAY-20
Silicon (Si)-Dissolved		2.01	1.94		mg/L	3.7	20	08-MAY-20
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	08-MAY-20
Sodium (Na)-Dissolved		6.48	6.57		mg/L	1.3	20	08-MAY-20
Strontium (Sr)-Dissolved		0.195	0.189		mg/L	3.2	20	08-MAY-20
Thallium (Tl)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	08-MAY-20
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	08-MAY-20
Titanium (Ti)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	08-MAY-20
Uranium (U)-Dissolved		0.00273	0.00269		mg/L	1.7	20	08-MAY-20
Vanadium (V)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	08-MAY-20
Zinc (Zn)-Dissolved		0.0042	0.0040		mg/L	5.2	20	08-MAY-20
WG3318997-2 LCS								
Aluminum (Al)-Dissolved			104.3		%		80-120	08-MAY-20
Antimony (Sb)-Dissolved			102.7		%		80-120	08-MAY-20
Arsenic (As)-Dissolved			101.4		%		80-120	08-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5079953								
WG3318997-2 LCS								
Barium (Ba)-Dissolved			105.6		%		80-120	08-MAY-20
Bismuth (Bi)-Dissolved			102.7		%		80-120	08-MAY-20
Boron (B)-Dissolved			87.0		%		80-120	08-MAY-20
Cadmium (Cd)-Dissolved			102.7		%		80-120	08-MAY-20
Calcium (Ca)-Dissolved			96.0		%		80-120	08-MAY-20
Chromium (Cr)-Dissolved			104.1		%		80-120	08-MAY-20
Cobalt (Co)-Dissolved			101.5		%		80-120	08-MAY-20
Copper (Cu)-Dissolved			100.7		%		80-120	08-MAY-20
Iron (Fe)-Dissolved			98.6		%		80-120	08-MAY-20
Lead (Pb)-Dissolved			104.2		%		80-120	08-MAY-20
Lithium (Li)-Dissolved			99.9		%		80-120	08-MAY-20
Magnesium (Mg)-Dissolved			100.6		%		80-120	08-MAY-20
Manganese (Mn)-Dissolved			104.7		%		80-120	08-MAY-20
Molybdenum (Mo)-Dissolved			101.6		%		80-120	08-MAY-20
Nickel (Ni)-Dissolved			101.5		%		80-120	08-MAY-20
Potassium (K)-Dissolved			104.9		%		80-120	08-MAY-20
Selenium (Se)-Dissolved			96.4		%		80-120	08-MAY-20
Silicon (Si)-Dissolved			93.7		%		60-140	08-MAY-20
Silver (Ag)-Dissolved			98.7		%		80-120	08-MAY-20
Sodium (Na)-Dissolved			105.9		%		80-120	08-MAY-20
Strontium (Sr)-Dissolved			103.6		%		80-120	08-MAY-20
Thallium (Tl)-Dissolved			100.2		%		80-120	08-MAY-20
Tin (Sn)-Dissolved			99.9		%		80-120	08-MAY-20
Titanium (Ti)-Dissolved			94.7		%		80-120	08-MAY-20
Uranium (U)-Dissolved			100.8		%		80-120	08-MAY-20
Vanadium (V)-Dissolved			104.7		%		80-120	08-MAY-20
Zinc (Zn)-Dissolved			101.2		%		80-120	08-MAY-20
WG3318997-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	08-MAY-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	08-MAY-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	08-MAY-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	08-MAY-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	08-MAY-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	08-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5079953								
WG3318997-1 MB		**NP**						
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	08-MAY-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	08-MAY-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	08-MAY-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	08-MAY-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	08-MAY-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	08-MAY-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	08-MAY-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	08-MAY-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	08-MAY-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	08-MAY-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	08-MAY-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	08-MAY-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	08-MAY-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	08-MAY-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	08-MAY-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	08-MAY-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	08-MAY-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	08-MAY-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	08-MAY-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	08-MAY-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	08-MAY-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	08-MAY-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	08-MAY-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	08-MAY-20
WG3318997-4 MS		**L2442697-2**						
Aluminum (Al)-Dissolved			101.0		%		70-130	08-MAY-20
Antimony (Sb)-Dissolved			102.0		%		70-130	08-MAY-20
Arsenic (As)-Dissolved			102.0		%		70-130	08-MAY-20
Barium (Ba)-Dissolved			N/A	MS-B	%		-	08-MAY-20
Bismuth (Bi)-Dissolved			87.8		%		70-130	08-MAY-20
Boron (B)-Dissolved			93.2		%		70-130	08-MAY-20
Cadmium (Cd)-Dissolved			99.0		%		70-130	08-MAY-20
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	08-MAY-20
Chromium (Cr)-Dissolved			98.1		%		70-130	08-MAY-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5079953								
WG3318997-4 MS		**L2442697-2**						
Cobalt (Co)-Dissolved			95.8		%		70-130	08-MAY-20
Copper (Cu)-Dissolved			93.8		%		70-130	08-MAY-20
Iron (Fe)-Dissolved			97.7		%		70-130	08-MAY-20
Lead (Pb)-Dissolved			97.0		%		70-130	08-MAY-20
Lithium (Li)-Dissolved			93.6		%		70-130	08-MAY-20
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	08-MAY-20
Manganese (Mn)-Dissolved			99.7		%		70-130	08-MAY-20
Molybdenum (Mo)-Dissolved			102.9		%		70-130	08-MAY-20
Nickel (Ni)-Dissolved			93.8		%		70-130	08-MAY-20
Potassium (K)-Dissolved			97.6		%		70-130	08-MAY-20
Selenium (Se)-Dissolved			99.5		%		70-130	08-MAY-20
Silicon (Si)-Dissolved			87.3		%		70-130	08-MAY-20
Silver (Ag)-Dissolved			93.5		%		70-130	08-MAY-20
Sodium (Na)-Dissolved			N/A	MS-B	%		-	08-MAY-20
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	08-MAY-20
Thallium (Tl)-Dissolved			92.5		%		70-130	08-MAY-20
Tin (Sn)-Dissolved			99.0		%		70-130	08-MAY-20
Titanium (Ti)-Dissolved			94.5		%		70-130	08-MAY-20
Uranium (U)-Dissolved			97.1		%		70-130	08-MAY-20
Vanadium (V)-Dissolved			101.2		%		70-130	08-MAY-20
Zinc (Zn)-Dissolved			97.3		%		70-130	08-MAY-20
Batch R5080505								
WG3320219-2 LCS								
Aluminum (Al)-Dissolved			99.4		%		80-120	08-MAY-20
Antimony (Sb)-Dissolved			92.3		%		80-120	08-MAY-20
Arsenic (As)-Dissolved			97.3		%		80-120	08-MAY-20
Barium (Ba)-Dissolved			101.2		%		80-120	08-MAY-20
Bismuth (Bi)-Dissolved			105.4		%		80-120	08-MAY-20
Boron (B)-Dissolved			90.1		%		80-120	08-MAY-20
Cadmium (Cd)-Dissolved			98.1		%		80-120	08-MAY-20
Calcium (Ca)-Dissolved			99.6		%		80-120	08-MAY-20
Chromium (Cr)-Dissolved			94.5		%		80-120	08-MAY-20
Cobalt (Co)-Dissolved			95.6		%		80-120	08-MAY-20
Copper (Cu)-Dissolved			95.5		%		80-120	08-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5080505								
WG3320219-2 LCS								
Iron (Fe)-Dissolved			94.4		%		80-120	08-MAY-20
Lead (Pb)-Dissolved			101.7		%		80-120	08-MAY-20
Lithium (Li)-Dissolved			97.7		%		80-120	08-MAY-20
Magnesium (Mg)-Dissolved			97.7		%		80-120	08-MAY-20
Manganese (Mn)-Dissolved			102.2		%		80-120	08-MAY-20
Molybdenum (Mo)-Dissolved			91.0		%		80-120	08-MAY-20
Nickel (Ni)-Dissolved			95.8		%		80-120	08-MAY-20
Potassium (K)-Dissolved			98.4		%		80-120	08-MAY-20
Selenium (Se)-Dissolved			94.9		%		80-120	08-MAY-20
Silicon (Si)-Dissolved			96.0		%		60-140	08-MAY-20
Silver (Ag)-Dissolved			92.3		%		80-120	08-MAY-20
Sodium (Na)-Dissolved			100.7		%		80-120	08-MAY-20
Strontium (Sr)-Dissolved			95.2		%		80-120	08-MAY-20
Thallium (Tl)-Dissolved			100.8		%		80-120	08-MAY-20
Tin (Sn)-Dissolved			92.6		%		80-120	08-MAY-20
Titanium (Ti)-Dissolved			92.4		%		80-120	08-MAY-20
Uranium (U)-Dissolved			97.5		%		80-120	08-MAY-20
Vanadium (V)-Dissolved			100.2		%		80-120	08-MAY-20
Zinc (Zn)-Dissolved			97.9		%		80-120	08-MAY-20
WG3320219-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	08-MAY-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	08-MAY-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	08-MAY-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	08-MAY-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	08-MAY-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	08-MAY-20
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	08-MAY-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	08-MAY-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	08-MAY-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	08-MAY-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	08-MAY-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	08-MAY-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	08-MAY-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	08-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5080505								
WG3320219-1 MB		**NP**						
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	08-MAY-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	08-MAY-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	08-MAY-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	08-MAY-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	08-MAY-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	08-MAY-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	08-MAY-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	08-MAY-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	08-MAY-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	08-MAY-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	08-MAY-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	08-MAY-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	08-MAY-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	08-MAY-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	08-MAY-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	08-MAY-20
WG3320219-4 MS		**L2442697-3**						
Aluminum (Al)-Dissolved			95.6		%		70-130	08-MAY-20
Antimony (Sb)-Dissolved			90.4		%		70-130	08-MAY-20
Arsenic (As)-Dissolved			95.9		%		70-130	08-MAY-20
Barium (Ba)-Dissolved			99.8		%		70-130	08-MAY-20
Bismuth (Bi)-Dissolved			94.7		%		70-130	08-MAY-20
Boron (B)-Dissolved			93.3		%		70-130	08-MAY-20
Cadmium (Cd)-Dissolved			99.1		%		70-130	08-MAY-20
Calcium (Ca)-Dissolved			97.1		%		70-130	08-MAY-20
Chromium (Cr)-Dissolved			92.8		%		70-130	08-MAY-20
Cobalt (Co)-Dissolved			97.5		%		70-130	08-MAY-20
Copper (Cu)-Dissolved			96.6		%		70-130	08-MAY-20
Iron (Fe)-Dissolved			96.5		%		70-130	08-MAY-20
Lead (Pb)-Dissolved			99.9		%		70-130	08-MAY-20
Lithium (Li)-Dissolved			99.5		%		70-130	08-MAY-20
Magnesium (Mg)-Dissolved			94.8		%		70-130	08-MAY-20
Manganese (Mn)-Dissolved			101.5		%		70-130	08-MAY-20
Molybdenum (Mo)-Dissolved			87.7		%		70-130	08-MAY-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5080505								
WG3320219-4 MS		**L2442697-3**						
Nickel (Ni)-Dissolved			97.2		%		70-130	08-MAY-20
Potassium (K)-Dissolved			97.7		%		70-130	08-MAY-20
Selenium (Se)-Dissolved			96.4		%		70-130	08-MAY-20
Silicon (Si)-Dissolved			92.5		%		70-130	08-MAY-20
Silver (Ag)-Dissolved			91.8		%		70-130	08-MAY-20
Sodium (Na)-Dissolved			96.9		%		70-130	08-MAY-20
Strontium (Sr)-Dissolved			91.1		%		70-130	08-MAY-20
Thallium (Tl)-Dissolved			97.3		%		70-130	08-MAY-20
Tin (Sn)-Dissolved			89.4		%		70-130	08-MAY-20
Titanium (Ti)-Dissolved			94.4		%		70-130	08-MAY-20
Uranium (U)-Dissolved			96.9		%		70-130	08-MAY-20
Vanadium (V)-Dissolved			97.3		%		70-130	08-MAY-20
Zinc (Zn)-Dissolved			100.0		%		70-130	08-MAY-20
MET-T-CCMS-VA	**Water**							
Batch R5079557								
WG3318226-2 LCS								
Aluminum (Al)-Total			97.1		%		80-120	07-MAY-20
Antimony (Sb)-Total			103.5		%		80-120	07-MAY-20
Arsenic (As)-Total			98.8		%		80-120	07-MAY-20
Barium (Ba)-Total			100.9		%		80-120	07-MAY-20
Bismuth (Bi)-Total			107.6		%		80-120	07-MAY-20
Boron (B)-Total			97.2		%		80-120	07-MAY-20
Cadmium (Cd)-Total			98.8		%		80-120	07-MAY-20
Calcium (Ca)-Total			105.7		%		80-120	07-MAY-20
Chromium (Cr)-Total			99.0		%		80-120	07-MAY-20
Cobalt (Co)-Total			99.5		%		80-120	07-MAY-20
Copper (Cu)-Total			98.3		%		80-120	07-MAY-20
Iron (Fe)-Total			96.4		%		80-120	07-MAY-20
Lead (Pb)-Total			107.4		%		80-120	07-MAY-20
Lithium (Li)-Total			106.1		%		80-120	07-MAY-20
Magnesium (Mg)-Total			98.1		%		80-120	07-MAY-20
Manganese (Mn)-Total			98.4		%		80-120	07-MAY-20
Molybdenum (Mo)-Total			104.5		%		80-120	07-MAY-20
Nickel (Ni)-Total			99.0		%		80-120	07-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5079557								
WG3318226-2 LCS								
Potassium (K)-Total			104.1		%		80-120	07-MAY-20
Selenium (Se)-Total			103.2		%		80-120	07-MAY-20
Silicon (Si)-Total			103.3		%		80-120	07-MAY-20
Silver (Ag)-Total			103.4		%		80-120	07-MAY-20
Sodium (Na)-Total			102.3		%		80-120	07-MAY-20
Strontium (Sr)-Total			104.5		%		80-120	07-MAY-20
Thallium (Tl)-Total			108.1		%		80-120	07-MAY-20
Tin (Sn)-Total			102.2		%		80-120	07-MAY-20
Titanium (Ti)-Total			99.5		%		80-120	07-MAY-20
Uranium (U)-Total			100.6		%		80-120	07-MAY-20
Vanadium (V)-Total			101.5		%		80-120	07-MAY-20
Zinc (Zn)-Total			101.9		%		80-120	07-MAY-20
WG3318226-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	07-MAY-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	07-MAY-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	07-MAY-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	07-MAY-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	07-MAY-20
Boron (B)-Total			<0.010		mg/L		0.01	07-MAY-20
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	07-MAY-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	07-MAY-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	07-MAY-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	07-MAY-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	07-MAY-20
Iron (Fe)-Total			<0.010		mg/L		0.01	07-MAY-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	07-MAY-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	07-MAY-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	07-MAY-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	07-MAY-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	07-MAY-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	07-MAY-20
Potassium (K)-Total			<0.050		mg/L		0.05	07-MAY-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	07-MAY-20
Silicon (Si)-Total			<0.10		mg/L		0.1	07-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5079557								
WG3318226-1 MB								
Silver (Ag)-Total			<0.000010		mg/L		0.00001	07-MAY-20
Sodium (Na)-Total			<0.050		mg/L		0.05	07-MAY-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	07-MAY-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	07-MAY-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	07-MAY-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	07-MAY-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	07-MAY-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	07-MAY-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	07-MAY-20
NH3-L-F-CL	**Water**							
Batch R5080203								
WG3319590-15 DUP		**L2442697-3**						
Ammonia as N		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	08-MAY-20
WG3319590-14 LCS								
Ammonia as N			101.4		%		85-115	08-MAY-20
WG3319590-18 LCS								
Ammonia as N			100.4		%		85-115	08-MAY-20
WG3319590-13 MB								
Ammonia as N			<0.0050		mg/L		0.005	08-MAY-20
WG3319590-17 MB								
Ammonia as N			<0.0050		mg/L		0.005	08-MAY-20
WG3319590-16 MS		**L2442697-2**						
Ammonia as N			105.5		%		75-125	08-MAY-20
NO2-L-IC-N-CL	**Water**							
Batch R5073340								
WG3316969-3 DUP		**L2442697-3**						
Nitrite (as N)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	02-MAY-20
WG3316969-2 LCS								
Nitrite (as N)			99.9		%		90-110	02-MAY-20
WG3316969-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	02-MAY-20
WG3316969-4 MS		**L2442697-3**						
Nitrite (as N)			93.4		%		75-125	02-MAY-20
NO3-L-IC-N-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-L-IC-N-CL	**Water**							
Batch R5073340								
WG3316969-3 DUP		**L2442697-3**						
Nitrate (as N)		<0.0050	0.0057	RPD-NA	mg/L	N/A	20	02-MAY-20
WG3316969-2 LCS								
Nitrate (as N)			102.9		%		90-110	02-MAY-20
WG3316969-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	02-MAY-20
WG3316969-4 MS		**L2442697-3**						
Nitrate (as N)			97.6		%		75-125	02-MAY-20
ORP-CL	**Water**							
Batch R5078862								
WG3319006-13 CRM		**CL-ORP**						
ORP			220		mV		210-230	06-MAY-20
P-T-L-COL-CL	**Water**							
Batch R5079530								
WG3319282-10 LCS								
Phosphorus (P)-Total			100.4		%		80-120	07-MAY-20
WG3319282-9 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	07-MAY-20
PH-CL	**Water**							
Batch R5073319								
WG3316959-8 LCS								
pH			6.99		pH		6.9-7.1	02-MAY-20
PO4-DO-L-COL-CL	**Water**							
Batch R5073876								
WG3316889-14 LCS								
Orthophosphate-Dissolved (as P)			104.2		%		80-120	02-MAY-20
WG3316889-13 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	02-MAY-20
SO4-IC-N-CL	**Water**							
Batch R5073340								
WG3316969-3 DUP		**L2442697-3**						
Sulfate (SO4)		<0.30	<0.30	RPD-NA	mg/L	N/A	20	02-MAY-20
WG3316969-2 LCS								
Sulfate (SO4)			106.2		%		90-110	02-MAY-20
WG3316969-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-N-CL	**Water**							
Batch R5073340								
WG3316969-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	02-MAY-20
WG3316969-4 MS		**L2442697-3**						
Sulfate (SO4)			100.6		%		75-125	02-MAY-20
SOLIDS-TDS-CL	**Water**							
Batch R5079905								
WG3318423-8 LCS								
Total Dissolved Solids			100.3		%		85-115	06-MAY-20
WG3318423-7 MB								
Total Dissolved Solids			<10		mg/L		10	06-MAY-20
TKN-L-F-CL	**Water**							
Batch R5080434								
WG3320325-10 LCS								
Total Kjeldahl Nitrogen			89.0		%		75-125	08-MAY-20
WG3320325-14 LCS								
Total Kjeldahl Nitrogen			90.1		%		75-125	08-MAY-20
WG3320325-18 LCS								
Total Kjeldahl Nitrogen			90.8		%		75-125	08-MAY-20
WG3320325-2 LCS								
Total Kjeldahl Nitrogen			92.9		%		75-125	08-MAY-20
WG3320325-22 LCS								
Total Kjeldahl Nitrogen			89.8		%		75-125	08-MAY-20
WG3320325-26 LCS								
Total Kjeldahl Nitrogen			94.6		%		75-125	08-MAY-20
WG3320325-6 LCS								
Total Kjeldahl Nitrogen			90.0		%		75-125	08-MAY-20
WG3320325-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-13 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-17 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-21 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-25 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-5 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-L-F-CL	**Water**							
Batch R5080434								
WG3320325-9 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
TSS-L-CL	**Water**							
Batch R5080454								
WG3319188-4 LCS								
Total Suspended Solids			110.9		%		85-115	07-MAY-20
WG3319188-3 MB								
Total Suspended Solids			<1.0		mg/L		1	07-MAY-20
TURBIDITY-CL	**Water**							
Batch R5073116								
WG3316918-31 DUP		**L2442697-1**						
Turbidity		1.18	1.21		NTU	2.5	15	02-MAY-20
WG3316918-20 LCS								
Turbidity			104.0		%		85-115	02-MAY-20
WG3316918-19 MB								
Turbidity			<0.10		NTU		0.1	02-MAY-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	30-APR-20 08:25	06-MAY-20 19:00	0.25	155	hours	EHTR-FM
	2	30-APR-20 10:30	06-MAY-20 19:00	0.25	152	hours	EHTR-FM
	3	30-APR-20 12:00	06-MAY-20 19:00	0.25	151	hours	EHTR-FM
	4	30-APR-20 12:30	06-MAY-20 19:00	0.25	150	hours	EHTR-FM
pH							
	1	30-APR-20 08:25	02-MAY-20 13:00	0.25	53	hours	EHTR-FM
	2	30-APR-20 10:30	02-MAY-20 13:00	0.25	50	hours	EHTR-FM
	3	30-APR-20 12:00	02-MAY-20 13:00	0.25	49	hours	EHTR-FM
	4	30-APR-20 12:30	02-MAY-20 13:00	0.25	48	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2442697 were received on 01-MAY-20 08:45.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes 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 pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID: **Regional Effects Program**

TURNAROUND TIME: Regular

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program/Line Creek LAEMP			Lab Name	ALS Calgary			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cait Good			Lab Contact	Lyuda Shvets			Email 1:	cait.good@teck.com	X	X	X
Email	cait.good@teck.com			Email	Lyudmyla.Shvets@ALSGlobal.com			Email 2:	carlie.meyer@teck.com	X	X	X
Address	421 Pine Avenue			Address	2559 29 Street NE			Email 3:	teckcoal@equisonline.com			X
								Email 4:	kbatchelar@minnow.ca	X	X	X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:				
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada					
Phone Number	250-425-8202			Phone Number	403-407-1800			PO number	VPO00689999			

L2442697-COFC

SAMPLE DETAILS								ANALYSIS REQUESTED									
								Filtered (F), Field, Lab, F&L Field & Lab, N None									
								Filt.	N	Y	N	Y	Y	N	N		
								PRESERV.	NONE	H2SO4	H2SO4	HCl	HNO3	HNO3	NONE		
Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	ANALYSIS	HG-T-U-CVAF-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-D-CVAF-VA	TECKCOAL-MET-D-VA	TECKCOAL-MET-T-VA	TECKCOAL-ROUTINE-VA		
RG.LIDCOM.WS.20200430-0825	RG.LIDCOM	WS	No	2020/04/30	8:25	G	7		X	X	X	X	X	X	X		
RG.LI8.WS.20200430-1030	RG.LI8	WS	No	2020/04/30	10:30	G	7		X	X	X	X	X	X	X		
RG.FBLANK.WS.20200430-1200	RG.FBLANK	WS	No	2020/04/30	12:00	G	7		X	X	X	X	X	X	X		
RG.TRIP.WS.20200430-1230	RG.TRIP	WS	No	2020/04/30	12:30	G	4		X		X			X	X		

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
VPO00689999	Scott Gordon / Lotic Environmental	2020/04/30 13:00		5/1 8:25

SERVICE REQUEST (rush - subject to availability)					
Regular (default)	X	Sampler's Name	Scott Gordon	Mobile #	780-385-0186
Priority (2-3 business days) - 50% surcharge		Sampler's Signature		Date/Time	2020/04/30 13:00
Emergency (1 Business Day) - 100% surcharge					
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

4

WATER CHEMISTRY

ALS Laboratory Report L2473605

(Finalized July 21, 2020)

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 14-JUL-20
Report Date: 21-JUL-20 12:30 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2473605

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM/LINE CREEK LAEMP

C of C Numbers:
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2473605-1				
	Description	WS				
	Sampled Date	13-JUL-20				
	Sampled Time	13:50				
	Client ID	RG_LCUT_WS_20 20-07-13_1350				
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	691				
	Hardness (as CaCO3) (mg/L)	363				
	pH (pH)	8.49				
	ORP (mV)	319				
	Total Suspended Solids (mg/L)	<1.0				
	Total Dissolved Solids (mg/L)	489				
	Turbidity (NTU)	0.17				
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	173				
	Alkalinity, Carbonate (as CaCO3) (mg/L)	11.2				
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Total (as CaCO3) (mg/L)	184				
	Ammonia as N (mg/L)	<0.0050				
	Bromide (Br) (mg/L)	<0.050				
	Chloride (Cl) (mg/L)	3.67				
	Fluoride (F) (mg/L)	0.176				
	Ion Balance (%)	96.4				
	Nitrate (as N) (mg/L)	9.59				
	Nitrite (as N) (mg/L)	0.0034				
	Total Kjeldahl Nitrogen (mg/L)	<0.25 TKNI				
	Orthophosphate-Dissolved (as P) (mg/L)	0.0022				
	Phosphorus (P)-Total (mg/L)	<0.0020				
	Sulfate (SO4) (mg/L)	161				
	Anion Sum (meq/L)	7.83				
	Cation Sum (meq/L)	7.55				
	Cation - Anion Balance (%)	-1.8				
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.28				
	Total Organic Carbon (mg/L)	1.12				
Total Metals	Aluminum (Al)-Total (mg/L)	0.0054				
	Antimony (Sb)-Total (mg/L)	0.00034				
	Arsenic (As)-Total (mg/L)	0.00013				
	Barium (Ba)-Total (mg/L)	0.0395				
	Beryllium (Be)-Total (ug/L)	<0.020				
	Bismuth (Bi)-Total (mg/L)	<0.000050				
	Boron (B)-Total (mg/L)	0.015				
	Cadmium (Cd)-Total (ug/L)	0.482				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2473605-1				
	Description	WS				
	Sampled Date	13-JUL-20				
	Sampled Time	13:50				
	Client ID	RG_LCUT_WS_20 20-07-13_1350				
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	85.4				
	Chromium (Cr)-Total (mg/L)	0.00012				
	Cobalt (Co)-Total (ug/L)	<0.10				
	Copper (Cu)-Total (mg/L)	<0.00050				
	Iron (Fe)-Total (mg/L)	<0.010				
	Lead (Pb)-Total (mg/L)	<0.000050				
	Lithium (Li)-Total (mg/L)	0.0407				
	Magnesium (Mg)-Total (mg/L)	37.5				
	Manganese (Mn)-Total (mg/L)	0.00016				
	Mercury (Hg)-Total (ug/L)	0.00060				
	Molybdenum (Mo)-Total (mg/L)	0.00170				
	Nickel (Ni)-Total (mg/L)	0.00994				
	Potassium (K)-Total (mg/L)	1.46				
	Selenium (Se)-Total (ug/L)	33.4				
	Silicon (Si)-Total (mg/L)	2.10				
	Silver (Ag)-Total (mg/L)	<0.000010				
	Sodium (Na)-Total (mg/L)	5.72				
	Strontium (Sr)-Total (mg/L)	0.187				
	Thallium (Tl)-Total (mg/L)	0.000014				
	Tin (Sn)-Total (mg/L)	<0.00010				
	Titanium (Ti)-Total (mg/L)	<0.010				
	Uranium (U)-Total (mg/L)	0.00299				
	Vanadium (V)-Total (mg/L)	<0.00050				
	Zinc (Zn)-Total (mg/L)	0.0196				
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD				
	Dissolved Metals Filtration Location	FIELD				
	Aluminum (Al)-Dissolved (mg/L)	<0.0030				
	Antimony (Sb)-Dissolved (mg/L)	0.00034				
	Arsenic (As)-Dissolved (mg/L)	0.00012				
	Barium (Ba)-Dissolved (mg/L)	0.0394				
	Beryllium (Be)-Dissolved (ug/L)	<0.020				
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050				
	Boron (B)-Dissolved (mg/L)	0.014				
	Cadmium (Cd)-Dissolved (ug/L)	0.473				
	Calcium (Ca)-Dissolved (mg/L)	83.5				
	Chromium (Cr)-Dissolved (mg/L)	0.00013				
	Cobalt (Co)-Dissolved (ug/L)	<0.10				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2473605-1				
	Description	WS				
	Sampled Date	13-JUL-20				
	Sampled Time	13:50				
	Client ID	RG_LCUT_WS_2020-07-13_1350				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	0.00114				
	Iron (Fe)-Dissolved (mg/L)	<0.010				
	Lead (Pb)-Dissolved (mg/L)	<0.000050				
	Lithium (Li)-Dissolved (mg/L)	0.0399				
	Magnesium (Mg)-Dissolved (mg/L)	37.5				
	Manganese (Mn)-Dissolved (mg/L)	0.00012				
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050				
	Molybdenum (Mo)-Dissolved (mg/L)	0.00163				
	Nickel (Ni)-Dissolved (mg/L)	0.0103				
	Potassium (K)-Dissolved (mg/L)	1.47				
	Selenium (Se)-Dissolved (ug/L)	39.5				
	Silicon (Si)-Dissolved (mg/L)	1.93				
	Silver (Ag)-Dissolved (mg/L)	<0.000010				
	Sodium (Na)-Dissolved (mg/L)	5.92				
	Strontium (Sr)-Dissolved (mg/L)	0.184				
	Thallium (Tl)-Dissolved (mg/L)	0.000016				
	Tin (Sn)-Dissolved (mg/L)	<0.00010				
	Titanium (Ti)-Dissolved (mg/L)	<0.010				
	Uranium (U)-Dissolved (mg/L)	0.00295				
	Vanadium (V)-Dissolved (mg/L)	<0.00050				
	Zinc (Zn)-Dissolved (mg/L)	0.0198				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2473605-1
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2473605-1
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2473605-1
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2473605-1
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2473605-1
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2473605-1
Matrix Spike	Barium (Ba)-Total	MS-B	L2473605-1
Matrix Spike	Calcium (Ca)-Total	MS-B	L2473605-1
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2473605-1
Matrix Spike	Selenium (Se)-Total	MS-B	L2473605-1
Matrix Spike	Sodium (Na)-Total	MS-B	L2473605-1
Matrix Spike	Strontium (Sr)-Total	MS-B	L2473605-1
Matrix Spike	Uranium (U)-Total	MS-B	L2473605-1

Qualifiers for Individual Parameters Listed:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". 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.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by

Reference Information

subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-IC-N-CL Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

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 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL Water Oxidation redution potential by elect. ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL Water Phosphorus (P)-Total APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

Reference Information

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL	Water	Orthophosphate-Dissolved (as P)	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL	Water	Total Kjeldahl Nitrogen	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour 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.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5154367								
WG3363616-5 LCS								
Acidity (as CaCO3)			97.8		%		85-115	15-JUL-20
WG3363616-4 MB								
Acidity (as CaCO3)			1.4		mg/L		2	15-JUL-20
ALK-MAN-CL	**Water**							
Batch R5156838								
WG3364599-8 LCS								
Alkalinity, Total (as CaCO3)			103.5		%		85-115	15-JUL-20
WG3364599-7 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	15-JUL-20
BE-D-L-CCMS-VA	**Water**							
Batch R5157839								
WG3364343-2 LCS								
Beryllium (Be)-Dissolved			102.9		%		80-120	18-JUL-20
WG3364343-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	18-JUL-20
BE-T-L-CCMS-VA	**Water**							
Batch R5157839								
WG3364211-2 LCS								
Beryllium (Be)-Total			90.2		%		80-120	18-JUL-20
WG3364211-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	18-JUL-20
BR-L-IC-N-CL	**Water**							
Batch R5153749								
WG3362834-6 LCS								
Bromide (Br)			103.7		%		85-115	14-JUL-20
WG3362834-5 MB								
Bromide (Br)			<0.050		mg/L		0.05	14-JUL-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5157711								
WG3365492-2 LCS								
Dissolved Organic Carbon			91.2		%		80-120	17-JUL-20
WG3365492-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	17-JUL-20
C-TOT-ORG-LOW-CL	**Water**							

Quality Control Report

Workorder: L2473605 Report Date: 21-JUL-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-LOW-CL	**Water**							
Batch R5157711								
WG3365492-2 LCS								
Total Organic Carbon			97.6		%		80-120	17-JUL-20
WG3365492-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	17-JUL-20
CL-IC-N-CL	**Water**							
Batch R5153749								
WG3362834-6 LCS								
Chloride (Cl)			106.0		%		90-110	14-JUL-20
WG3362834-5 MB								
Chloride (Cl)			<0.50		mg/L		0.5	14-JUL-20
EC-L-PCT-CL	**Water**							
Batch R5156838								
WG3364599-8 LCS								
Conductivity (@ 25C)			102.1		%		90-110	15-JUL-20
WG3364599-7 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	15-JUL-20
F-IC-N-CL	**Water**							
Batch R5153749								
WG3362834-6 LCS								
Fluoride (F)			99.8		%		90-110	14-JUL-20
WG3362834-5 MB								
Fluoride (F)			<0.020		mg/L		0.02	14-JUL-20
HG-D-CVAA-VA	**Water**							
Batch R5156597								
WG3365234-2 LCS								
Mercury (Hg)-Dissolved			101.3		%		80-120	17-JUL-20
WG3365234-1 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	17-JUL-20
HG-T-U-CVAF-VA	**Water**							
Batch R5157434								
WG3365152-2 LCS								
Mercury (Hg)-Total			106.4		%		80-120	17-JUL-20
WG3365152-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	17-JUL-20
MET-D-CCMS-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5157839								
WG3364343-2 LCS								
Aluminum (Al)-Dissolved			103.8		%		80-120	18-JUL-20
Antimony (Sb)-Dissolved			99.9		%		80-120	18-JUL-20
Arsenic (As)-Dissolved			101.4		%		80-120	18-JUL-20
Barium (Ba)-Dissolved			103.4		%		80-120	18-JUL-20
Bismuth (Bi)-Dissolved			102.6		%		80-120	18-JUL-20
Boron (B)-Dissolved			98.8		%		80-120	18-JUL-20
Cadmium (Cd)-Dissolved			102.1		%		80-120	18-JUL-20
Calcium (Ca)-Dissolved			97.7		%		80-120	18-JUL-20
Chromium (Cr)-Dissolved			99.9		%		80-120	18-JUL-20
Cobalt (Co)-Dissolved			98.4		%		80-120	18-JUL-20
Copper (Cu)-Dissolved			98.7		%		80-120	18-JUL-20
Iron (Fe)-Dissolved			102.2		%		80-120	18-JUL-20
Lead (Pb)-Dissolved			99.6		%		80-120	18-JUL-20
Lithium (Li)-Dissolved			99.7		%		80-120	18-JUL-20
Magnesium (Mg)-Dissolved			99.9		%		80-120	18-JUL-20
Manganese (Mn)-Dissolved			99.9		%		80-120	18-JUL-20
Molybdenum (Mo)-Dissolved			98.9		%		80-120	18-JUL-20
Nickel (Ni)-Dissolved			98.0		%		80-120	18-JUL-20
Potassium (K)-Dissolved			106.3		%		80-120	18-JUL-20
Selenium (Se)-Dissolved			107.2		%		80-120	18-JUL-20
Silicon (Si)-Dissolved			102.8		%		60-140	18-JUL-20
Silver (Ag)-Dissolved			100.7		%		80-120	18-JUL-20
Sodium (Na)-Dissolved			106.3		%		80-120	18-JUL-20
Strontium (Sr)-Dissolved			102.8		%		80-120	18-JUL-20
Thallium (Tl)-Dissolved			102.4		%		80-120	18-JUL-20
Tin (Sn)-Dissolved			100.1		%		80-120	18-JUL-20
Titanium (Ti)-Dissolved			96.2		%		80-120	18-JUL-20
Uranium (U)-Dissolved			98.7		%		80-120	18-JUL-20
Vanadium (V)-Dissolved			102.4		%		80-120	18-JUL-20
Zinc (Zn)-Dissolved			105.4		%		80-120	18-JUL-20
WG3364343-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	18-JUL-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	18-JUL-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	18-JUL-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5157839								
WG3364343-1 MB		**NP**						
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	18-JUL-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	18-JUL-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	18-JUL-20
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	18-JUL-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	18-JUL-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	18-JUL-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	18-JUL-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	18-JUL-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	18-JUL-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	18-JUL-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	18-JUL-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	18-JUL-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	18-JUL-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	18-JUL-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	18-JUL-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	18-JUL-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	18-JUL-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	18-JUL-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	18-JUL-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	18-JUL-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	18-JUL-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	18-JUL-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	18-JUL-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	18-JUL-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	18-JUL-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	18-JUL-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	18-JUL-20
MET-T-CCMS-VA	**Water**							
Batch R5157839								
WG3364211-2 LCS								
Aluminum (Al)-Total			94.6		%		80-120	18-JUL-20
Antimony (Sb)-Total			96.1		%		80-120	18-JUL-20
Arsenic (As)-Total			98.0		%		80-120	18-JUL-20
Barium (Ba)-Total			98.8		%		80-120	18-JUL-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5157839								
WG3364211-2 LCS								
Bismuth (Bi)-Total			104.8		%		80-120	18-JUL-20
Boron (B)-Total			91.1		%		80-120	18-JUL-20
Cadmium (Cd)-Total			99.2		%		80-120	18-JUL-20
Calcium (Ca)-Total			93.7		%		80-120	18-JUL-20
Chromium (Cr)-Total			96.7		%		80-120	18-JUL-20
Cobalt (Co)-Total			97.1		%		80-120	18-JUL-20
Copper (Cu)-Total			97.7		%		80-120	18-JUL-20
Iron (Fe)-Total			99.9		%		80-120	18-JUL-20
Lead (Pb)-Total			99.0		%		80-120	18-JUL-20
Lithium (Li)-Total			86.6		%		80-120	18-JUL-20
Magnesium (Mg)-Total			93.8		%		80-120	18-JUL-20
Manganese (Mn)-Total			96.8		%		80-120	18-JUL-20
Molybdenum (Mo)-Total			95.7		%		80-120	18-JUL-20
Nickel (Ni)-Total			97.4		%		80-120	18-JUL-20
Potassium (K)-Total			101.2		%		80-120	18-JUL-20
Selenium (Se)-Total			100.9		%		80-120	18-JUL-20
Silicon (Si)-Total			100.6		%		80-120	18-JUL-20
Silver (Ag)-Total			96.6		%		80-120	18-JUL-20
Sodium (Na)-Total			100.3		%		80-120	18-JUL-20
Strontium (Sr)-Total			98.6		%		80-120	18-JUL-20
Thallium (Tl)-Total			101.6		%		80-120	18-JUL-20
Tin (Sn)-Total			98.1		%		80-120	18-JUL-20
Titanium (Ti)-Total			92.1		%		80-120	18-JUL-20
Uranium (U)-Total			99.1		%		80-120	18-JUL-20
Vanadium (V)-Total			98.5		%		80-120	18-JUL-20
Zinc (Zn)-Total			97.6		%		80-120	18-JUL-20
WG3364211-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	18-JUL-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	18-JUL-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	18-JUL-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	18-JUL-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	18-JUL-20
Boron (B)-Total			<0.010		mg/L		0.01	18-JUL-20
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	18-JUL-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5157839								
WG3364211-1 MB								
Calcium (Ca)-Total			<0.050		mg/L		0.05	18-JUL-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	18-JUL-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	18-JUL-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	18-JUL-20
Iron (Fe)-Total			<0.010		mg/L		0.01	18-JUL-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	18-JUL-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	18-JUL-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	18-JUL-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	18-JUL-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	18-JUL-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	18-JUL-20
Potassium (K)-Total			<0.050		mg/L		0.05	18-JUL-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	18-JUL-20
Silicon (Si)-Total			<0.10		mg/L		0.1	18-JUL-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	18-JUL-20
Sodium (Na)-Total			<0.050		mg/L		0.05	18-JUL-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	18-JUL-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	18-JUL-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	18-JUL-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	18-JUL-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	18-JUL-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	18-JUL-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	18-JUL-20
NH3-L-F-CL	**Water**							
Batch R5159555								
WG3366770-11 DUP		**L2473605-1**						
Ammonia as N		<0.0050	0.0055	RPD-NA	mg/L	N/A	20	20-JUL-20
WG3366770-10 LCS								
Ammonia as N			101.3		%		85-115	20-JUL-20
WG3366770-9 MB								
Ammonia as N			<0.0050		mg/L		0.005	20-JUL-20
WG3366770-12 MS		**L2473605-1**						
Ammonia as N			101.1		%		75-125	20-JUL-20
NO2-L-IC-N-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-L-IC-N-CL	**Water**							
Batch R5153749								
WG3362834-6 LCS								
Nitrite (as N)			106.7		%		90-110	14-JUL-20
WG3362834-5 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	14-JUL-20
NO3-L-IC-N-CL	**Water**							
Batch R5153749								
WG3362834-6 LCS								
Nitrate (as N)			106.4		%		90-110	14-JUL-20
WG3362834-5 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	14-JUL-20
ORP-CL	**Water**							
Batch R5159157								
WG3366313-1 CRM		**CL-ORP**						
ORP			213		mV		210-230	20-JUL-20
P-T-L-COL-CL	**Water**							
Batch R5157100								
WG3364767-10 LCS								
Phosphorus (P)-Total			94.2		%		80-120	17-JUL-20
WG3364767-9 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	17-JUL-20
PH-CL	**Water**							
Batch R5156838								
WG3364599-8 LCS								
pH			6.98		pH		6.9-7.1	15-JUL-20
PO4-DO-L-COL-CL	**Water**							
Batch R5153423								
WG3362241-6 LCS								
Orthophosphate-Dissolved (as P)			105.0		%		80-120	14-JUL-20
WG3362241-5 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	14-JUL-20
SO4-IC-N-CL	**Water**							
Batch R5153749								
WG3362834-6 LCS								
Sulfate (SO4)			107.2		%		90-110	14-JUL-20
WG3362834-5 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-N-CL	**Water**							
Batch R5153749								
WG3362834-5 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	14-JUL-20
SOLIDS-TDS-CL	**Water**							
Batch R5157760								
WG3364589-2 LCS								
Total Dissolved Solids			96.9		%		85-115	17-JUL-20
WG3364589-1 MB								
Total Dissolved Solids			<10		mg/L		10	17-JUL-20
TKN-L-F-CL	**Water**							
Batch R5159280								
WG3366474-2 LCS								
Total Kjeldahl Nitrogen			83.4		%		75-125	20-JUL-20
WG3366474-5 LCS								
Total Kjeldahl Nitrogen			81.5		%		75-125	20-JUL-20
WG3366474-9 LCS								
Total Kjeldahl Nitrogen			81.5		%		75-125	20-JUL-20
WG3366474-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	20-JUL-20
WG3366474-4 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	20-JUL-20
WG3366474-8 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	20-JUL-20
TSS-L-CL	**Water**							
Batch R5157740								
WG3364591-2 LCS								
Total Suspended Solids			92.0		%		85-115	17-JUL-20
WG3364591-1 MB								
Total Suspended Solids			<1.0		mg/L		1	17-JUL-20
TURBIDITY-CL	**Water**							
Batch R5153466								
WG3362225-2 LCS								
Turbidity			99.0		%		85-115	14-JUL-20
WG3362225-1 MB								
Turbidity			<0.10		NTU		0.1	14-JUL-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	13-JUL-20 13:50	20-JUL-20 07:30	0.25	162	hours	EHTR-FM
pH							
	1	13-JUL-20 13:50	15-JUL-20 11:00	0.25	45	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2473605 were received on 14-JUL-20 09:30.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes 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 pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID: **Regional Effects Program**

TURNAROUND TIME: Regular

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program/Line Creek LAEMP			Lab Name	ALS Calgary			Report Format / Distribution	Excel	PDF	EDD
Project Manager	Cait Good			Lab Contact	Lyuda Shvets			Email 1: cait.good@teck.com	X	X	X
Email	cait.good@teck.com			Email	Lyudmyla.Shvets@ALSGlobal.com			Email 2: carlie.meyer@teck.com	X	X	X
Address	421 Pine Avenue			Address	2559 29 Street NE			Email 3: teckcoal@equisonline.com			X
								Email 4: kbatchelar@minnow.ca	X	X	X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:			
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada				
Phone Number	250-425-8202			Phone Number	403-407-1800			PO number	VPO00689999		

SAMPLE DETAILS

L2473605-COFC

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	N	Y	N	Y	Y	N	N
								PRESERV.	NONE	H2SO4	H2SO4	HCl	HNO3	HNO3	NONE
								ANALYSIS	HG-T-U-CVAF-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-D-CVAF-VA	TECKCOAL-MET-D-VA	TECKCOAL-MET-T-VA	TECKCOAL-ROUTINE-VA
RG_LCUT_WS_20200713_1350	RG.LCUT	WS	No	2020/07/13	13:50	G	7		X	X	X	X	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
VPO00689999	Rick Smit/Lotic Environmental	2020/07/13 16:00	[signature]	14/07 9:30

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 #	1-403-586-3241
Sampler's Signature	[signature]	Date/Time	2020/07/13 16:00

WATER CHEMISTRY

ALS Laboratory Report L2474683

(Finalized January 19, 2021)

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 15-JUL-20
Report Date: 19-JAN-21 09:48 (MT)
Version: FINAL REV. 2

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2474683

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: Regional Effects
Legal Site Desc:

Comments:
19-JAN-2021 Alkalinity (Species)result revised on L2474683-1 to -3.

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2474683-1	L2474683-2	L2474683-3		
	Description	WS	WS	WS		
	Sampled Date	14-JUL-20	14-JUL-20	14-JUL-20		
	Sampled Time	09:00	12:09	14:30		
	Client ID	RG_LI24_WS_20200714-0900	RG_SLINE_WS_20200714-1209	RG_LIDCOM_WS_20200714-1430		
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	257	257	575		
	Hardness (as CaCO3) (mg/L)	139	139	303		
	pH (pH)	8.34	8.39	8.51		
	ORP (mV)	297	383	377		
	Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0		
	Total Dissolved Solids (mg/L)	163	154	412 DLHC		
	Turbidity (NTU)	<0.10	<0.10	0.24		
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0	<1.0		
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	104	117	164		
	Alkalinity, Carbonate (as CaCO3) (mg/L)	2.0	2.6	9.0		
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0		
	Alkalinity, Total (as CaCO3) (mg/L)	106	119	173		
	Ammonia as N (mg/L)	0.0077	<0.0050	0.0157		
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050		
	Chloride (Cl) (mg/L)	<0.50	<0.50	2.90		
	Fluoride (F) (mg/L)	0.283	0.252	0.221		
	Ion Balance (%)	98.2	96.8	92.5		
	Nitrate (as N) (mg/L)	0.142	0.0215	5.91		
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	0.0028		
	Total Kjeldahl Nitrogen (mg/L)	0.087	0.084	0.551 TKNI		
	Orthophosphate-Dissolved (as P) (mg/L)	0.0019	0.0013	0.0022		
	Phosphorus (P)-Total (mg/L)	<0.0020	0.0022	0.0041		
	Sulfate (SO4) (mg/L)	34.8	24.3	134		
	Anion Sum (meq/L)	2.87	2.90	6.76		
	Cation Sum (meq/L)	2.82	2.81	6.25		
	Cation - Anion Balance (%)	-0.9	-1.6	-3.9		
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	0.88	1.14	1.00		
	Total Organic Carbon (mg/L)	0.79	1.15	1.15		
Total Metals	Aluminum (Al)-Total (mg/L)	0.0032	0.0046	0.0048		
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	0.00023		
	Arsenic (As)-Total (mg/L)	0.00015	0.00012	<0.00010		
	Barium (Ba)-Total (mg/L)	0.0345	0.0247	0.0459		
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020		
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050		
	Boron (B)-Total (mg/L)	<0.010	<0.010	0.012		
	Cadmium (Cd)-Total (ug/L)	<0.0050	0.0124	0.185		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2474683-1	L2474683-2	L2474683-3		
	Description	WS	WS	WS		
	Sampled Date	14-JUL-20	14-JUL-20	14-JUL-20		
	Sampled Time	09:00	12:09	14:30		
	Client ID	RG_LI24_WS_20200714-0900	RG_SLINE_WS_20200714-1209	RG_LIDCOM_WS_20200714-1430		
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	40.5	39.7	80.5		
	Chromium (Cr)-Total (mg/L)	0.00021	0.00018	0.00013		
	Cobalt (Co)-Total (ug/L)	<0.10	<0.10	<0.10		
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050		
	Iron (Fe)-Total (mg/L)	<0.010	<0.010	<0.010		
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050		
	Lithium (Li)-Total (mg/L)	0.0028	0.0018	0.0265		
	Magnesium (Mg)-Total (mg/L)	9.27	10.0	29.7		
	Manganese (Mn)-Total (mg/L)	<0.00010	0.00016	0.00067		
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	<0.00050		
	Molybdenum (Mo)-Total (mg/L)	0.000791	0.000972	0.00143		
	Nickel (Ni)-Total (mg/L)	0.00064	<0.00050	0.00441		
	Potassium (K)-Total (mg/L)	0.219	0.263	0.988		
	Selenium (Se)-Total (ug/L)	2.38	0.854	28.2		
	Silicon (Si)-Total (mg/L)	1.42	1.67	1.98		
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Total (mg/L)	0.963	0.442	3.64		
	Strontium (Sr)-Total (mg/L)	0.119	0.0957	0.163		
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Total (mg/L)	0.00106	0.00103	0.00228		
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050		
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	0.0077		
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD		
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD		
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030		
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	0.00019		
	Arsenic (As)-Dissolved (mg/L)	0.00014	0.00011	0.00010		
	Barium (Ba)-Dissolved (mg/L)	0.0349	0.0272	0.0477		
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020		
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	0.020		
	Cadmium (Cd)-Dissolved (ug/L)	<0.0050	0.0125	0.186		
	Calcium (Ca)-Dissolved (mg/L)	40.5	38.3	72.4		
	Chromium (Cr)-Dissolved (mg/L)	0.00018	0.00014	0.00012		
	Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10	<0.10		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2474683-1	L2474683-2	L2474683-3		
	Description	WS	WS	WS		
	Sampled Date	14-JUL-20	14-JUL-20	14-JUL-20		
	Sampled Time	09:00	12:09	14:30		
	Client ID	RG_LI24_WS_20200714-0900	RG_SLINE_WS_20200714-1209	RG_LIDCOM_WS_20200714-1430		
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020	<0.00020	0.00022		
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Lithium (Li)-Dissolved (mg/L)	0.0027	0.0018	0.0241		
	Magnesium (Mg)-Dissolved (mg/L)	9.11	10.6	29.7		
	Manganese (Mn)-Dissolved (mg/L)	<0.00010	<0.00010	0.00033		
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050		
	Molybdenum (Mo)-Dissolved (mg/L)	0.000764	0.000950	0.00147		
	Nickel (Ni)-Dissolved (mg/L)	0.00052	<0.00050	0.00428		
	Potassium (K)-Dissolved (mg/L)	0.228	0.296	1.01		
	Selenium (Se)-Dissolved (ug/L)	2.15	0.789	27.1		
	Silicon (Si)-Dissolved (mg/L)	1.47	1.64	1.96		
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Dissolved (mg/L)	1.02	0.507	4.00		
	Strontium (Sr)-Dissolved (mg/L)	0.112	0.0933	0.156		
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Dissolved (mg/L)	0.00105	0.00103	0.00217		
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Zinc (Zn)-Dissolved (mg/L)	0.0029	0.0026	0.0063		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2474683-1, -2, -3
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2474683-1, -2, -3
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2474683-1, -2, -3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2474683-1, -2, -3
Matrix Spike	Barium (Ba)-Total	MS-B	L2474683-1, -2, -3
Matrix Spike	Calcium (Ca)-Total	MS-B	L2474683-1, -2, -3
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2474683-1, -2, -3
Matrix Spike	Sodium (Na)-Total	MS-B	L2474683-1, -2, -3
Matrix Spike	Strontium (Sr)-Total	MS-B	L2474683-1, -2, -3

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". 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.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-IC-N-CL	Water	Chloride in Water by IC	EPA 300.1 (mod)

Reference Information

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

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 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL Water Oxidation redution potential by elect. ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL Water Phosphorus (P)-Total APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL Water pH APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

Reference Information

PO4-DO-L-COL-CL	Water	Orthophosphate-Dissolved (as P)	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL	Water	Total Kjeldahl Nitrogen	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Regional Effects

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour 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.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5157227								
WG3364951-5 LCS								
Acidity (as CaCO3)			106.4		%		85-115	17-JUL-20
WG3364951-4 MB								
Acidity (as CaCO3)			1.1		mg/L		2	17-JUL-20
ALK-MAN-CL	**Water**							
Batch R5157244								
WG3364974-17 LCS								
Alkalinity, Total (as CaCO3)			98.1		%		85-115	18-JUL-20
WG3364974-16 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	18-JUL-20
BE-D-L-CCMS-VA	**Water**							
Batch R5159079								
WG3365405-2 LCS								
Beryllium (Be)-Dissolved			98.3		%		80-120	19-JUL-20
WG3365405-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	19-JUL-20
BE-T-L-CCMS-VA	**Water**							
Batch R5160031								
WG3364936-2 LCS								
Beryllium (Be)-Total			101.4		%		80-120	21-JUL-20
WG3364936-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	21-JUL-20
BR-L-IC-N-CL	**Water**							
Batch R5157185								
WG3364877-2 LCS								
Bromide (Br)			104.6		%		85-115	16-JUL-20
WG3364877-1 MB								
Bromide (Br)			<0.050		mg/L		0.05	16-JUL-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5157698								
WG3365479-10 LCS								
Dissolved Organic Carbon			91.3		%		80-120	17-JUL-20
WG3365479-6 LCS								
Dissolved Organic Carbon			87.3		%		80-120	17-JUL-20
WG3365479-5 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	17-JUL-20
WG3365479-9 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-LOW-CL	**Water**							
Batch R5157698								
WG3365479-9 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	17-JUL-20
C-TOT-ORG-LOW-CL	**Water**							
Batch R5157698								
WG3365479-10 LCS								
Total Organic Carbon			96.7		%		80-120	17-JUL-20
WG3365479-6 LCS								
Total Organic Carbon			88.6		%		80-120	17-JUL-20
WG3365479-5 MB								
Total Organic Carbon			<0.50		mg/L		0.5	17-JUL-20
WG3365479-9 MB								
Total Organic Carbon			<0.50		mg/L		0.5	17-JUL-20
CL-IC-N-CL	**Water**							
Batch R5157185								
WG3364877-2 LCS								
Chloride (Cl)			104.2		%		90-110	16-JUL-20
WG3364877-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	16-JUL-20
EC-L-PCT-CL	**Water**							
Batch R5157244								
WG3364974-17 LCS								
Conductivity (@ 25C)			100.5		%		90-110	18-JUL-20
WG3364974-16 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	18-JUL-20
F-IC-N-CL	**Water**							
Batch R5157185								
WG3364877-2 LCS								
Fluoride (F)			101.7		%		90-110	16-JUL-20
WG3364877-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	16-JUL-20
HG-D-CVAA-VA	**Water**							
Batch R5159525								
WG3366723-6 LCS								
Mercury (Hg)-Dissolved			102.4		%		80-120	21-JUL-20
WG3366723-5 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	21-JUL-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-CVAA-VA	**Water**							
Batch R5159525								
WG3366723-8 MS		**L2474683-1**						
Mercury (Hg)-Dissolved			98.6		%		70-130	21-JUL-20
HG-T-U-CVAF-VA	**Water**							
Batch R5160100								
WG3367423-2 LCS								
Mercury (Hg)-Total			103.0		%		80-120	21-JUL-20
WG3367423-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	21-JUL-20
MET-D-CCMS-VA	**Water**							
Batch R5159079								
WG3365405-2 LCS								
Aluminum (Al)-Dissolved			97.8		%		80-120	19-JUL-20
Antimony (Sb)-Dissolved			96.8		%		80-120	19-JUL-20
Arsenic (As)-Dissolved			92.2		%		80-120	19-JUL-20
Barium (Ba)-Dissolved			101.1		%		80-120	19-JUL-20
Bismuth (Bi)-Dissolved			102.2		%		80-120	19-JUL-20
Boron (B)-Dissolved			94.3		%		80-120	19-JUL-20
Cadmium (Cd)-Dissolved			94.0		%		80-120	19-JUL-20
Calcium (Ca)-Dissolved			99.2		%		80-120	19-JUL-20
Chromium (Cr)-Dissolved			96.1		%		80-120	19-JUL-20
Cobalt (Co)-Dissolved			94.1		%		80-120	19-JUL-20
Copper (Cu)-Dissolved			92.9		%		80-120	19-JUL-20
Iron (Fe)-Dissolved			97.5		%		80-120	19-JUL-20
Lead (Pb)-Dissolved			98.7		%		80-120	19-JUL-20
Lithium (Li)-Dissolved			96.9		%		80-120	19-JUL-20
Magnesium (Mg)-Dissolved			95.2		%		80-120	19-JUL-20
Manganese (Mn)-Dissolved			97.2		%		80-120	19-JUL-20
Molybdenum (Mo)-Dissolved			99.3		%		80-120	19-JUL-20
Nickel (Ni)-Dissolved			93.9		%		80-120	19-JUL-20
Potassium (K)-Dissolved			98.7		%		80-120	19-JUL-20
Selenium (Se)-Dissolved			93.9		%		80-120	19-JUL-20
Silicon (Si)-Dissolved			97.6		%		60-140	19-JUL-20
Silver (Ag)-Dissolved			95.5		%		80-120	19-JUL-20
Sodium (Na)-Dissolved			100.8		%		80-120	19-JUL-20
Strontium (Sr)-Dissolved			100.5		%		80-120	19-JUL-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5159079								
WG3365405-2 LCS								
Thallium (Tl)-Dissolved			101.0		%		80-120	19-JUL-20
Tin (Sn)-Dissolved			96.5		%		80-120	19-JUL-20
Titanium (Ti)-Dissolved			92.1		%		80-120	19-JUL-20
Uranium (U)-Dissolved			94.8		%		80-120	19-JUL-20
Vanadium (V)-Dissolved			95.9		%		80-120	19-JUL-20
Zinc (Zn)-Dissolved			95.2		%		80-120	19-JUL-20
WG3365405-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	19-JUL-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	19-JUL-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	19-JUL-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	19-JUL-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	19-JUL-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	19-JUL-20
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	19-JUL-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	19-JUL-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	19-JUL-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	19-JUL-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	19-JUL-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	19-JUL-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	19-JUL-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	19-JUL-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	19-JUL-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	19-JUL-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	19-JUL-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	19-JUL-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	19-JUL-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	19-JUL-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	19-JUL-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	19-JUL-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	19-JUL-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	19-JUL-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	19-JUL-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	19-JUL-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	19-JUL-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5159079								
WG3365405-1 MB		**NP**						
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	19-JUL-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	19-JUL-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	19-JUL-20
MET-T-CCMS-VA	**Water**							
Batch R5160031								
WG3364936-2 LCS								
Aluminum (Al)-Total			92.8		%		80-120	21-JUL-20
Antimony (Sb)-Total			111.4		%		80-120	21-JUL-20
Arsenic (As)-Total			93.8		%		80-120	21-JUL-20
Barium (Ba)-Total			90.2		%		80-120	21-JUL-20
Bismuth (Bi)-Total			104.9		%		80-120	21-JUL-20
Boron (B)-Total			99.0		%		80-120	21-JUL-20
Cadmium (Cd)-Total			94.8		%		80-120	21-JUL-20
Calcium (Ca)-Total			101.6		%		80-120	21-JUL-20
Chromium (Cr)-Total			92.5		%		80-120	21-JUL-20
Cobalt (Co)-Total			95.2		%		80-120	21-JUL-20
Copper (Cu)-Total			93.6		%		80-120	21-JUL-20
Iron (Fe)-Total			91.3		%		80-120	21-JUL-20
Lead (Pb)-Total			103.4		%		80-120	21-JUL-20
Lithium (Li)-Total			103.7		%		80-120	21-JUL-20
Magnesium (Mg)-Total			94.4		%		80-120	21-JUL-20
Manganese (Mn)-Total			89.5		%		80-120	21-JUL-20
Molybdenum (Mo)-Total			107.3		%		80-120	21-JUL-20
Nickel (Ni)-Total			95.0		%		80-120	21-JUL-20
Potassium (K)-Total			97.2		%		80-120	21-JUL-20
Selenium (Se)-Total			103.8		%		80-120	21-JUL-20
Silicon (Si)-Total			95.1		%		80-120	21-JUL-20
Silver (Ag)-Total			103.7		%		80-120	21-JUL-20
Sodium (Na)-Total			93.9		%		80-120	21-JUL-20
Strontium (Sr)-Total			103.9		%		80-120	21-JUL-20
Thallium (Tl)-Total			104.3		%		80-120	21-JUL-20
Tin (Sn)-Total			96.0		%		80-120	21-JUL-20
Titanium (Ti)-Total			92.4		%		80-120	21-JUL-20
Uranium (U)-Total			99.2		%		80-120	21-JUL-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5160031								
WG3364936-2 LCS								
Vanadium (V)-Total			98.2		%		80-120	21-JUL-20
Zinc (Zn)-Total			98.1		%		80-120	21-JUL-20
WG3364936-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	21-JUL-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	21-JUL-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	21-JUL-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	21-JUL-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	21-JUL-20
Boron (B)-Total			<0.010		mg/L		0.01	21-JUL-20
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	21-JUL-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	21-JUL-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	21-JUL-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	21-JUL-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	21-JUL-20
Iron (Fe)-Total			<0.010		mg/L		0.01	21-JUL-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	21-JUL-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	21-JUL-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	21-JUL-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	21-JUL-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	21-JUL-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	21-JUL-20
Potassium (K)-Total			<0.050		mg/L		0.05	21-JUL-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	21-JUL-20
Silicon (Si)-Total			<0.10		mg/L		0.1	21-JUL-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	21-JUL-20
Sodium (Na)-Total			<0.050		mg/L		0.05	21-JUL-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	21-JUL-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	21-JUL-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	21-JUL-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	21-JUL-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	21-JUL-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	21-JUL-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	21-JUL-20
NH3-L-F-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-L-F-CL	**Water**							
Batch R5159866								
WG3367138-10 LCS								
Ammonia as N			107.9		%		85-115	21-JUL-20
WG3367138-9 MB								
Ammonia as N			<0.0050		mg/L		0.005	21-JUL-20
NO2-L-IC-N-CL	**Water**							
Batch R5157185								
WG3364877-2 LCS								
Nitrite (as N)			105.8		%		90-110	16-JUL-20
WG3364877-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	16-JUL-20
NO3-L-IC-N-CL	**Water**							
Batch R5157185								
WG3364877-2 LCS								
Nitrate (as N)			104.6		%		90-110	16-JUL-20
WG3364877-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	16-JUL-20
ORP-CL	**Water**							
Batch R5160318								
WG3367589-3 CRM		**CL-ORP**						
ORP			220		mV		210-230	21-JUL-20
P-T-L-COL-CL	**Water**							
Batch R5159775								
WG3367035-10 LCS								
Phosphorus (P)-Total			105.0		%		80-120	21-JUL-20
WG3367035-9 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	21-JUL-20
PH-CL	**Water**							
Batch R5157244								
WG3364974-17 LCS								
pH			6.99		pH		6.9-7.1	18-JUL-20
PO4-DO-L-COL-CL	**Water**							
Batch R5154213								
WG3363175-14 LCS								
Orthophosphate-Dissolved (as P)			101.0		%		80-120	15-JUL-20
WG3363175-13 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PO4-DO-L-COL-CL	**Water**							
Batch R5154213								
WG3363175-13 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	15-JUL-20
SO4-IC-N-CL	**Water**							
Batch R5157185								
WG3364877-2 LCS								
Sulfate (SO4)			104.8		%		90-110	16-JUL-20
WG3364877-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	16-JUL-20
SOLIDS-TDS-CL	**Water**							
Batch R5159955								
WG3365838-2 LCS								
Total Dissolved Solids			105.3		%		85-115	20-JUL-20
WG3365838-5 LCS								
Total Dissolved Solids			101.2		%		85-115	20-JUL-20
WG3365838-1 MB								
Total Dissolved Solids			<10		mg/L		10	20-JUL-20
WG3365838-4 MB								
Total Dissolved Solids			<10		mg/L		10	20-JUL-20
TKN-L-F-CL	**Water**							
Batch R5162745								
WG3368355-6 DUP		**L2474683-2**						
Total Kjeldahl Nitrogen		0.084	0.089		mg/L	5.8	20	22-JUL-20
WG3368355-10 LCS								
Total Kjeldahl Nitrogen			101.0		%		75-125	22-JUL-20
WG3368355-2 LCS								
Total Kjeldahl Nitrogen			109.0		%		75-125	22-JUL-20
WG3368355-5 LCS								
Total Kjeldahl Nitrogen			105.7		%		75-125	22-JUL-20
WG3368355-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	22-JUL-20
WG3368355-4 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	22-JUL-20
WG3368355-9 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	22-JUL-20
WG3368355-7 MS		**L2474683-2**						
Total Kjeldahl Nitrogen			118.0		%		70-130	22-JUL-20
TSS-L-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TSS-L-CL	**Water**							
Batch R5159902								
WG3365834-2 LCS								
Total Suspended Solids			97.3		%		85-115	20-JUL-20
WG3365834-1 MB								
Total Suspended Solids			<1.0		mg/L		1	20-JUL-20
TURBIDITY-CL	**Water**							
Batch R5154986								
WG3364067-2 LCS								
Turbidity			96.9		%		85-115	16-JUL-20
WG3364067-1 MB								
Turbidity			<0.10		NTU		0.1	16-JUL-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	14-JUL-20 09:00	21-JUL-20 08:20	0.25	167	hours	EHTR-FM
	2	14-JUL-20 12:09	21-JUL-20 08:20	0.25	164	hours	EHTR-FM
	3	14-JUL-20 14:30	21-JUL-20 08:20	0.25	162	hours	EHTR-FM
pH							
	1	14-JUL-20 09:00	18-JUL-20 13:00	0.25	100	hours	EHTR-FM
	2	14-JUL-20 12:09	18-JUL-20 13:00	0.25	97	hours	EHTR-FM
	3	14-JUL-20 14:30	18-JUL-20 13:00	0.25	95	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2474683 were received on 15-JUL-20 09:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes 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 pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID: Regional Effects Program

TURNAROUND TIME: Regular

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program			Lab Name	ALS Calgary			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cait Good			Lab Contact	Lyuda Shvets			Email 1:	cait.good@teck.com	X	X	X
Email	cait.good@teck.com			Email	Lyudmyla.Shvets@ALSGlobal.com			Email 2:	carlie.meyer@teck.com	X	X	X
Address	421 Pine Avenue			Address	2559 29 Street NE			Email 3:	teckcoal@equisonline.com			X
								Email 4:	kbatchelar@minnow.ca	X	X	X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:	Carla.FroymanParker@teck.com	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada					
Phone Number	250-425-8202			Phone Number	403-407-1800			PO number	VPO00689999			

L2474683-COFC

SAMPLE DETAILS								ANALYSIS REQUESTED (Filtered = F; Field, Lr Lab, FL? Field & Lab, N: None)										
								DIL	N	Y	N	Y	Y	N	N			
								PRESERV.	NONE	H2SO4	H2SO4	HCl	HNO3	HNO3	NONE			
Sample ID	Sample Location (sys loc code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	ANALYSIS	HG-T-U-CVAF-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-D-CVAF-VA	TECKCOAL-MET-D-VA	TECKCOAL-MET-T-VA	TECKCOAL-ROUTINE-VA			
RG_LI24_WS_20200714-0900	RG_LI24	WS	NO	14-Jul-20	9:00:00	G	7		X	X	X	X	X	X	X			
RG_SLINE_WS_20200714-1209	RG_SLINE	WS	NO	14-Jul-20	12:09:00	G	7		X	X	X	X	X	X	X			
RG_LIDCOM_WS_20200714-1430	RG_LIDCOM	WS	NO	14-Jul-20	14:30:00	G	7		X	X	X	X	X	X	X			

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
VPO00689999	Nicole Zathey/Lotic Environmental	July 14, 2020		

SERVICE REQUEST (rush - subject to availability)					
Regular (default)	X	Sampler's Name	Nicole Zathey	Mobile #	647 454 1818
Priority (2-3 business days) - 50% surcharge					
Emergency (1 Business Day) - 100% surcharge		Sampler's Signature		Date/Time	July 14, 2020
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

WATER CHEMISTRY

ALS Laboratory Report L2475301

(Finalized January 19, 2021)

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 16-JUL-20
Report Date: 19-JAN-21 09:50 (MT)
Version: FINAL REV. 2

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2475301

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: Regional Effects
Legal Site Desc:

Comments:
19-JAN-2021 Alkalinity (Species) result revised on L2475301-1 and -3.

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2475301-1	L2475301-2	L2475301-3	L2475301-4	L2475301-5
	Description	WS	WS	WS	WS	WS
	Sampled Date	15-JUL-20	15-JUL-20	15-JUL-20	15-JUL-20	15-JUL-20
	Sampled Time	08:25	10:45	13:20	11:00	13:00
	Client ID	RG_LILC3_WS_20200715-0825	RG_LISP24_WS_20200715-1045	RG_LI8_WS_20200715-1320	RG_TRIP_WS_20200715-1100	RG_FBLANK_WS_20200715-1300
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	673	569	517	<2.0	<2.0
	Hardness (as CaCO3) (mg/L)	450	371	338		<0.50
	pH (pH)	8.33	8.33	8.38	4.82	5.54
	ORP (mV)	254	322	310	385	371
	Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Total Dissolved Solids (mg/L)	583 DLHC	480 DLHC	432 DLHC	<10	<10
	Turbidity (NTU)	0.22	0.28	0.19	<0.10	<0.10
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	1.6	1.4
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	188	177	166	<1.0	<1.0
	Alkalinity, Carbonate (as CaCO3) (mg/L)	7.6	6.0	7.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	196	183	173	<1.0	<1.0
	Ammonia as N (mg/L)	<0.0050	<0.0050	<0.0050	0.0290 RRV	0.0082 RRV
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	3.65	2.70	2.57	<0.50	<0.50
	Fluoride (F) (mg/L)	0.153	0.158	0.166	<0.020	<0.020
	Ion Balance (%)	109	107	108	0.0	0.0
	Nitrate (as N) (mg/L)	9.63	6.94	5.42	<0.0050	<0.0050
	Nitrite (as N) (mg/L)	0.0010	0.0018	0.0019	<0.0010	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	<0.050 TKNI	0.068 TKNI	0.477 TKNI	<0.050	<0.050
	Orthophosphate-Dissolved (as P) (mg/L)	0.0014	0.0011	0.0013	<0.0010	<0.0010
	Phosphorus (P)-Total (mg/L)	0.0026	0.0023	0.0035	<0.0020	<0.0020
	Sulfate (SO4) (mg/L)	184	141	121	<0.30	<0.30
	Anion Sum (meq/L)	8.54	7.17	6.45	<0.10	<0.10
	Cation Sum (meq/L)	9.31	7.65	6.96	<0.10	<0.10
	Cation - Anion Balance (%)	4.3	3.3	3.8	0.0	0.0
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	0.59	0.87	0.79		<0.50
	Total Organic Carbon (mg/L)	0.61	0.74	0.65	<0.50	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.0037	0.0031	0.0039	<0.0030	<0.0030
	Antimony (Sb)-Total (mg/L)	0.00036	0.00024	0.00019	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00015	0.00012	0.00012	<0.00010	<0.00010
	Barium (Ba)-Total (mg/L)	0.0434	0.0413	0.0516	<0.00010	<0.00010
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	0.017	0.013	0.012	<0.010	<0.010
	Cadmium (Cd)-Total (ug/L)	0.520	0.314	0.190	<0.0050	<0.0050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2475301-6				
	Description	WS				
	Sampled Date	15-JUL-20				
	Sampled Time	12:00				
	Client ID	RG_RIVER_WS_2 0200715-1200				
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	519				
	Hardness (as CaCO3) (mg/L)	288				
	pH (pH)	8.39				
	ORP (mV)	323				
	Total Suspended Solids (mg/L)	<1.0				
	Total Dissolved Solids (mg/L)	431 DLHC				
	Turbidity (NTU)	0.23				
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	163				
	Alkalinity, Carbonate (as CaCO3) (mg/L)	5.8				
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Total (as CaCO3) (mg/L)	169				
	Ammonia as N (mg/L)	<0.0050				
	Bromide (Br) (mg/L)	<0.050				
	Chloride (Cl) (mg/L)	2.59				
	Fluoride (F) (mg/L)	0.169				
	Ion Balance (%)	93.4				
	Nitrate (as N) (mg/L)	5.41				
	Nitrite (as N) (mg/L)	0.0021				
	Total Kjeldahl Nitrogen (mg/L)	0.175 TKNI				
	Orthophosphate-Dissolved (as P) (mg/L)	0.0015				
	Phosphorus (P)-Total (mg/L)	0.0033				
	Sulfate (SO4) (mg/L)	121				
	Anion Sum (meq/L)	6.36				
	Cation Sum (meq/L)	5.94				
	Cation - Anion Balance (%)	-3.4				
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	0.62				
	Total Organic Carbon (mg/L)	0.63				
Total Metals	Aluminum (Al)-Total (mg/L)	0.0043				
	Antimony (Sb)-Total (mg/L)	0.00020				
	Arsenic (As)-Total (mg/L)	0.00015				
	Barium (Ba)-Total (mg/L)	0.0505				
	Beryllium (Be)-Total (ug/L)	<0.020				
	Bismuth (Bi)-Total (mg/L)	<0.000050				
	Boron (B)-Total (mg/L)	0.012				
	Cadmium (Cd)-Total (ug/L)	0.180				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2475301-1	L2475301-2	L2475301-3	L2475301-4	L2475301-5
	Description	WS	WS	WS	WS	WS
	Sampled Date	15-JUL-20	15-JUL-20	15-JUL-20	15-JUL-20	15-JUL-20
	Sampled Time	08:25	10:45	13:20	11:00	13:00
	Client ID	RG_LILC3_WS_20200715-0825	RG_LISP24_WS_20200715-1045	RG_LI8_WS_20200715-1320	RG_TRIP_WS_20200715-1100	RG_FBLANK_WS_20200715-1300
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	102	80.9	77.8	<0.050	<0.050
	Chromium (Cr)-Total (mg/L)	0.00015	0.00013	0.00017	<0.00010	<0.00010
	Cobalt (Co)-Total (ug/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	0.0429	0.0316	0.0254	<0.0010	<0.0010
	Magnesium (Mg)-Total (mg/L)	45.0	35.5	31.1	<0.10	<0.10
	Manganese (Mn)-Total (mg/L)	0.00118	0.00049	0.00053	<0.00010	<0.00010
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Molybdenum (Mo)-Total (mg/L)	0.00161	0.00147	0.00140	<0.000050	<0.000050
	Nickel (Ni)-Total (mg/L)	0.0108	0.00682	0.00415	<0.00050	<0.00050
	Potassium (K)-Total (mg/L)	1.37	1.03	0.934	<0.050	<0.050
	Selenium (Se)-Total (ug/L)	42.2	31.7	26.5	<0.050	<0.050
	Silicon (Si)-Total (mg/L)	2.04	1.99	1.93	<0.10	<0.10
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	5.99	4.31	3.87	<0.050	<0.050
	Strontium (Sr)-Total (mg/L)	0.183	0.164	0.153	<0.00020	<0.00020
	Thallium (Tl)-Total (mg/L)	0.000015	0.000012	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.00331	0.00275	0.00234	<0.000010	<0.000010
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	0.0225	0.0125	0.0060	<0.0030	<0.0030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD		FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	LAB	FIELD
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030		<0.0030
	Antimony (Sb)-Dissolved (mg/L)	0.00031	0.00023	0.00018		<0.00010
	Arsenic (As)-Dissolved (mg/L)	<0.00010	0.00011	<0.00010		<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.0443	0.0423	0.0527		<0.00010
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020		<0.020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		<0.000050
	Boron (B)-Dissolved (mg/L)	0.014	0.011	0.010		<0.010
	Cadmium (Cd)-Dissolved (ug/L)	0.539	0.329	0.131		<0.0050
	Calcium (Ca)-Dissolved (mg/L)	108	90.5	82.8	<0.050	<0.050
	Chromium (Cr)-Dissolved (mg/L)	0.00013	0.00015	0.00015		<0.00010
	Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10	<0.10		<0.10

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2475301-6				
	Description	WS				
	Sampled Date	15-JUL-20				
	Sampled Time	12:00				
	Client ID	RG_RIVER_WS_2 0200715-1200				
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	75.5				
	Chromium (Cr)-Total (mg/L)	0.00014				
	Cobalt (Co)-Total (ug/L)	<0.10				
	Copper (Cu)-Total (mg/L)	<0.00050				
	Iron (Fe)-Total (mg/L)	<0.010				
	Lead (Pb)-Total (mg/L)	<0.000050				
	Lithium (Li)-Total (mg/L)	0.0248				
	Magnesium (Mg)-Total (mg/L)	30.2				
	Manganese (Mn)-Total (mg/L)	0.00066				
	Mercury (Hg)-Total (ug/L)	<0.00050				
	Molybdenum (Mo)-Total (mg/L)	0.00141				
	Nickel (Ni)-Total (mg/L)	0.00397				
	Potassium (K)-Total (mg/L)	0.908				
	Selenium (Se)-Total (ug/L)	25.3				
	Silicon (Si)-Total (mg/L)	1.92				
	Silver (Ag)-Total (mg/L)	<0.000010				
	Sodium (Na)-Total (mg/L)	3.79				
	Strontium (Sr)-Total (mg/L)	0.157				
	Thallium (Tl)-Total (mg/L)	<0.000010				
	Tin (Sn)-Total (mg/L)	<0.00010				
	Titanium (Ti)-Total (mg/L)	<0.010				
	Uranium (U)-Total (mg/L)	0.00226				
	Vanadium (V)-Total (mg/L)	<0.00050				
	Zinc (Zn)-Total (mg/L)	0.0069				
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD				
	Dissolved Metals Filtration Location	FIELD				
	Aluminum (Al)-Dissolved (mg/L)	<0.0030				
	Antimony (Sb)-Dissolved (mg/L)	0.00018				
	Arsenic (As)-Dissolved (mg/L)	0.00011				
	Barium (Ba)-Dissolved (mg/L)	0.0489				
	Beryllium (Be)-Dissolved (ug/L)	<0.020				
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050				
	Boron (B)-Dissolved (mg/L)	0.011				
	Cadmium (Cd)-Dissolved (ug/L)	0.128				
	Calcium (Ca)-Dissolved (mg/L)	68.6				
	Chromium (Cr)-Dissolved (mg/L)	0.00013				
	Cobalt (Co)-Dissolved (ug/L)	<0.10				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2475301-1 WS 15-JUL-20 08:25 RG_LILC3_WS_20200715-0825	L2475301-2 WS 15-JUL-20 10:45 RG_LISP24_WS_20200715-1045	L2475301-3 WS 15-JUL-20 13:20 RG_LI8_WS_20200715-1320	L2475301-4 WS 15-JUL-20 11:00 RG_TRIP_WS_20200715-1100	L2475301-5 WS 15-JUL-20 13:00 RG_FBLANK_WS_20200715-1300
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	0.00047	0.00031	0.00021		<0.00020
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010		<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.0473	0.0318	0.0262		<0.0010
	Magnesium (Mg)-Dissolved (mg/L)	43.9	35.2	31.7	<0.0050	<0.10
	Manganese (Mn)-Dissolved (mg/L)	0.00025	0.00029	0.00027		<0.00010
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050		<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.00154	0.00143	0.00138		<0.000050
	Nickel (Ni)-Dissolved (mg/L)	0.0106	0.00702	0.00403		<0.00050
	Potassium (K)-Dissolved (mg/L)	1.55	1.18	1.07	<0.050	<0.050
	Selenium (Se)-Dissolved (ug/L)	43.5	33.2	26.1		<0.050
	Silicon (Si)-Dissolved (mg/L)	1.93	1.90	1.78		<0.050
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		<0.000010
	Sodium (Na)-Dissolved (mg/L)	6.32	4.76	4.27	<0.050	<0.050
	Strontium (Sr)-Dissolved (mg/L)	0.195	0.172	0.167		<0.00020
	Thallium (Tl)-Dissolved (mg/L)	0.000015	0.000011	<0.000010		<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010		<0.010
	Uranium (U)-Dissolved (mg/L)	0.00343	0.00273	0.00235		<0.000010
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		<0.00050
	Zinc (Zn)-Dissolved (mg/L)	0.0212	0.0134	0.0055		<0.0010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2475301-6				
	Description	WS				
	Sampled Date	15-JUL-20				
	Sampled Time	12:00				
	Client ID	RG_RIVER_WS_2 0200715-1200				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020				
	Iron (Fe)-Dissolved (mg/L)	<0.010				
	Lead (Pb)-Dissolved (mg/L)	<0.000050				
	Lithium (Li)-Dissolved (mg/L)	0.0253				
	Magnesium (Mg)-Dissolved (mg/L)	28.3				
	Manganese (Mn)-Dissolved (mg/L)	0.00026				
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050				
	Molybdenum (Mo)-Dissolved (mg/L)	0.00132				
	Nickel (Ni)-Dissolved (mg/L)	0.00370				
	Potassium (K)-Dissolved (mg/L)	0.969				
	Selenium (Se)-Dissolved (ug/L)	30.7				
	Silicon (Si)-Dissolved (mg/L)	1.91				
	Silver (Ag)-Dissolved (mg/L)	<0.000010				
	Sodium (Na)-Dissolved (mg/L)	3.85				
	Strontium (Sr)-Dissolved (mg/L)	0.154				
	Thallium (Tl)-Dissolved (mg/L)	<0.000010				
	Tin (Sn)-Dissolved (mg/L)	<0.00010				
	Titanium (Ti)-Dissolved (mg/L)	<0.010				
	Uranium (U)-Dissolved (mg/L)	0.00227				
	Vanadium (V)-Dissolved (mg/L)	<0.00050				
	Zinc (Zn)-Dissolved (mg/L)	0.0052				

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Antimony (Sb)-Total	B	L2475301-4, -5
Laboratory Control Sample	Beryllium (Be)-Dissolved	MES	L2475301-5, -6
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2475301-4
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2475301-4
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2475301-1, -2, -3
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2475301-5, -6
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2475301-5
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2475301-1, -2, -3
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2475301-5, -6
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2475301-5
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2475301-1, -2, -3
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2475301-5, -6
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2475301-5
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2475301-5
Matrix Spike	Selenium (Se)-Dissolved	MS-B	L2475301-1, -2, -3
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L2475301-5
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2475301-1, -2, -3
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2475301-5
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2475301-1, -2, -3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2475301-5, -6
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2475301-5
Matrix Spike	Uranium (U)-Dissolved	MS-B	L2475301-1, -2, -3
Matrix Spike	Barium (Ba)-Total	MS-B	L2475301-1, -2, -3, -4, -5, -6
Matrix Spike	Calcium (Ca)-Total	MS-B	L2475301-1, -2, -3, -4, -5, -6
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2475301-1, -2, -3, -4, -5, -6
Matrix Spike	Selenium (Se)-Total	MS-B	L2475301-1, -2, -3, -4, -5, -6
Matrix Spike	Sodium (Na)-Total	MS-B	L2475301-1, -2, -3, -4, -5, -6
Matrix Spike	Strontium (Sr)-Total	MS-B	L2475301-1, -2, -3, -4, -5, -6

Qualifiers for Individual Parameters Listed:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". 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.			
BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.			
BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Reference Information

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL Water Bromide in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL Water Dissolved Organic Carbon APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL Water Total Organic Carbon APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-IC-N-CL Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

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 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-CL Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Reference Information

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL Water Oxidation redution potential by elect. ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL Water Phosphorus (P)-Total APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL Water pH APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL Water Orthophosphate-Dissolved (as P) APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL Water Total Dissolved Solids APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL Water Total Kjeldahl Nitrogen APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL Water Total Suspended Solids APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL Water Turbidity APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

Reference Information

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Regional Effects

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour 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.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5157227								
WG3364951-2 LCS								
Acidity (as CaCO3)			108.1		%		85-115	17-JUL-20
WG3364951-1 MB								
Acidity (as CaCO3)			1.2		mg/L		2	17-JUL-20
ALK-MAN-CL	**Water**							
Batch R5158097								
WG3365872-5 LCS								
Alkalinity, Total (as CaCO3)			100.3		%		85-115	18-JUL-20
WG3365872-4 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	18-JUL-20
BE-D-L-CCMS-VA	**Water**							
Batch R5160070								
WG3366945-2 LCS								
Beryllium (Be)-Dissolved			122.2	MES	%		80-120	21-JUL-20
WG3366945-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	21-JUL-20
Batch R5162576								
WG3366293-2 LCS								
Beryllium (Be)-Dissolved			100.9		%		80-120	22-JUL-20
WG3366293-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	22-JUL-20
BE-T-L-CCMS-VA	**Water**							
Batch R5160925								
WG3365629-2 LCS								
Beryllium (Be)-Total			109.0		%		80-120	22-JUL-20
WG3365629-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	22-JUL-20
WG3365629-4 MS		**L2475301-1**						
Beryllium (Be)-Total			96.3		%		70-130	22-JUL-20
BR-L-IC-N-CL	**Water**							
Batch R5157626								
WG3365380-3 DUP		**L2475301-5**						
Bromide (Br)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	17-JUL-20
WG3365380-2 LCS								
Bromide (Br)			102.8		%		85-115	17-JUL-20
WG3365380-1 MB								
Bromide (Br)			<0.050		mg/L		0.05	17-JUL-20
		L2475301-5						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BR-L-IC-N-CL	**Water**							
Batch R5157626								
WG3365380-4 MS		**L2475301-5**						
Bromide (Br)			106.4		%		75-125	17-JUL-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5158116								
WG3365989-7 DUP		**L2475301-1**						
Dissolved Organic Carbon		0.59	0.63		mg/L	6.8	20	19-JUL-20
WG3365989-6 LCS								
Dissolved Organic Carbon			89.6		%		80-120	19-JUL-20
WG3365989-5 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	19-JUL-20
WG3365989-8 MS		**L2475301-1**						
Dissolved Organic Carbon			108.0		%		70-130	19-JUL-20
C-TOT-ORG-LOW-CL	**Water**							
Batch R5158116								
WG3365989-7 DUP		**L2475301-1**						
Total Organic Carbon		0.61	<0.50	RPD-NA	mg/L	N/A	20	19-JUL-20
WG3365989-6 LCS								
Total Organic Carbon			98.0		%		80-120	19-JUL-20
WG3365989-5 MB								
Total Organic Carbon			<0.50		mg/L		0.5	19-JUL-20
WG3365989-8 MS		**L2475301-1**						
Total Organic Carbon			99.1		%		70-130	19-JUL-20
CL-IC-N-CL	**Water**							
Batch R5157626								
WG3365380-3 DUP		**L2475301-5**						
Chloride (Cl)		<0.50	<0.50	RPD-NA	mg/L	N/A	20	17-JUL-20
WG3365380-2 LCS								
Chloride (Cl)			105.8		%		90-110	17-JUL-20
WG3365380-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	17-JUL-20
WG3365380-4 MS		**L2475301-5**						
Chloride (Cl)			117.4		%		75-125	17-JUL-20
EC-L-PCT-CL	**Water**							
Batch R5158097								
WG3365872-5 LCS								
Conductivity (@ 25C)			100.1		%		90-110	18-JUL-20
WG3365872-4 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-L-PCT-CL	**Water**							
Batch R5158097								
WG3365872-4 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	18-JUL-20
F-IC-N-CL	**Water**							
Batch R5157626								
WG3365380-3 DUP		**L2475301-5**						
Fluoride (F)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	17-JUL-20
WG3365380-2 LCS								
Fluoride (F)			102.9		%		90-110	17-JUL-20
WG3365380-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	17-JUL-20
WG3365380-4 MS		**L2475301-5**						
Fluoride (F)			108.6		%		75-125	17-JUL-20
HG-D-CVAA-VA	**Water**							
Batch R5159525								
WG3366949-14 LCS								
Mercury (Hg)-Dissolved			103.7		%		80-120	21-JUL-20
WG3366949-13 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	21-JUL-20
WG3366949-16 MS		**L2475301-5**						
Mercury (Hg)-Dissolved			99.2		%		70-130	21-JUL-20
HG-T-U-CVAF-VA	**Water**							
Batch R5161943								
WG3368114-2 LCS								
Mercury (Hg)-Total			109.8		%		80-120	22-JUL-20
WG3368114-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	22-JUL-20
Batch R5164778								
WG3368971-2 LCS								
Mercury (Hg)-Total			110.6		%		80-120	23-JUL-20
WG3368971-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	23-JUL-20
MET-D-CCMS-CL	**Water**							
Batch R5165182								
WG3369023-14 LCS		**TMRM**						
Calcium (Ca)-Dissolved			104.0		%		80-120	24-JUL-20
Magnesium (Mg)-Dissolved			116.7		%		80-120	24-JUL-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-CL	**Water**							
Batch R5165182								
WG3369023-14 LCS		**TMRM**						
Potassium (K)-Dissolved			106.7		%		80-120	24-JUL-20
Sodium (Na)-Dissolved			109.6		%		80-120	24-JUL-20
WG3369023-13 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	24-JUL-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	24-JUL-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	24-JUL-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	24-JUL-20
MET-D-CCMS-VA	**Water**							
Batch R5160070								
WG3366945-2 LCS								
Aluminum (Al)-Dissolved			105.1		%		80-120	21-JUL-20
Antimony (Sb)-Dissolved			99.9		%		80-120	21-JUL-20
Arsenic (As)-Dissolved			100.1		%		80-120	21-JUL-20
Barium (Ba)-Dissolved			105.7		%		80-120	21-JUL-20
Bismuth (Bi)-Dissolved			105.0		%		80-120	21-JUL-20
Boron (B)-Dissolved			97.8		%		80-120	21-JUL-20
Cadmium (Cd)-Dissolved			100.9		%		80-120	21-JUL-20
Calcium (Ca)-Dissolved			99.0		%		80-120	21-JUL-20
Chromium (Cr)-Dissolved			101.0		%		80-120	21-JUL-20
Cobalt (Co)-Dissolved			99.6		%		80-120	21-JUL-20
Copper (Cu)-Dissolved			99.7		%		80-120	21-JUL-20
Iron (Fe)-Dissolved			102.0		%		80-120	21-JUL-20
Lead (Pb)-Dissolved			99.2		%		80-120	21-JUL-20
Lithium (Li)-Dissolved			98.3		%		80-120	21-JUL-20
Magnesium (Mg)-Dissolved			97.7		%		80-120	21-JUL-20
Manganese (Mn)-Dissolved			101.4		%		80-120	21-JUL-20
Molybdenum (Mo)-Dissolved			98.6		%		80-120	21-JUL-20
Nickel (Ni)-Dissolved			99.9		%		80-120	21-JUL-20
Potassium (K)-Dissolved			103.6		%		80-120	21-JUL-20
Selenium (Se)-Dissolved			105.2		%		80-120	21-JUL-20
Silicon (Si)-Dissolved			110.1		%		60-140	21-JUL-20
Silver (Ag)-Dissolved			96.9		%		80-120	21-JUL-20
Sodium (Na)-Dissolved			107.8		%		80-120	21-JUL-20
Strontium (Sr)-Dissolved			100.3		%		80-120	21-JUL-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5160070								
WG3366945-2 LCS								
Thallium (Tl)-Dissolved			102.0		%		80-120	21-JUL-20
Tin (Sn)-Dissolved			96.9		%		80-120	21-JUL-20
Titanium (Ti)-Dissolved			100.3		%		80-120	21-JUL-20
Uranium (U)-Dissolved			104.2		%		80-120	21-JUL-20
Vanadium (V)-Dissolved			102.6		%		80-120	21-JUL-20
Zinc (Zn)-Dissolved			100.2		%		80-120	21-JUL-20
WG3366945-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	21-JUL-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	21-JUL-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	21-JUL-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	21-JUL-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	21-JUL-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	21-JUL-20
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	21-JUL-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	21-JUL-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	21-JUL-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	21-JUL-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	21-JUL-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	21-JUL-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	21-JUL-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	21-JUL-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	21-JUL-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	21-JUL-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	21-JUL-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	21-JUL-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	21-JUL-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	21-JUL-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	21-JUL-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	21-JUL-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	21-JUL-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	21-JUL-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	21-JUL-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	21-JUL-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	21-JUL-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5160070								
WG3366945-1 MB		**NP**						
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	21-JUL-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	21-JUL-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	21-JUL-20
Batch R5160925								
WG3367495-2 LCS								
Aluminum (Al)-Dissolved			102.5		%		80-120	22-JUL-20
Antimony (Sb)-Dissolved			97.6		%		80-120	22-JUL-20
Arsenic (As)-Dissolved			100.4		%		80-120	22-JUL-20
Barium (Ba)-Dissolved			104.5		%		80-120	22-JUL-20
Bismuth (Bi)-Dissolved			99.97		%		80-120	22-JUL-20
Boron (B)-Dissolved			100.8		%		80-120	22-JUL-20
Cadmium (Cd)-Dissolved			102.1		%		80-120	22-JUL-20
Calcium (Ca)-Dissolved			105.6		%		80-120	22-JUL-20
Chromium (Cr)-Dissolved			103.4		%		80-120	22-JUL-20
Cobalt (Co)-Dissolved			101.9		%		80-120	22-JUL-20
Copper (Cu)-Dissolved			102.1		%		80-120	22-JUL-20
Iron (Fe)-Dissolved			103.1		%		80-120	22-JUL-20
Lead (Pb)-Dissolved			101.4		%		80-120	22-JUL-20
Lithium (Li)-Dissolved			103.5		%		80-120	22-JUL-20
Magnesium (Mg)-Dissolved			107.1		%		80-120	22-JUL-20
Manganese (Mn)-Dissolved			105.4		%		80-120	22-JUL-20
Molybdenum (Mo)-Dissolved			104.8		%		80-120	22-JUL-20
Nickel (Ni)-Dissolved			102.5		%		80-120	22-JUL-20
Potassium (K)-Dissolved			97.8		%		80-120	22-JUL-20
Selenium (Se)-Dissolved			98.5		%		80-120	22-JUL-20
Silicon (Si)-Dissolved			98.6		%		60-140	22-JUL-20
Silver (Ag)-Dissolved			102.3		%		80-120	22-JUL-20
Sodium (Na)-Dissolved			109.4		%		80-120	22-JUL-20
Strontium (Sr)-Dissolved			103.5		%		80-120	22-JUL-20
Thallium (Tl)-Dissolved			98.5		%		80-120	22-JUL-20
Tin (Sn)-Dissolved			101.0		%		80-120	22-JUL-20
Titanium (Ti)-Dissolved			100.5		%		80-120	22-JUL-20
Uranium (U)-Dissolved			101.4		%		80-120	22-JUL-20
Vanadium (V)-Dissolved			102.3		%		80-120	22-JUL-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5160925								
WG3367495-2 LCS								
Zinc (Zn)-Dissolved			102.7		%		80-120	22-JUL-20
WG3367495-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	22-JUL-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	22-JUL-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	22-JUL-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	22-JUL-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	22-JUL-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	22-JUL-20
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	22-JUL-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	22-JUL-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	22-JUL-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	22-JUL-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	22-JUL-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	22-JUL-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	22-JUL-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	22-JUL-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	22-JUL-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	22-JUL-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	22-JUL-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	22-JUL-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	22-JUL-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	22-JUL-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	22-JUL-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	22-JUL-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	22-JUL-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	22-JUL-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	22-JUL-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	22-JUL-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	22-JUL-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	22-JUL-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	22-JUL-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	22-JUL-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5162576								
WG3366293-2 LCS								
Aluminum (Al)-Dissolved			99.98		%		80-120	22-JUL-20
Antimony (Sb)-Dissolved			98.2		%		80-120	22-JUL-20
Arsenic (As)-Dissolved			96.5		%		80-120	22-JUL-20
Barium (Ba)-Dissolved			99.4		%		80-120	22-JUL-20
Bismuth (Bi)-Dissolved			110.8		%		80-120	22-JUL-20
Boron (B)-Dissolved			94.5		%		80-120	22-JUL-20
Cadmium (Cd)-Dissolved			99.0		%		80-120	22-JUL-20
Calcium (Ca)-Dissolved			109.0		%		80-120	22-JUL-20
Chromium (Cr)-Dissolved			99.9		%		80-120	22-JUL-20
Cobalt (Co)-Dissolved			99.9		%		80-120	22-JUL-20
Copper (Cu)-Dissolved			95.9		%		80-120	22-JUL-20
Iron (Fe)-Dissolved			94.5		%		80-120	22-JUL-20
Lead (Pb)-Dissolved			100.9		%		80-120	22-JUL-20
Lithium (Li)-Dissolved			105.3		%		80-120	22-JUL-20
Magnesium (Mg)-Dissolved			97.7		%		80-120	22-JUL-20
Manganese (Mn)-Dissolved			99.8		%		80-120	22-JUL-20
Molybdenum (Mo)-Dissolved			102.7		%		80-120	22-JUL-20
Nickel (Ni)-Dissolved			97.9		%		80-120	22-JUL-20
Potassium (K)-Dissolved			101.1		%		80-120	22-JUL-20
Selenium (Se)-Dissolved			100.1		%		80-120	22-JUL-20
Silicon (Si)-Dissolved			100.5		%		60-140	22-JUL-20
Silver (Ag)-Dissolved			100.4		%		80-120	22-JUL-20
Sodium (Na)-Dissolved			107.8		%		80-120	22-JUL-20
Strontium (Sr)-Dissolved			103.0		%		80-120	22-JUL-20
Thallium (Tl)-Dissolved			100.7		%		80-120	22-JUL-20
Tin (Sn)-Dissolved			100.2		%		80-120	22-JUL-20
Titanium (Ti)-Dissolved			94.3		%		80-120	22-JUL-20
Uranium (U)-Dissolved			104.1		%		80-120	22-JUL-20
Vanadium (V)-Dissolved			98.3		%		80-120	22-JUL-20
Zinc (Zn)-Dissolved			99.3		%		80-120	22-JUL-20
WG3366293-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	22-JUL-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	22-JUL-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	22-JUL-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5162576								
WG3366293-1 MB		**NP**						
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	22-JUL-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	22-JUL-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	22-JUL-20
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	22-JUL-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	22-JUL-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	22-JUL-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	22-JUL-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	22-JUL-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	22-JUL-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	22-JUL-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	22-JUL-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	22-JUL-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	22-JUL-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	22-JUL-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	22-JUL-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	22-JUL-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	22-JUL-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	22-JUL-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	22-JUL-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	22-JUL-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	22-JUL-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	22-JUL-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	22-JUL-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	22-JUL-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	22-JUL-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	22-JUL-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	22-JUL-20
MET-T-CCMS-VA	**Water**							
Batch R5160925								
WG3365629-2 LCS								
Aluminum (Al)-Total			99.1		%		80-120	22-JUL-20
Antimony (Sb)-Total			102.6		%		80-120	22-JUL-20
Arsenic (As)-Total			101.0		%		80-120	22-JUL-20
Barium (Ba)-Total			106.9		%		80-120	22-JUL-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5160925								
WG3365629-2 LCS								
Bismuth (Bi)-Total			88.8		%		80-120	22-JUL-20
Boron (B)-Total			104.2		%		80-120	22-JUL-20
Cadmium (Cd)-Total			103.1		%		80-120	22-JUL-20
Calcium (Ca)-Total			105.2		%		80-120	22-JUL-20
Chromium (Cr)-Total			98.5		%		80-120	22-JUL-20
Cobalt (Co)-Total			95.9		%		80-120	22-JUL-20
Copper (Cu)-Total			97.5		%		80-120	22-JUL-20
Iron (Fe)-Total			91.7		%		80-120	22-JUL-20
Lead (Pb)-Total			101.0		%		80-120	22-JUL-20
Lithium (Li)-Total			105.3		%		80-120	22-JUL-20
Magnesium (Mg)-Total			104.1		%		80-120	22-JUL-20
Manganese (Mn)-Total			99.3		%		80-120	22-JUL-20
Molybdenum (Mo)-Total			103.4		%		80-120	22-JUL-20
Nickel (Ni)-Total			97.3		%		80-120	22-JUL-20
Potassium (K)-Total			96.2		%		80-120	22-JUL-20
Selenium (Se)-Total			102.4		%		80-120	22-JUL-20
Silicon (Si)-Total			101.1		%		80-120	22-JUL-20
Silver (Ag)-Total			103.9		%		80-120	22-JUL-20
Sodium (Na)-Total			100.1		%		80-120	22-JUL-20
Strontium (Sr)-Total			105.3		%		80-120	22-JUL-20
Thallium (Tl)-Total			97.6		%		80-120	22-JUL-20
Tin (Sn)-Total			99.1		%		80-120	22-JUL-20
Titanium (Ti)-Total			93.3		%		80-120	22-JUL-20
Uranium (U)-Total			103.4		%		80-120	22-JUL-20
Vanadium (V)-Total			97.3		%		80-120	22-JUL-20
Zinc (Zn)-Total			103.1		%		80-120	22-JUL-20
WG3365629-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	22-JUL-20
Antimony (Sb)-Total			0.00012	B	mg/L		0.0001	22-JUL-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	22-JUL-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	22-JUL-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	22-JUL-20
Boron (B)-Total			<0.010		mg/L		0.01	22-JUL-20
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	22-JUL-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5160925								
WG3365629-1 MB								
Calcium (Ca)-Total			<0.050		mg/L		0.05	22-JUL-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	22-JUL-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	22-JUL-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	22-JUL-20
Iron (Fe)-Total			<0.010		mg/L		0.01	22-JUL-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	22-JUL-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	22-JUL-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	22-JUL-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	22-JUL-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	22-JUL-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	22-JUL-20
Potassium (K)-Total			<0.050		mg/L		0.05	22-JUL-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	22-JUL-20
Silicon (Si)-Total			<0.10		mg/L		0.1	22-JUL-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	22-JUL-20
Sodium (Na)-Total			<0.050		mg/L		0.05	22-JUL-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	22-JUL-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	22-JUL-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	22-JUL-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	22-JUL-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	22-JUL-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	22-JUL-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	22-JUL-20
WG3365629-4 MS		**L2475301-1**						
Aluminum (Al)-Total			98.6		%		70-130	22-JUL-20
Arsenic (As)-Total			99.9		%		70-130	22-JUL-20
Barium (Ba)-Total			N/A	MS-B	%		-	22-JUL-20
Bismuth (Bi)-Total			97.5		%		70-130	22-JUL-20
Boron (B)-Total			112.2		%		70-130	22-JUL-20
Cadmium (Cd)-Total			99.96		%		70-130	22-JUL-20
Calcium (Ca)-Total			N/A	MS-B	%		-	22-JUL-20
Chromium (Cr)-Total			101.1		%		70-130	22-JUL-20
Cobalt (Co)-Total			94.7		%		70-130	22-JUL-20
Copper (Cu)-Total			94.8		%		70-130	22-JUL-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5160925								
WG3365629-4 MS		**L2475301-1**						
Iron (Fe)-Total			96.6		%		70-130	22-JUL-20
Lead (Pb)-Total			95.9		%		70-130	22-JUL-20
Lithium (Li)-Total			92.0		%		70-130	22-JUL-20
Magnesium (Mg)-Total			N/A	MS-B	%		-	22-JUL-20
Manganese (Mn)-Total			96.2		%		70-130	22-JUL-20
Molybdenum (Mo)-Total			107.6		%		70-130	22-JUL-20
Nickel (Ni)-Total			93.7		%		70-130	22-JUL-20
Potassium (K)-Total			92.4		%		70-130	22-JUL-20
Selenium (Se)-Total			N/A	MS-B	%		-	22-JUL-20
Silicon (Si)-Total			92.6		%		70-130	22-JUL-20
Silver (Ag)-Total			102.0		%		70-130	22-JUL-20
Sodium (Na)-Total			N/A	MS-B	%		-	22-JUL-20
Strontium (Sr)-Total			N/A	MS-B	%		-	22-JUL-20
Thallium (Tl)-Total			95.0		%		70-130	22-JUL-20
Tin (Sn)-Total			101.4		%		70-130	22-JUL-20
Titanium (Ti)-Total			98.5		%		70-130	22-JUL-20
Uranium (U)-Total			107.6		%		70-130	22-JUL-20
Vanadium (V)-Total			100.7		%		70-130	22-JUL-20
Zinc (Zn)-Total			92.5		%		70-130	22-JUL-20
Batch R5164059								
WG3368193-2 LCS								
Aluminum (Al)-Total			96.9		%		80-120	23-JUL-20
Antimony (Sb)-Total			100.9		%		80-120	23-JUL-20
Arsenic (As)-Total			93.5		%		80-120	23-JUL-20
Barium (Ba)-Total			101.3		%		80-120	23-JUL-20
Bismuth (Bi)-Total			105.3		%		80-120	23-JUL-20
Boron (B)-Total			99.3		%		80-120	23-JUL-20
Cadmium (Cd)-Total			94.9		%		80-120	23-JUL-20
Calcium (Ca)-Total			99.0		%		80-120	23-JUL-20
Chromium (Cr)-Total			97.2		%		80-120	23-JUL-20
Cobalt (Co)-Total			94.6		%		80-120	23-JUL-20
Copper (Cu)-Total			91.7		%		80-120	23-JUL-20
Iron (Fe)-Total			88.7		%		80-120	23-JUL-20
Lead (Pb)-Total			95.5		%		80-120	23-JUL-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5164059								
WG3368193-2 LCS								
Lithium (Li)-Total			90.0		%		80-120	23-JUL-20
Magnesium (Mg)-Total			93.4		%		80-120	23-JUL-20
Manganese (Mn)-Total			97.2		%		80-120	23-JUL-20
Molybdenum (Mo)-Total			96.3		%		80-120	23-JUL-20
Nickel (Ni)-Total			95.1		%		80-120	23-JUL-20
Potassium (K)-Total			95.5		%		80-120	23-JUL-20
Selenium (Se)-Total			97.2		%		80-120	23-JUL-20
Silicon (Si)-Total			89.7		%		80-120	23-JUL-20
Silver (Ag)-Total			92.4		%		80-120	23-JUL-20
Sodium (Na)-Total			94.2		%		80-120	23-JUL-20
Strontium (Sr)-Total			96.5		%		80-120	23-JUL-20
Thallium (Tl)-Total			97.5		%		80-120	23-JUL-20
Tin (Sn)-Total			96.3		%		80-120	23-JUL-20
Titanium (Ti)-Total			95.8		%		80-120	23-JUL-20
Uranium (U)-Total			88.0		%		80-120	23-JUL-20
Vanadium (V)-Total			96.1		%		80-120	23-JUL-20
Zinc (Zn)-Total			97.2		%		80-120	23-JUL-20
WG3368193-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	23-JUL-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	23-JUL-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	23-JUL-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	23-JUL-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	23-JUL-20
Boron (B)-Total			<0.010		mg/L		0.01	23-JUL-20
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	23-JUL-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	23-JUL-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	23-JUL-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	23-JUL-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	23-JUL-20
Iron (Fe)-Total			<0.010		mg/L		0.01	23-JUL-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	23-JUL-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	23-JUL-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	23-JUL-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	23-JUL-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5164059								
WG3368193-1 MB								
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	23-JUL-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	23-JUL-20
Potassium (K)-Total			<0.050		mg/L		0.05	23-JUL-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	23-JUL-20
Silicon (Si)-Total			<0.10		mg/L		0.1	23-JUL-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	23-JUL-20
Sodium (Na)-Total			<0.050		mg/L		0.05	23-JUL-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	23-JUL-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	23-JUL-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	23-JUL-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	23-JUL-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	23-JUL-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	23-JUL-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	23-JUL-20
NH3-L-F-CL	**Water**							
Batch R5163616								
WG3368141-19 DUP		**L2475301-6**						
Ammonia as N		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	22-JUL-20
WG3368141-18 LCS								
Ammonia as N			97.3		%		85-115	22-JUL-20
WG3368141-17 MB								
Ammonia as N			<0.0050		mg/L		0.005	22-JUL-20
WG3368141-20 MS		**L2475301-6**						
Ammonia as N			94.9		%		75-125	22-JUL-20
NO2-L-IC-N-CL	**Water**							
Batch R5157626								
WG3365380-3 DUP		**L2475301-5**						
Nitrite (as N)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	17-JUL-20
WG3365380-2 LCS								
Nitrite (as N)			105.3		%		90-110	17-JUL-20
WG3365380-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	17-JUL-20
WG3365380-4 MS		**L2475301-5**						
Nitrite (as N)			114.6		%		75-125	17-JUL-20
NO3-L-IC-N-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-L-IC-N-CL	**Water**							
Batch R5157626								
WG3365380-3 DUP		**L2475301-5**						
Nitrate (as N)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	17-JUL-20
WG3365380-2 LCS								
Nitrate (as N)			106.2		%		90-110	17-JUL-20
WG3365380-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	17-JUL-20
WG3365380-4 MS		**L2475301-5**						
Nitrate (as N)			117.7		%		75-125	17-JUL-20
ORP-CL	**Water**							
Batch R5162043								
WG3368124-3 CRM		**CL-ORP**						
ORP			220		mV		210-230	22-JUL-20
WG3368124-4 DUP		**L2475301-1**						
ORP		254	243	J	mV	10.6	15	22-JUL-20
P-T-L-COL-CL	**Water**							
Batch R5161978								
WG3367969-22 LCS								
Phosphorus (P)-Total			106.9		%		80-120	22-JUL-20
WG3367969-21 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	22-JUL-20
PH-CL	**Water**							
Batch R5158097								
WG3365872-5 LCS								
pH			6.98		pH		6.9-7.1	18-JUL-20
PO4-DO-L-COL-CL	**Water**							
Batch R5156119								
WG3364165-10 LCS								
Orthophosphate-Dissolved (as P)			100.4		%		80-120	16-JUL-20
WG3364165-9 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	16-JUL-20
SO4-IC-N-CL	**Water**							
Batch R5157626								
WG3365380-3 DUP		**L2475301-5**						
Sulfate (SO4)		<0.30	<0.30	RPD-NA	mg/L	N/A	20	17-JUL-20
WG3365380-2 LCS								
Sulfate (SO4)			104.7		%		90-110	17-JUL-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-N-CL	**Water**							
Batch R5157626								
WG3365380-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	17-JUL-20
WG3365380-4 MS		**L2475301-5**						
Sulfate (SO4)			117.7		%		75-125	17-JUL-20
SOLIDS-TDS-CL	**Water**							
Batch R5159955								
WG3365838-11 LCS								
Total Dissolved Solids			105.6		%		85-115	20-JUL-20
WG3365838-10 MB								
Total Dissolved Solids			<10		mg/L		10	20-JUL-20
TKN-L-F-CL	**Water**							
Batch R5163016								
WG3368422-17 DUP		**L2475301-5**						
Total Kjeldahl Nitrogen		<0.050	<0.050	RPD-NA	mg/L	N/A	20	22-JUL-20
WG3368422-12 LCS								
Total Kjeldahl Nitrogen			109.0		%		75-125	22-JUL-20
WG3368422-16 LCS								
Total Kjeldahl Nitrogen			108.6		%		75-125	22-JUL-20
WG3368422-2 LCS								
Total Kjeldahl Nitrogen			118.0		%		75-125	22-JUL-20
WG3368422-20 LCS								
Total Kjeldahl Nitrogen			102.0		%		75-125	22-JUL-20
WG3368422-24 LCS								
Total Kjeldahl Nitrogen			103.0		%		75-125	22-JUL-20
WG3368422-4 LCS								
Total Kjeldahl Nitrogen			116.0		%		75-125	22-JUL-20
WG3368422-8 LCS								
Total Kjeldahl Nitrogen			111.6		%		75-125	22-JUL-20
WG3368422-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	22-JUL-20
WG3368422-11 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	22-JUL-20
WG3368422-15 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	22-JUL-20
WG3368422-19 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	22-JUL-20
WG3368422-23 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	22-JUL-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-L-F-CL	**Water**							
Batch R5163016								
WG3368422-3 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	22-JUL-20
WG3368422-7 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	22-JUL-20
WG3368422-18 MS		**L2475301-5**						
Total Kjeldahl Nitrogen			129.0		%		70-130	22-JUL-20
TSS-L-CL	**Water**							
Batch R5159902								
WG3365834-8 LCS								
Total Suspended Solids			114.4		%		85-115	20-JUL-20
WG3365834-7 MB								
Total Suspended Solids			<1.0		mg/L		1	20-JUL-20
TURBIDITY-CL	**Water**							
Batch R5156196								
WG3364317-5 LCS								
Turbidity			96.9		%		85-115	16-JUL-20
WG3364317-8 LCS								
Turbidity			97.4		%		85-115	16-JUL-20
WG3364317-4 MB								
Turbidity			<0.10		NTU		0.1	16-JUL-20
WG3364317-7 MB								
Turbidity			<0.10		NTU		0.1	16-JUL-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
J	Duplicate results and limits are expressed in terms of absolute difference.
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	15-JUL-20 08:25	22-JUL-20 15:00	0.25	174	hours	EHTR-FM
	2	15-JUL-20 10:45	22-JUL-20 08:45	0.25	166	hours	EHTR-FM
	3	15-JUL-20 13:20	22-JUL-20 08:45	0.25	163	hours	EHTR-FM
	4	15-JUL-20 11:00	22-JUL-20 08:45	0.25	166	hours	EHTR-FM
	5	15-JUL-20 13:00	22-JUL-20 08:45	0.25	164	hours	EHTR-FM
	6	15-JUL-20 12:00	22-JUL-20 08:45	0.25	165	hours	EHTR-FM
pH							
	1	15-JUL-20 08:25	18-JUL-20 12:00	0.25	76	hours	EHTR-FM
	2	15-JUL-20 10:45	18-JUL-20 12:00	0.25	73	hours	EHTR-FM
	3	15-JUL-20 13:20	18-JUL-20 12:00	0.25	71	hours	EHTR-FM
	4	15-JUL-20 11:00	18-JUL-20 12:00	0.25	73	hours	EHTR-FM
	5	15-JUL-20 13:00	18-JUL-20 12:00	0.25	71	hours	EHTR-FM
	6	15-JUL-20 12:00	18-JUL-20 12:00	0.25	72	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2475301 were received on 16-JUL-20 09:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes 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 pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID: Regional Effects Program

TURNAROUND TIME: Regular

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program [redacted]			Lab Name	ALS Calgary			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cait Good			Lab Contact	Lyuda Shvets			Email 1:	cait.good@teck.com	X	X	X
Email	cait.good@teck.com			Email	Lyudmyla.Shvets@ALSGlobal.com			Email 2:	carlie.meyer@teck.com	X	X	X
Address	421 Pine Avenue			Address	2559 29 Street NE			Email 3:	teckcoal@equisonline.com			X
								Email 4:	kbatchelar@minnow.ca	X	X	X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:				
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada					
Phone Number	250-425-8202			Phone Number	403-407-1800			PO number	VPO00689999			

SAMPLE DETAILS — **ANALYSIS REQUESTED** (Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)

L2475301-COFC

Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	Fil.	N	Y	N	Y	Y	N	N					
								PRESERV.	NONE	H2SO4	H2SO4	HCl	HNO3	HNO3	NONE					
								ANALYSIS	HG-T-U-CVAF-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-D-CVAF-VA	TECKCOAL-MET-D-VA	TECKCOAL-MET-T-VA	TECKCOAL-ROUTINE-VA					
RG_LILC3_WS_20200715-08:25	RG_LILC3	WS	NO	2020/07/15	08:25	G	7		X	X	X	X	X	X	X					
RG_LISP24_WS_20200715-10:45	RG_LISP24	WS	NO	2020/07/15	10:45	G	7		X	X	X	X	X	X	X					
RG_LI8_WS_20200715-13:20	RG_LI8	WS	NO	2020/07/15	13:20	G	7		X	X	X	X	X	X	X					
RG_TRIP_WS_20200715-11:00	RG_TRIP	WS	NO	2020/07/15	11:00	G	4		X		X			X	X					
RG_FBLANK_WS_20200715-13:00	RG_FBLANK	WS	NO	2020/07/15	13:00	G	7		X	X	X	X	X	X	X					
RG_RIVER_WS_20200715-12:00	RG_RIVER	WS	NO	2020/07/15	12:00	G	7		X	X	X	X	X	X	X					

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS
VPO00689999

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Nicole Zatley / Lotic Environmental	2020/07/15 1630		7/16 900

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	Nicole Zatley	Mobile #	647 454-1818
Sampler's Signature		Date/Time	2020 07 15 / 16:30

WATER CHEMISTRY

ALS Laboratory Report L2476017

(Finalized December 3, 2020)

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 17-JUL-20
Report Date: 03-DEC-20 16:23 (MT)
Version: FINAL REV. 2

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2476017

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: Regional Effects Pro
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2476017-1	L2476017-2			
	Description	WS	WS			
	Sampled Date	16-JUL-20	16-JUL-20			
	Sampled Time	08:30	11:35			
	Client ID	RG_FRUL_WS_20200716_0830	RG_FO23_WS_20200716_1135			
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	578	574			
	Hardness (as CaCO3) (mg/L)	339	330			
	pH (pH)	8.47	8.46			
	ORP (mV)	237	306			
	Total Suspended Solids (mg/L)	2.6	<1.0			
	Total Dissolved Solids (mg/L)	432 DLHC	425 DLHC			
	Turbidity (NTU)	0.54	0.40			
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	163	164			
	Alkalinity, Carbonate (as CaCO3) (mg/L)	11.4	8.0			
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Total (as CaCO3) (mg/L)	175	172			
	Ammonia as N (mg/L)	0.0198	0.0054			
	Bromide (Br) (mg/L)	<0.050	<0.050			
	Chloride (Cl) (mg/L)	0.93	1.48			
	Fluoride (F) (mg/L)	0.189	0.172			
	Ion Balance (%)	105	105			
	Nitrate (as N) (mg/L)	7.58	6.81			
	Nitrite (as N) (mg/L)	0.0051	0.0057			
	Total Kjeldahl Nitrogen (mg/L)	<0.25 TKNI	<0.25 TKNI			
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010			
	Phosphorus (P)-Total (mg/L)	0.0035	0.0036			
	Sulfate (SO4) (mg/L)	120	117			
	Anion Sum (meq/L)	6.57	6.40			
	Cation Sum (meq/L)	6.88	6.73			
	Cation - Anion Balance (%)	2.3	2.4			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.19	1.78			
	Total Organic Carbon (mg/L)	2.10	1.47			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0291	0.0122			
	Antimony (Sb)-Total (mg/L)	0.00014	0.00015			
	Arsenic (As)-Total (mg/L)	0.00013	0.00011			
	Barium (Ba)-Total (mg/L)	0.0790	0.0713			
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020			
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050			
	Boron (B)-Total (mg/L)	<0.010	<0.010			
	Cadmium (Cd)-Total (ug/L)	0.0239	0.0541			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2476017-1	L2476017-2			
	Description	WS	WS			
	Sampled Date	16-JUL-20	16-JUL-20			
	Sampled Time	08:30	11:35			
	Client ID	RG_FRUL_WS_20200716_0830	RG_FO23_WS_20200716_1135			
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	83.6	81.8			
	Chromium (Cr)-Total (mg/L)	0.00013	0.00010			
	Cobalt (Co)-Total (ug/L)	<0.10	<0.10			
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050			
	Iron (Fe)-Total (mg/L)	0.046	0.028			
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Total (mg/L)	0.0184	0.0201			
	Magnesium (Mg)-Total (mg/L)	32.1	31.7			
	Manganese (Mn)-Total (mg/L)	0.00474	0.00220			
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050			
	Molybdenum (Mo)-Total (mg/L)	0.00129	0.00130			
	Nickel (Ni)-Total (mg/L)	0.00093	0.00128			
	Potassium (K)-Total (mg/L)	1.20	1.12			
	Selenium (Se)-Total (ug/L)	31.9	29.7			
	Silicon (Si)-Total (mg/L)	1.96	1.94			
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Total (mg/L)	1.62	2.34			
	Strontium (Sr)-Total (mg/L)	0.122	0.132			
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010			
	Uranium (U)-Total (mg/L)	0.00178	0.00190			
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050			
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030			
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD			
	Dissolved Metals Filtration Location	FIELD	FIELD			
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	0.0039			
	Antimony (Sb)-Dissolved (mg/L)	0.00015	0.00015			
	Arsenic (As)-Dissolved (mg/L)	0.00010	<0.00010			
	Barium (Ba)-Dissolved (mg/L)	0.0759	0.0680			
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020			
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050			
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010			
	Cadmium (Cd)-Dissolved (ug/L)	0.0139	0.0507			
	Calcium (Ca)-Dissolved (mg/L)	82.4	81.3			
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	0.00011			
	Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2476017-1	L2476017-2			
	Description	WS	WS			
	Sampled Date	16-JUL-20	16-JUL-20			
	Sampled Time	08:30	11:35			
	Client ID	RG_FRUL_WS_20200716_0830	RG_FO23_WS_20200716_1135			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020	0.00081			
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010			
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	0.0185	0.0200			
	Magnesium (Mg)-Dissolved (mg/L)	32.4	30.9			
	Manganese (Mn)-Dissolved (mg/L)	0.00105	0.00117			
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050			
	Molybdenum (Mo)-Dissolved (mg/L)	0.00127	0.00125			
	Nickel (Ni)-Dissolved (mg/L)	0.00075	0.00128			
	Potassium (K)-Dissolved (mg/L)	1.21	1.12			
	Selenium (Se)-Dissolved (ug/L)	31.0	29.3			
	Silicon (Si)-Dissolved (mg/L)	1.83	1.83			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	1.62	2.31			
	Strontium (Sr)-Dissolved (mg/L)	0.124	0.134			
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	0.00026			
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010			
	Uranium (U)-Dissolved (mg/L)	0.00180	0.00187			
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050			
	Zinc (Zn)-Dissolved (mg/L)	0.0010	0.0037			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Selenium (Se)-Dissolved	DUP-H,J	L2476017-1, -2
Matrix Spike	Barium (Ba)-Total	MS-B	L2476017-1, -2
Matrix Spike	Calcium (Ca)-Total	MS-B	L2476017-1, -2
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2476017-1, -2
Matrix Spike	Manganese (Mn)-Total	MS-B	L2476017-1, -2
Matrix Spike	Sodium (Na)-Total	MS-B	L2476017-1, -2
Matrix Spike	Strontium (Sr)-Total	MS-B	L2476017-1, -2

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DUP-H,J	Duplicate results outside ALS DQO, due to sample heterogeneity. Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". 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.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-IC-N-CL	Water	Chloride in Water by IC	EPA 300.1 (mod)

Reference Information

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

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 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL Water Oxidation redution potential by elect. ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL Water Phosphorus (P)-Total APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL Water pH APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

Reference Information

PO4-DO-L-COL-CL	Water	Orthophosphate-Dissolved (as P)	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL	Water	Total Kjeldahl Nitrogen	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Regional Effects Pro

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour 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.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5159492								
WG3366728-5 LCS								
Acidity (as CaCO3)			96.4		%		85-115	20-JUL-20
WG3366728-4 MB								
Acidity (as CaCO3)			<1.0		mg/L		2	20-JUL-20
ALK-MAN-CL	**Water**							
Batch R5158097								
WG3365872-11 LCS								
Alkalinity, Total (as CaCO3)			97.9		%		85-115	18-JUL-20
WG3365872-10 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	18-JUL-20
BE-D-L-CCMS-VA	**Water**							
Batch R5166171								
WG3366307-2 LCS								
Beryllium (Be)-Dissolved			97.0		%		80-120	24-JUL-20
WG3366307-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	23-JUL-20
BE-T-L-CCMS-VA	**Water**							
Batch R5166171								
WG3366447-2 LCS								
Beryllium (Be)-Total			103.9		%		80-120	24-JUL-20
WG3366447-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	24-JUL-20
BR-L-IC-N-CL	**Water**							
Batch R5157866								
WG3365634-2 LCS								
Bromide (Br)			105.9		%		85-115	18-JUL-20
WG3365634-1 MB								
Bromide (Br)			<0.050		mg/L		0.05	18-JUL-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5163656								
WG3367674-2 LCS								
Dissolved Organic Carbon			92.0		%		80-120	22-JUL-20
WG3367674-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	22-JUL-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-LOW-CL	**Water**							
Batch R5164417								
WG3368864-3 DUP		**L2476017-1**						
Dissolved Organic Carbon		1.19	1.12		mg/L	5.5	20	22-JUL-20
WG3368864-2 LCS								
Dissolved Organic Carbon			81.4		%		80-120	22-JUL-20
WG3368864-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	22-JUL-20
WG3368864-4 MS		**L2476017-1**						
Dissolved Organic Carbon			103.4		%		70-130	22-JUL-20
C-TOT-ORG-LOW-CL	**Water**							
Batch R5163656								
WG3367674-3 DUP		**L2476017-2**						
Total Organic Carbon		1.47	1.55		mg/L	5.2	20	22-JUL-20
WG3367674-2 LCS								
Total Organic Carbon			89.9		%		80-120	22-JUL-20
WG3367674-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	22-JUL-20
Batch R5164417								
WG3368864-3 DUP		**L2476017-1**						
Total Organic Carbon		2.10	1.46	J	mg/L	0.64	1	22-JUL-20
WG3368864-2 LCS								
Total Organic Carbon			89.5		%		80-120	22-JUL-20
WG3368864-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	22-JUL-20
WG3368864-4 MS		**L2476017-1**						
Total Organic Carbon			104.2		%		70-130	22-JUL-20
CL-IC-N-CL	**Water**							
Batch R5157866								
WG3365634-2 LCS								
Chloride (Cl)			106.9		%		90-110	18-JUL-20
WG3365634-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	18-JUL-20
EC-L-PCT-CL	**Water**							
Batch R5158097								
WG3365872-11 LCS								
Conductivity (@ 25C)			100.7		%		90-110	18-JUL-20
WG3365872-10 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	18-JUL-20
F-IC-N-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-IC-N-CL	**Water**							
Batch R5157866								
WG3365634-2 LCS								
Fluoride (F)			106.7		%		90-110	18-JUL-20
WG3365634-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	18-JUL-20
HG-D-CVAA-VA	**Water**							
Batch R5159525								
WG3367445-10 LCS								
Mercury (Hg)-Dissolved			103.5		%		80-120	21-JUL-20
WG3367445-9 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	21-JUL-20
HG-T-U-CVAF-VA	**Water**							
Batch R5164778								
WG3368971-2 LCS								
Mercury (Hg)-Total			110.6		%		80-120	23-JUL-20
WG3368971-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	23-JUL-20
WG3368971-4 MS		**L2476017-2**						
Mercury (Hg)-Total			103.8		%		70-130	23-JUL-20
MET-D-CCMS-VA	**Water**							
Batch R5166171								
WG3366307-2 LCS								
Aluminum (Al)-Dissolved			103.8		%		80-120	24-JUL-20
Antimony (Sb)-Dissolved			93.9		%		80-120	24-JUL-20
Arsenic (As)-Dissolved			95.7		%		80-120	24-JUL-20
Barium (Ba)-Dissolved			102.5		%		80-120	24-JUL-20
Bismuth (Bi)-Dissolved			102.1		%		80-120	24-JUL-20
Boron (B)-Dissolved			96.0		%		80-120	24-JUL-20
Cadmium (Cd)-Dissolved			98.4		%		80-120	24-JUL-20
Calcium (Ca)-Dissolved			104.0		%		80-120	24-JUL-20
Chromium (Cr)-Dissolved			98.4		%		80-120	24-JUL-20
Cobalt (Co)-Dissolved			97.1		%		80-120	24-JUL-20
Copper (Cu)-Dissolved			95.6		%		80-120	24-JUL-20
Iron (Fe)-Dissolved			90.9		%		80-120	24-JUL-20
Lead (Pb)-Dissolved			99.0		%		80-120	24-JUL-20
Lithium (Li)-Dissolved			100.3		%		80-120	24-JUL-20
Magnesium (Mg)-Dissolved			98.4		%		80-120	24-JUL-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5166171								
WG3366307-2 LCS								
Manganese (Mn)-Dissolved			100.5		%		80-120	24-JUL-20
Molybdenum (Mo)-Dissolved			98.3		%		80-120	24-JUL-20
Nickel (Ni)-Dissolved			96.5		%		80-120	24-JUL-20
Potassium (K)-Dissolved			98.6		%		80-120	24-JUL-20
Selenium (Se)-Dissolved			97.9		%		80-120	24-JUL-20
Silicon (Si)-Dissolved			101.0		%		60-140	24-JUL-20
Silver (Ag)-Dissolved			93.5		%		80-120	24-JUL-20
Sodium (Na)-Dissolved			101.5		%		80-120	24-JUL-20
Strontium (Sr)-Dissolved			98.1		%		80-120	24-JUL-20
Thallium (Tl)-Dissolved			99.6		%		80-120	24-JUL-20
Tin (Sn)-Dissolved			95.1		%		80-120	24-JUL-20
Titanium (Ti)-Dissolved			96.9		%		80-120	24-JUL-20
Uranium (U)-Dissolved			101.7		%		80-120	24-JUL-20
Vanadium (V)-Dissolved			97.3		%		80-120	24-JUL-20
Zinc (Zn)-Dissolved			93.0		%		80-120	24-JUL-20
WG3366307-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	23-JUL-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	23-JUL-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	23-JUL-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	23-JUL-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	23-JUL-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	23-JUL-20
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	23-JUL-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	23-JUL-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	23-JUL-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	23-JUL-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	23-JUL-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	23-JUL-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	23-JUL-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	23-JUL-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	23-JUL-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	23-JUL-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	23-JUL-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	23-JUL-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5166171								
WG3366307-1 MB		**NP**						
Potassium (K)-Dissolved			<0.050		mg/L		0.05	23-JUL-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	23-JUL-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	23-JUL-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	23-JUL-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	23-JUL-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	23-JUL-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	23-JUL-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	23-JUL-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	23-JUL-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	23-JUL-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	23-JUL-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	23-JUL-20
MET-T-CCMS-VA	**Water**							
Batch R5166171								
WG3366447-2 LCS								
Aluminum (Al)-Total			104.8		%		80-120	24-JUL-20
Antimony (Sb)-Total			99.2		%		80-120	24-JUL-20
Arsenic (As)-Total			99.4		%		80-120	24-JUL-20
Barium (Ba)-Total			109.2		%		80-120	24-JUL-20
Bismuth (Bi)-Total			107.0		%		80-120	24-JUL-20
Boron (B)-Total			97.2		%		80-120	24-JUL-20
Cadmium (Cd)-Total			103.2		%		80-120	24-JUL-20
Calcium (Ca)-Total			107.2		%		80-120	24-JUL-20
Chromium (Cr)-Total			103.2		%		80-120	24-JUL-20
Cobalt (Co)-Total			101.6		%		80-120	24-JUL-20
Copper (Cu)-Total			99.95		%		80-120	24-JUL-20
Iron (Fe)-Total			94.5		%		80-120	24-JUL-20
Lead (Pb)-Total			102.2		%		80-120	24-JUL-20
Lithium (Li)-Total			104.6		%		80-120	24-JUL-20
Magnesium (Mg)-Total			102.9		%		80-120	24-JUL-20
Manganese (Mn)-Total			103.7		%		80-120	24-JUL-20
Molybdenum (Mo)-Total			104.4		%		80-120	24-JUL-20
Nickel (Ni)-Total			101.9		%		80-120	24-JUL-20
Potassium (K)-Total			102.2		%		80-120	24-JUL-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5166171								
WG3366447-2 LCS								
Selenium (Se)-Total			102.6		%		80-120	24-JUL-20
Silicon (Si)-Total			107.2		%		80-120	24-JUL-20
Silver (Ag)-Total			99.98		%		80-120	24-JUL-20
Sodium (Na)-Total			106.9		%		80-120	24-JUL-20
Strontium (Sr)-Total			106.1		%		80-120	24-JUL-20
Thallium (Tl)-Total			101.5		%		80-120	24-JUL-20
Tin (Sn)-Total			101.6		%		80-120	24-JUL-20
Titanium (Ti)-Total			94.8		%		80-120	24-JUL-20
Uranium (U)-Total			101.3		%		80-120	24-JUL-20
Vanadium (V)-Total			100.8		%		80-120	24-JUL-20
Zinc (Zn)-Total			100.0		%		80-120	24-JUL-20
WG3366447-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	24-JUL-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	24-JUL-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	24-JUL-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	24-JUL-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	24-JUL-20
Boron (B)-Total			<0.010		mg/L		0.01	24-JUL-20
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	24-JUL-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	24-JUL-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	24-JUL-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	24-JUL-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	24-JUL-20
Iron (Fe)-Total			<0.010		mg/L		0.01	24-JUL-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	24-JUL-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	24-JUL-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	24-JUL-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	24-JUL-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	24-JUL-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	24-JUL-20
Potassium (K)-Total			<0.050		mg/L		0.05	24-JUL-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	24-JUL-20
Silicon (Si)-Total			<0.10		mg/L		0.1	24-JUL-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	24-JUL-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5166171								
WG3366447-1 MB								
Sodium (Na)-Total			<0.050		mg/L		0.05	24-JUL-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	24-JUL-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	24-JUL-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	24-JUL-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	24-JUL-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	24-JUL-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	24-JUL-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	24-JUL-20
NH3-L-F-CL	**Water**							
Batch R5166542								
WG3369074-14 LCS								
Ammonia as N			104.1		%		85-115	23-JUL-20
WG3369074-13 MB								
Ammonia as N			<0.0050		mg/L		0.005	23-JUL-20
NO2-L-IC-N-CL	**Water**							
Batch R5157866								
WG3365634-2 LCS								
Nitrite (as N)			105.0		%		90-110	18-JUL-20
WG3365634-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	18-JUL-20
NO3-L-IC-N-CL	**Water**							
Batch R5157866								
WG3365634-2 LCS								
Nitrate (as N)			105.0		%		90-110	18-JUL-20
WG3365634-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	18-JUL-20
ORP-CL	**Water**							
Batch R5166155								
WG3369200-5 CRM		**CL-ORP**						
ORP			227		mV		210-230	23-JUL-20
P-T-L-COL-CL	**Water**							
Batch R5161978								
WG3367969-30 LCS								
Phosphorus (P)-Total			108.0		%		80-120	22-JUL-20
WG3367969-29 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-T-L-COL-CL	**Water**							
Batch R5161978								
WG3367969-29 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	22-JUL-20
PH-CL	**Water**							
Batch R5158097								
WG3365872-11 LCS								
pH			6.98		pH		6.9-7.1	18-JUL-20
PO4-DO-L-COL-CL	**Water**							
Batch R5157513								
WG3365044-6 LCS								
Orthophosphate-Dissolved (as P)			103.2		%		80-120	17-JUL-20
WG3365044-5 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	17-JUL-20
SO4-IC-N-CL	**Water**							
Batch R5157866								
WG3365634-2 LCS								
Sulfate (SO4)			105.0		%		90-110	18-JUL-20
WG3365634-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	18-JUL-20
SOLIDS-TDS-CL	**Water**							
Batch R5165576								
WG3367620-5 LCS								
Total Dissolved Solids			101.0		%		85-115	22-JUL-20
WG3367620-4 MB								
Total Dissolved Solids			<10		mg/L		10	22-JUL-20
TKN-L-F-CL	**Water**							
Batch R5165856								
WG3369235-2 LCS								
Total Kjeldahl Nitrogen			107.4		%		75-125	23-JUL-20
WG3369235-6 LCS								
Total Kjeldahl Nitrogen			103.9		%		75-125	23-JUL-20
WG3369235-9 LCS								
Total Kjeldahl Nitrogen			99.0		%		75-125	23-JUL-20
WG3369235-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	23-JUL-20
WG3369235-5 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-L-F-CL	**Water**							
Batch R5165856								
WG3369235-5 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	23-JUL-20
WG3369235-8 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	23-JUL-20
TSS-L-CL	**Water**							
Batch R5165704								
WG3367619-7 LCS								
Total Suspended Solids			96.0		%		85-115	22-JUL-20
WG3367619-6 MB								
Total Suspended Solids			<1.0		mg/L		1	22-JUL-20
TURBIDITY-CL	**Water**							
Batch R5157514								
WG3365058-8 LCS								
Turbidity			97.9		%		85-115	17-JUL-20
WG3365058-7 MB								
Turbidity			<0.10		NTU		0.1	17-JUL-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	16-JUL-20 08:30	23-JUL-20 11:30	0.25	171	hours	EHTR-FM
	2	16-JUL-20 11:35	23-JUL-20 11:30	0.25	168	hours	EHTR-FM
pH							
	1	16-JUL-20 08:30	18-JUL-20 12:00	0.25	52	hours	EHTR-FM
	2	16-JUL-20 11:35	18-JUL-20 12:00	0.25	48	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2476017 were received on 17-JUL-20 08:40.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes 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 pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID: Regional Effects Program

TURNAROUND TIME: Regular

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program/~~Line Creek LEAMP~~			Lab Name	ALS Calgary			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cait Good			Lab Contact	Lyuda Shvets			Email 1:	cait.good@teck.com	X	X	X
Email	cait.good@teck.com			Email	Lyudmyla.Shvets@ALSGlobal.com			Email 2:	carlie.meyer@teck.com	X	X	X
Address	421 Pine Avenue			Address	2559 29 Street NE			Email 3:	teckcoal@equisonline.com			X
								Email 4:	kbatchelar@minnow.ca	X	X	X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:				
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada					
Phone Number	250-425-8202			Phone Number	403-407-1800			PO number	VPO00689999			

SAMPLE DETAILS

L2476017-COFC

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.	N	Y	N	Y	Y	N	N
								PRESERV.	NONE	H2SO4	H2SO4	HCl	HNO3	HNO3	NONE
								ANALYSIS	HG-T-U-CVAF-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-D-CVAF-VA	TECKCOAL-MET-D-VA	TECKCOAL-MET-T-VA	TECKCOAL-ROUTINE-VA
RG-FRULE_WS_20000716_0830	RG_FRULE	WS	NO	2000-07-16	08:30	G	7		X	X	X	X	X	X	X
RG-FO23_WS_20000716_1135	RG_FO23	WS	NO	2000-07-16	11:35	G	7		X	X	X	X	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

VPO00689999

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Nicole Zathey/Lotic Environmental	20000716 16:00		7/17 8:40

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	Nicole Zathey	Mobile #	647 454-188
Sampler's Signature	NZathey	Date/Time	July 16/20 16:00

WATER CHEMISTRY

ALS Laboratory Report L2496902

(Finalized January 19, 2021)

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 01-SEP-20
Report Date: 19-JAN-21 11:06 (MT)
Version: FINAL REV. 2

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2496902

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers:
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID	L2496902-1	L2496902-2	L2496902-3	L2496902-4	L2496902-5
		Description	WS	WS	WS	WS	WS
		Sampled Date	31-AUG-20	31-AUG-20	30-AUG-20	30-AUG-20	30-AUG-20
		Sampled Time	09:00	09:42	08:30	15:15	11:15
		Client ID	RG_SLINE_WS_LAEMP_LCO_2020-08_NP	RG_LI24_WS_LAEMP_LCO_2020-08_NP	RG_LILC3_WS_LAEMP_LCO_2020-08_NP	RG_LIDCOM_WS_LAEMP_LCO_2020-08_NP	RG_LI8_WS_LAEMP_LCO_2020-08_NP
WATER							
Physical Tests	Conductivity (@ 25C) (uS/cm)		324	326	1010	739	700
	Hardness (as CaCO3) (mg/L)		190	182	614	432	410
	pH (pH)		8.38	8.33	8.40	8.48	8.48
	ORP (mV)		426	438	429	455	417
	Total Suspended Solids (mg/L)		<1.0	<1.0	1.1	1.4	1.7
	Total Dissolved Solids (mg/L)		218 DLHC	213 DLHC	812 DLHC	571 DLHC	541 DLHC
	Turbidity (NTU)		0.17	<0.10	0.24	0.24	0.33
Anions and Nutrients	Acidity (as CaCO3) (mg/L)		<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)		134	120	221	184	178
	Alkalinity, Carbonate (as CaCO3) (mg/L)		3.2	1.8	9.6	12.0	11.6
	Alkalinity, Hydroxide (as CaCO3) (mg/L)		<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)		137	122	230	196	190
	Ammonia as N (mg/L)		0.0689	0.0104	<0.0050	0.140	0.0596
	Bromide (Br) (mg/L)		<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)		0.35	0.29	20.0	11.1	9.98
	Fluoride (F) (mg/L)		0.347	0.380	0.202	0.234	0.288
	Ion Balance (%)		97.9	95.9	98.2	96.9	97.1
	Nitrate (as N) (mg/L)		0.103	0.133	11.8	7.22	6.48
	Nitrite (as N) (mg/L)		<0.0010	<0.0010	<0.0010	0.0030	0.0013
	Total Kjeldahl Nitrogen (mg/L)		0.180	0.239	<0.050 TKNI	<0.050 TKNI	0.106 TKNI
	Orthophosphate-Dissolved (as P) (mg/L)		0.0025	0.0018	<0.0010	0.0031	0.0024
	Phosphorus (P)-Total (mg/L)		0.0025	<0.0020	<0.0020	0.0032	<0.0020
	Sulfate (SO4) (mg/L)		55.5	67.0	334	216	201
	Anion Sum (meq/L)		3.93	3.87	13.0	9.25	8.74
	Cation Sum (meq/L)		3.85	3.71	12.7	8.96	8.48
	Cation - Anion Balance (%)		-1.1	-2.1	-0.9	-1.6	-1.5
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)		<0.50	<0.50	<0.50	<0.50	<0.50
	Total Organic Carbon (mg/L)		<0.50	<0.50	<0.50	<0.50	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)		0.0040	0.0031	<0.0030	<0.0030	0.0032
	Antimony (Sb)-Total (mg/L)		<0.00010	<0.00010	0.00033	0.00020	0.00018
	Arsenic (As)-Total (mg/L)		0.00014	0.00019	0.00012	0.00017	0.00013
	Barium (Ba)-Total (mg/L)		0.0399	0.0491	0.0638	0.0728	0.0684
	Beryllium (Be)-Total (ug/L)		<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total (mg/L)		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)		<0.010	<0.010	0.017	0.013	0.012
	Cadmium (Cd)-Total (ug/L)		0.0261	0.0108	0.353	0.136	0.0979

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2496902-6	L2496902-7			
	Description	WS	WS			
	Sampled Date	29-AUG-20	30-AUG-20			
	Sampled Time	15:40	18:13			
	Client ID	RG_FRUL_WS_LAEMP_LCO_2020-08_NP	RG_FO23_WS_LAEMP_LCO_2020-08_NP			
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	686	684			
	Hardness (as CaCO3) (mg/L)	402	387			
	pH (pH)	8.44	8.45			
	ORP (mV)	452	427			
	Total Suspended Solids (mg/L)	<1.0	<1.0			
	Total Dissolved Solids (mg/L)	524 DLHC	512 DLHC			
	Turbidity (NTU)	0.18	0.19			
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	179	181			
	Alkalinity, Carbonate (as CaCO3) (mg/L)	8.8	9.4			
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Total (as CaCO3) (mg/L)	188	191			
	Ammonia as N (mg/L)	0.0452	<0.0050			
	Bromide (Br) (mg/L)	<0.050	<0.050			
	Chloride (Cl) (mg/L)	1.58	3.70			
	Fluoride (F) (mg/L)	0.190	0.215			
	Ion Balance (%)	96.9	93.0			
	Nitrate (as N) (mg/L)	11.2	9.81			
	Nitrite (as N) (mg/L)	0.0080	0.0070			
	Total Kjeldahl Nitrogen (mg/L)	<0.050 TKNI	0.125 TKNI			
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010			
	Phosphorus (P)-Total (mg/L)	<0.0020	0.0036			
	Sulfate (SO4) (mg/L)	184	186			
	Anion Sum (meq/L)	8.43	8.50			
	Cation Sum (meq/L)	8.17	7.90			
	Cation - Anion Balance (%)	-1.6	-3.6			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	<0.50	<0.50			
	Total Organic Carbon (mg/L)	<0.50	<0.50			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0033	<0.0030			
	Antimony (Sb)-Total (mg/L)	0.00011	0.00012			
	Arsenic (As)-Total (mg/L)	0.00013	0.00011			
	Barium (Ba)-Total (mg/L)	0.101	0.0954			
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020			
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050			
	Boron (B)-Total (mg/L)	<0.010	0.010			
	Cadmium (Cd)-Total (ug/L)	0.0076	0.0233			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2496902-1 WS 31-AUG-20 09:00 RG_SLINE_WS_LAEMP_LCO_2020-08_NP	L2496902-2 WS 31-AUG-20 09:42 RG_LI24_WS_LAEMP_LCO_2020-08_NP	L2496902-3 WS 30-AUG-20 08:30 RG_LILC3_WS_LAEMP_LCO_2020-08_NP	L2496902-4 WS 30-AUG-20 15:15 RG_LIDCOM_WS_LAEMP_LCO_2020-08_NP	L2496902-5 WS 30-AUG-20 11:15 RG_LI8_WS_LAEMP_LCO_2020-08_NP
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	49.4	50.6	133	96.9	95.7
	Chromium (Cr)-Total (mg/L)	0.00015	0.00017	0.00010	0.00012	0.00013
	Cobalt (Co)-Total (ug/L)	<0.10	<0.10	0.14	<0.10	<0.10
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	<0.010	<0.010	0.051	<0.010	<0.010
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	0.000064
	Lithium (Li)-Total (mg/L)	0.0030	0.0033	0.0508	0.0278	0.0260
	Magnesium (Mg)-Total (mg/L)	16.6	13.4	71.9	47.8	44.1
	Manganese (Mn)-Total (mg/L)	0.00049	<0.00010	0.0195	0.00262	0.00130
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Molybdenum (Mo)-Total (mg/L)	0.00132	0.00101	0.00395	0.00235	0.00311
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	0.0105	0.00357	0.00297
	Potassium (K)-Total (mg/L)	0.630	0.270	1.85	1.36	1.17
	Selenium (Se)-Total (ug/L)	1.38	2.53	45.1	30.4	27.6
	Silicon (Si)-Total (mg/L)	2.06	1.68	2.38	2.48	2.36
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	0.986	1.26	10.5	7.11	6.31
	Strontium (Sr)-Total (mg/L)	0.164	0.197	0.249	0.226	0.224
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.00152	0.00146	0.00444	0.00285	0.00267
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	0.0057	<0.0030	0.0145	0.0051	0.0056
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	0.0054
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	0.00031	0.00019	0.00017
	Arsenic (As)-Dissolved (mg/L)	0.00010	0.00014	<0.00010	0.00010	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.0398	0.0472	0.0660	0.0755	0.0739
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	0.018	0.014	0.012
	Cadmium (Cd)-Dissolved (ug/L)	0.0150	0.0070	0.321	0.122	0.0773
	Calcium (Ca)-Dissolved (mg/L)	50.3	50.9	137	104	94.7
	Chromium (Cr)-Dissolved (mg/L)	0.00019	0.00018	0.00010	0.00012	0.00014
	Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10	0.13	<0.10	<0.10

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2496902-6	L2496902-7			
	Description	WS	WS			
	Sampled Date	29-AUG-20	30-AUG-20			
	Sampled Time	15:40	18:13			
	Client ID	RG_FRUL_WS_LAEMP_LCO_2020-08_NP	RG_FO23_WS_LAEMP_LCO_2020-08_NP			
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	90.5	92.8			
	Chromium (Cr)-Total (mg/L)	0.00012	0.00010			
	Cobalt (Co)-Total (ug/L)	<0.10	<0.10			
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050			
	Iron (Fe)-Total (mg/L)	<0.010	<0.010			
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Total (mg/L)	0.0188	0.0204			
	Magnesium (Mg)-Total (mg/L)	44.5	43.6			
	Manganese (Mn)-Total (mg/L)	0.00073	0.00064			
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050			
	Molybdenum (Mo)-Total (mg/L)	0.00109	0.00132			
	Nickel (Ni)-Total (mg/L)	<0.00050	0.00068			
	Potassium (K)-Total (mg/L)	1.40	1.32			
	Selenium (Se)-Total (ug/L)	44.4	38.4			
	Silicon (Si)-Total (mg/L)	2.38	2.37			
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Total (mg/L)	2.58	3.42			
	Strontium (Sr)-Total (mg/L)	0.163	0.185			
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010			
	Uranium (U)-Total (mg/L)	0.00197	0.00211			
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050			
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030			
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD			
	Dissolved Metals Filtration Location	FIELD	FIELD			
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030			
	Antimony (Sb)-Dissolved (mg/L)	0.00010	0.00012			
	Arsenic (As)-Dissolved (mg/L)	<0.00010	0.00010			
	Barium (Ba)-Dissolved (mg/L)	0.106	0.0950			
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020			
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050			
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010			
	Cadmium (Cd)-Dissolved (ug/L)	0.0053	0.0186			
	Calcium (Ca)-Dissolved (mg/L)	93.8	90.4			
	Chromium (Cr)-Dissolved (mg/L)	0.00012	0.00012			
	Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2496902-1 WS 31-AUG-20 09:00 RG_SLINE_WS_LAEMP_LCO_2020-08_NP	L2496902-2 WS 31-AUG-20 09:42 RG_LI24_WS_LAEMP_LCO_2020-08_NP	L2496902-3 WS 30-AUG-20 08:30 RG_LILC3_WS_LAEMP_LCO_2020-08_NP	L2496902-4 WS 30-AUG-20 15:15 RG_LIDCOM_WS_LAEMP_LCO_2020-08_NP	L2496902-5 WS 30-AUG-20 11:15 RG_LI8_WS_LAEMP_LCO_2020-08_NP
Sample ID		L2496902-1	L2496902-2	L2496902-3	L2496902-4	L2496902-5
Description		WS	WS	WS	WS	WS
Sampled Date		31-AUG-20	31-AUG-20	30-AUG-20	30-AUG-20	30-AUG-20
Sampled Time		09:00	09:42	08:30	15:15	11:15
Client ID		RG_SLINE_WS_LAEMP_LCO_2020-08_NP	RG_LI24_WS_LAEMP_LCO_2020-08_NP	RG_LILC3_WS_LAEMP_LCO_2020-08_NP	RG_LIDCOM_WS_LAEMP_LCO_2020-08_NP	RG_LI8_WS_LAEMP_LCO_2020-08_NP
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020	<0.00020	0.00027	<0.00020	<0.00020
	Iron (Fe)-Dissolved (mg/L)	0.013	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.0040	0.0040	0.0562	0.0344	0.0310
	Magnesium (Mg)-Dissolved (mg/L)	15.7	13.4	65.9	42.0	42.1
	Manganese (Mn)-Dissolved (mg/L)	<0.00010	<0.00010	0.0184	0.00184	0.00090
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.00122	0.000919	0.00359	0.00224	0.00247
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	0.00054	0.0109	0.00366	0.00331
	Potassium (K)-Dissolved (mg/L)	0.396	0.293	1.94	1.34	1.23
	Selenium (Se)-Dissolved (ug/L)	1.52	2.86	49.8	32.0	30.9
	Silicon (Si)-Dissolved (mg/L)	2.14	1.69	2.40	2.43	2.49
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	0.838	1.28	10.0	6.51	6.03
	Strontium (Sr)-Dissolved (mg/L)	0.154	0.173	0.234	0.200	0.200
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	0.000011	<0.000010	<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.00136	0.00137	0.00422	0.00276	0.00270
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	0.0046	0.0027	0.0142	0.0044	0.0050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2496902-6	L2496902-7			
	Description	WS	WS			
	Sampled Date	29-AUG-20	30-AUG-20			
	Sampled Time	15:40	18:13			
	Client ID	RG_FRUL_WS_LAEMP_LCO_2020-08_NP	RG_FO23_WS_LAEMP_LCO_2020-08_NP			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020	<0.00020			
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010			
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	0.0219	0.0230			
	Magnesium (Mg)-Dissolved (mg/L)	40.7	39.1			
	Manganese (Mn)-Dissolved (mg/L)	0.00048	0.00044			
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050			
	Molybdenum (Mo)-Dissolved (mg/L)	0.00103	0.00124			
	Nickel (Ni)-Dissolved (mg/L)	0.00057	0.00101			
	Potassium (K)-Dissolved (mg/L)	1.40	1.33			
	Selenium (Se)-Dissolved (ug/L)	48.9	41.2			
	Silicon (Si)-Dissolved (mg/L)	2.37	2.34			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	2.25	3.23			
	Strontium (Sr)-Dissolved (mg/L)	0.146	0.167			
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010			
	Uranium (U)-Dissolved (mg/L)	0.00192	0.00210			
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050			
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	0.0011			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2496902-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2496902-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Cobalt (Co)-Dissolved	MS-B	L2496902-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Lithium (Li)-Dissolved	MS-B	L2496902-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2496902-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2496902-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Nickel (Ni)-Dissolved	MS-B	L2496902-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Potassium (K)-Dissolved	MS-B	L2496902-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2496902-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2496902-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Uranium (U)-Dissolved	MS-B	L2496902-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Barium (Ba)-Total	MS-B	L2496902-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Calcium (Ca)-Total	MS-B	L2496902-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2496902-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Strontium (Sr)-Total	MS-B	L2496902-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Nitrate (as N)	MS-B	L2496902-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Nitrate (as N)	MS-B	L2496902-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Sulfate (SO4)	MS-B	L2496902-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Sulfate (SO4)	MS-B	L2496902-1, -2, -3, -4, -5, -6, -7

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". 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.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

Reference Information

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-L-IC-N-CL	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL	Water	Electrical Conductivity (EC)	APHA 2510B

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 25C.

F-IC-N-CL	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA	Water	Total Mercury in Water by CVAFS (Ultra)	EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL	Water	Ammonia, Total (as N)	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL	Water	Oxidation redution potential by elect.	ASTM D1498

Reference Information

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL Water Phosphorus (P)-Total APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL Water pH APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL Water Orthophosphate-Dissolved (as P) APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL Water Total Dissolved Solids APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL Water Total Kjeldahl Nitrogen APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL Water Total Suspended Solids APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL Water Turbidity APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour 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.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5208912								
WG3396799-2 LCS								
Acidity (as CaCO3)			101.3		%		85-115	02-SEP-20
WG3396799-1 MB								
Acidity (as CaCO3)			1.2		mg/L		2	02-SEP-20
ALK-MAN-CL	**Water**							
Batch R5208902								
WG3396784-11 LCS								
Alkalinity, Total (as CaCO3)			101.4		%		85-115	02-SEP-20
WG3396784-10 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	02-SEP-20
BE-D-L-CCMS-VA	**Water**							
Batch R5209484								
WG3397711-2 LCS								
Beryllium (Be)-Dissolved			101.7		%		80-120	03-SEP-20
WG3397711-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	03-SEP-20
BE-T-L-CCMS-VA	**Water**							
Batch R5214240								
WG3397144-3 DUP		**L2496902-1**						
Beryllium (Be)-Total		<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	08-SEP-20
WG3397144-2 LCS								
Beryllium (Be)-Total			91.3		%		80-120	08-SEP-20
WG3397144-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	08-SEP-20
WG3397144-4 MS		**L2496902-2**						
Beryllium (Be)-Total			95.9		%		70-130	08-SEP-20
BR-L-IC-N-CL	**Water**							
Batch R5208695								
WG3396574-7 DUP		**L2496902-7**						
Bromide (Br)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	01-SEP-20
WG3396574-2 LCS								
Bromide (Br)			104.1		%		85-115	01-SEP-20
WG3396574-6 LCS								
Bromide (Br)			105.6		%		85-115	01-SEP-20
WG3396574-1 MB								
Bromide (Br)			<0.050		mg/L		0.05	01-SEP-20
WG3396574-5 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BR-L-IC-N-CL	**Water**							
Batch R5208695								
WG3396574-5 MB								
Bromide (Br)			<0.050		mg/L		0.05	01-SEP-20
WG3396574-8 MS		**L2496902-7**						
Bromide (Br)			119.6		%		75-125	01-SEP-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5208908								
WG3396461-7 DUP		**L2496902-7**						
Dissolved Organic Carbon		<0.50	<0.50	RPD-NA	mg/L	N/A	20	01-SEP-20
WG3396461-2 LCS								
Dissolved Organic Carbon			93.8		%		80-120	31-AUG-20
WG3396461-6 LCS								
Dissolved Organic Carbon			93.7		%		80-120	31-AUG-20
WG3396461-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	31-AUG-20
WG3396461-5 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	31-AUG-20
WG3396461-8 MS		**L2496902-7**						
Dissolved Organic Carbon			91.1		%		70-130	01-SEP-20
C-TOT-ORG-LOW-CL	**Water**							
Batch R5208908								
WG3396461-7 DUP		**L2496902-7**						
Total Organic Carbon		<0.50	<0.50	RPD-NA	mg/L	N/A	20	31-AUG-20
WG3396461-2 LCS								
Total Organic Carbon			96.0		%		80-120	31-AUG-20
WG3396461-6 LCS								
Total Organic Carbon			96.5		%		80-120	31-AUG-20
WG3396461-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	31-AUG-20
WG3396461-5 MB								
Total Organic Carbon			<0.50		mg/L		0.5	31-AUG-20
WG3396461-8 MS		**L2496902-7**						
Total Organic Carbon			94.4		%		70-130	31-AUG-20
CL-L-IC-N-CL	**Water**							
Batch R5208695								
WG3396574-7 DUP		**L2496902-7**						
Chloride (Cl)		3.70	3.70		mg/L	0.0	20	01-SEP-20
WG3396574-2 LCS								
Chloride (Cl)			104.3		%		85-115	01-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-L-IC-N-CL	**Water**							
Batch R5208695								
WG3396574-6 LCS								
Chloride (Cl)			104.6		%		85-115	01-SEP-20
WG3396574-1 MB								
Chloride (Cl)			<0.10		mg/L		0.1	01-SEP-20
WG3396574-5 MB								
Chloride (Cl)			<0.10		mg/L		0.1	01-SEP-20
WG3396574-8 MS		**L2496902-7**						
Chloride (Cl)			113.4		%		75-125	01-SEP-20
EC-L-PCT-CL	**Water**							
Batch R5208902								
WG3396784-11 LCS								
Conductivity (@ 25C)			95.3		%		90-110	02-SEP-20
WG3396784-10 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	02-SEP-20
F-IC-N-CL	**Water**							
Batch R5208695								
WG3396574-7 DUP		**L2496902-7**						
Fluoride (F)		0.215	0.226		mg/L	5.0	20	01-SEP-20
WG3396574-2 LCS								
Fluoride (F)			105.5		%		90-110	01-SEP-20
WG3396574-6 LCS								
Fluoride (F)			106.3		%		90-110	01-SEP-20
WG3396574-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	01-SEP-20
WG3396574-5 MB								
Fluoride (F)			<0.020		mg/L		0.02	01-SEP-20
WG3396574-8 MS		**L2496902-7**						
Fluoride (F)			109.3		%		75-125	01-SEP-20
HG-D-CVAA-VA	**Water**							
Batch R5210113								
WG3397897-11 DUP		**L2496902-1**						
Mercury (Hg)-Dissolved		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	04-SEP-20
WG3397897-10 LCS								
Mercury (Hg)-Dissolved			95.7		%		80-120	04-SEP-20
WG3397897-9 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	04-SEP-20
WG3397897-12 MS		**L2496902-2**						
Mercury (Hg)-Dissolved			101.4		%		70-130	04-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-U-CVAF-VA	**Water**							
Batch R5210660								
WG3398768-4 DUP		**L2496902-6**						
Mercury (Hg)-Total		<0.00050	<0.00050	RPD-NA	ug/L	N/A	20	05-SEP-20
WG3398768-2 LCS								
Mercury (Hg)-Total			98.2		%		80-120	04-SEP-20
WG3398768-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	04-SEP-20
MET-D-CCMS-VA	**Water**							
Batch R5209484								
WG3397711-2 LCS								
Aluminum (Al)-Dissolved			102.6		%		80-120	03-SEP-20
Antimony (Sb)-Dissolved			94.5		%		80-120	03-SEP-20
Arsenic (As)-Dissolved			101.9		%		80-120	03-SEP-20
Barium (Ba)-Dissolved			102.1		%		80-120	03-SEP-20
Bismuth (Bi)-Dissolved			99.8		%		80-120	03-SEP-20
Boron (B)-Dissolved			97.8		%		80-120	03-SEP-20
Cadmium (Cd)-Dissolved			101.9		%		80-120	03-SEP-20
Calcium (Ca)-Dissolved			108.5		%		80-120	03-SEP-20
Chromium (Cr)-Dissolved			104.1		%		80-120	03-SEP-20
Cobalt (Co)-Dissolved			102.4		%		80-120	03-SEP-20
Copper (Cu)-Dissolved			102.1		%		80-120	03-SEP-20
Iron (Fe)-Dissolved			98.4		%		80-120	03-SEP-20
Lead (Pb)-Dissolved			98.9		%		80-120	03-SEP-20
Lithium (Li)-Dissolved			114.5		%		80-120	03-SEP-20
Magnesium (Mg)-Dissolved			105.8		%		80-120	03-SEP-20
Manganese (Mn)-Dissolved			97.7		%		80-120	03-SEP-20
Molybdenum (Mo)-Dissolved			95.3		%		80-120	03-SEP-20
Nickel (Ni)-Dissolved			105.6		%		80-120	03-SEP-20
Potassium (K)-Dissolved			107.0		%		80-120	03-SEP-20
Selenium (Se)-Dissolved			104.1		%		80-120	03-SEP-20
Silicon (Si)-Dissolved			96.5		%		60-140	03-SEP-20
Silver (Ag)-Dissolved			95.9		%		80-120	03-SEP-20
Sodium (Na)-Dissolved			105.4		%		80-120	03-SEP-20
Strontium (Sr)-Dissolved			100.7		%		80-120	03-SEP-20
Thallium (Tl)-Dissolved			100.6		%		80-120	03-SEP-20
Tin (Sn)-Dissolved			95.6		%		80-120	03-SEP-20
Titanium (Ti)-Dissolved			104.5		%		80-120	03-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5209484								
WG3397711-2 LCS								
Uranium (U)-Dissolved			106.6		%		80-120	03-SEP-20
Vanadium (V)-Dissolved			103.8		%		80-120	03-SEP-20
Zinc (Zn)-Dissolved			103.6		%		80-120	03-SEP-20
WG3397711-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	03-SEP-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	03-SEP-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	03-SEP-20
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	03-SEP-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	03-SEP-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	03-SEP-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	03-SEP-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	03-SEP-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	03-SEP-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	03-SEP-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	03-SEP-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	03-SEP-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	03-SEP-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	03-SEP-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	03-SEP-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	03-SEP-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	03-SEP-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	03-SEP-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	03-SEP-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	03-SEP-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	03-SEP-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	03-SEP-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	03-SEP-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	03-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5214240								
WG3397144-3 DUP		**L2496902-1**						
Aluminum (Al)-Total		0.0040	0.0042		mg/L	4.5	20	08-SEP-20
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	08-SEP-20
Arsenic (As)-Total		0.00014	0.00015		mg/L	3.6	20	08-SEP-20
Barium (Ba)-Total		0.0399	0.0396		mg/L	1.0	20	08-SEP-20
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	08-SEP-20
Boron (B)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	08-SEP-20
Cadmium (Cd)-Total		0.0000261	0.0000220		mg/L	17	20	08-SEP-20
Calcium (Ca)-Total		49.4	50.0		mg/L	1.2	20	08-SEP-20
Chromium (Cr)-Total		0.00015	0.00016		mg/L	6.1	20	08-SEP-20
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	08-SEP-20
Copper (Cu)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	08-SEP-20
Iron (Fe)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	08-SEP-20
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	08-SEP-20
Lithium (Li)-Total		0.0030	0.0030		mg/L	0.0	20	08-SEP-20
Magnesium (Mg)-Total		16.6	16.3		mg/L	1.7	20	08-SEP-20
Manganese (Mn)-Total		0.00049	0.00053		mg/L	7.5	20	08-SEP-20
Molybdenum (Mo)-Total		0.00132	0.00126		mg/L	4.3	20	08-SEP-20
Nickel (Ni)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	08-SEP-20
Potassium (K)-Total		0.630	0.630		mg/L	0.0	20	08-SEP-20
Selenium (Se)-Total		0.00138	0.00127		mg/L	8.0	20	08-SEP-20
Silicon (Si)-Total		2.06	2.05		mg/L	0.4	20	08-SEP-20
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	08-SEP-20
Sodium (Na)-Total		0.986	0.986		mg/L	0.0	20	08-SEP-20
Strontium (Sr)-Total		0.164	0.160		mg/L	2.8	20	08-SEP-20
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	08-SEP-20
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	08-SEP-20
Titanium (Ti)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	08-SEP-20
Uranium (U)-Total		0.00152	0.00146		mg/L	3.8	20	08-SEP-20
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	08-SEP-20
Zinc (Zn)-Total		0.0057	0.0055		mg/L	4.3	20	08-SEP-20
WG3397144-2 LCS								
Aluminum (Al)-Total			103.8		%		80-120	08-SEP-20
Antimony (Sb)-Total			105.8		%		80-120	08-SEP-20
Arsenic (As)-Total			102.9		%		80-120	08-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5214240								
WG3397144-2 LCS								
Barium (Ba)-Total			104.3		%		80-120	08-SEP-20
Bismuth (Bi)-Total			106.9		%		80-120	08-SEP-20
Boron (B)-Total			90.5		%		80-120	08-SEP-20
Cadmium (Cd)-Total			105.7		%		80-120	08-SEP-20
Calcium (Ca)-Total			96.4		%		80-120	08-SEP-20
Chromium (Cr)-Total			104.3		%		80-120	08-SEP-20
Cobalt (Co)-Total			103.5		%		80-120	08-SEP-20
Copper (Cu)-Total			104.2		%		80-120	08-SEP-20
Iron (Fe)-Total			99.5		%		80-120	08-SEP-20
Lead (Pb)-Total			103.1		%		80-120	08-SEP-20
Lithium (Li)-Total			89.4		%		80-120	08-SEP-20
Magnesium (Mg)-Total			98.5		%		80-120	08-SEP-20
Manganese (Mn)-Total			103.7		%		80-120	08-SEP-20
Molybdenum (Mo)-Total			99.3		%		80-120	08-SEP-20
Nickel (Ni)-Total			106.4		%		80-120	08-SEP-20
Potassium (K)-Total			104.3		%		80-120	08-SEP-20
Selenium (Se)-Total			102.7		%		80-120	08-SEP-20
Silicon (Si)-Total			102.1		%		80-120	08-SEP-20
Silver (Ag)-Total			98.8		%		80-120	08-SEP-20
Sodium (Na)-Total			107.3		%		80-120	08-SEP-20
Strontium (Sr)-Total			105.5		%		80-120	08-SEP-20
Thallium (Tl)-Total			104.2		%		80-120	08-SEP-20
Tin (Sn)-Total			100.4		%		80-120	08-SEP-20
Titanium (Ti)-Total			96.2		%		80-120	08-SEP-20
Uranium (U)-Total			105.8		%		80-120	08-SEP-20
Vanadium (V)-Total			105.2		%		80-120	08-SEP-20
Zinc (Zn)-Total			104.0		%		80-120	08-SEP-20
WG3397144-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	08-SEP-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	08-SEP-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	08-SEP-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	08-SEP-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	08-SEP-20
Boron (B)-Total			<0.010		mg/L		0.01	08-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5214240								
WG3397144-1 MB								
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	08-SEP-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	08-SEP-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	08-SEP-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	08-SEP-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	08-SEP-20
Iron (Fe)-Total			<0.010		mg/L		0.01	08-SEP-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	08-SEP-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	08-SEP-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	08-SEP-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	08-SEP-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	08-SEP-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	08-SEP-20
Potassium (K)-Total			<0.050		mg/L		0.05	08-SEP-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	08-SEP-20
Silicon (Si)-Total			<0.10		mg/L		0.1	08-SEP-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	08-SEP-20
Sodium (Na)-Total			<0.050		mg/L		0.05	08-SEP-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	08-SEP-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	08-SEP-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	08-SEP-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	08-SEP-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	08-SEP-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	08-SEP-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	08-SEP-20
WG3397144-4 MS		**L2496902-2**						
Aluminum (Al)-Total			100.6		%		70-130	08-SEP-20
Antimony (Sb)-Total			105.0		%		70-130	08-SEP-20
Arsenic (As)-Total			103.1		%		70-130	08-SEP-20
Barium (Ba)-Total			N/A	MS-B	%		-	08-SEP-20
Bismuth (Bi)-Total			100.6		%		70-130	08-SEP-20
Boron (B)-Total			90.8		%		70-130	08-SEP-20
Cadmium (Cd)-Total			104.9		%		70-130	08-SEP-20
Calcium (Ca)-Total			N/A	MS-B	%		-	08-SEP-20
Chromium (Cr)-Total			102.9		%		70-130	08-SEP-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5214240								
WG3397144-4 MS		**L2496902-2**						
Cobalt (Co)-Total			99.8		%		70-130	08-SEP-20
Copper (Cu)-Total			99.1		%		70-130	08-SEP-20
Iron (Fe)-Total			100.7		%		70-130	08-SEP-20
Lead (Pb)-Total			99.9		%		70-130	08-SEP-20
Lithium (Li)-Total			96.0		%		70-130	08-SEP-20
Magnesium (Mg)-Total			N/A	MS-B	%		-	08-SEP-20
Manganese (Mn)-Total			100.2		%		70-130	08-SEP-20
Molybdenum (Mo)-Total			102.7		%		70-130	08-SEP-20
Nickel (Ni)-Total			103.0		%		70-130	08-SEP-20
Potassium (K)-Total			102.6		%		70-130	08-SEP-20
Selenium (Se)-Total			104.5		%		70-130	08-SEP-20
Silicon (Si)-Total			94.7		%		70-130	08-SEP-20
Silver (Ag)-Total			97.9		%		70-130	08-SEP-20
Sodium (Na)-Total			103.5		%		70-130	08-SEP-20
Strontium (Sr)-Total			N/A	MS-B	%		-	08-SEP-20
Thallium (Tl)-Total			100.2		%		70-130	08-SEP-20
Tin (Sn)-Total			102.9		%		70-130	08-SEP-20
Titanium (Ti)-Total			102.6		%		70-130	08-SEP-20
Uranium (U)-Total			104.7		%		70-130	08-SEP-20
Vanadium (V)-Total			105.1		%		70-130	08-SEP-20
Zinc (Zn)-Total			100.3		%		70-130	08-SEP-20
NH3-L-F-CL	**Water**							
Batch R5208799								
WG3396013-15 DUP		**L2496902-7**						
Ammonia as N		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	01-SEP-20
WG3396013-14 LCS								
Ammonia as N			106.4		%		85-115	01-SEP-20
WG3396013-13 MB								
Ammonia as N			<0.0050		mg/L		0.005	01-SEP-20
WG3396013-16 MS		**L2496902-7**						
Ammonia as N			103.8		%		75-125	01-SEP-20
NO2-L-IC-N-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-L-IC-N-CL	**Water**							
Batch R5208695								
WG3396574-7 DUP		**L2496902-7**						
Nitrite (as N)		0.0070	0.0073		mg/L	4.2	20	01-SEP-20
WG3396574-2 LCS								
Nitrite (as N)			104.6		%		90-110	01-SEP-20
WG3396574-6 LCS								
Nitrite (as N)			103.9		%		90-110	01-SEP-20
WG3396574-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	01-SEP-20
WG3396574-5 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	01-SEP-20
WG3396574-8 MS		**L2496902-7**						
Nitrite (as N)			115.4		%		75-125	01-SEP-20
NO3-L-IC-N-CL	**Water**							
Batch R5208695								
WG3396574-7 DUP		**L2496902-7**						
Nitrate (as N)		9.81	9.80		mg/L	0.0	20	01-SEP-20
WG3396574-2 LCS								
Nitrate (as N)			104.4		%		90-110	01-SEP-20
WG3396574-6 LCS								
Nitrate (as N)			104.8		%		90-110	01-SEP-20
WG3396574-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	01-SEP-20
WG3396574-5 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	01-SEP-20
WG3396574-8 MS		**L2496902-7**						
Nitrate (as N)			N/A	MS-B	%		-	01-SEP-20
ORP-CL	**Water**							
Batch R5208445								
WG3396212-1 CRM		**CL-ORP**						
ORP			221		mV		210-230	01-SEP-20
WG3396212-3 CRM		**CL-ORP**						
ORP			220		mV		210-230	01-SEP-20
P-T-L-COL-CL	**Water**							
Batch R5208940								
WG3396834-10 LCS								
Phosphorus (P)-Total			106.2		%		80-120	02-SEP-20
WG3396834-12 LCS								
Phosphorus (P)-Total			107.8		%		80-120	02-SEP-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-T-L-COL-CL	**Water**							
Batch R5208940								
WG3396834-11 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	02-SEP-20
WG3396834-9 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	02-SEP-20
PH-CL	**Water**							
Batch R5208902								
WG3396784-11 LCS								
pH			7.00		pH		6.9-7.1	02-SEP-20
PO4-DO-L-COL-CL	**Water**							
Batch R5208418								
WG3395787-6 LCS								
Orthophosphate-Dissolved (as P)			96.7		%		80-120	01-SEP-20
WG3395787-5 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	01-SEP-20
SO4-IC-N-CL	**Water**							
Batch R5208695								
WG3396574-7 DUP		**L2496902-7**						
Sulfate (SO4)		186	186		mg/L	0.1	20	01-SEP-20
WG3396574-2 LCS								
Sulfate (SO4)			105.1		%		90-110	01-SEP-20
WG3396574-6 LCS								
Sulfate (SO4)			104.4		%		90-110	01-SEP-20
WG3396574-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	01-SEP-20
WG3396574-5 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	01-SEP-20
WG3396574-8 MS		**L2496902-7**						
Sulfate (SO4)			N/A	MS-B	%		-	01-SEP-20
SOLIDS-TDS-CL	**Water**							
Batch R5208648								
WG3395436-5 LCS								
Total Dissolved Solids			106.6		%		85-115	01-SEP-20
WG3395436-8 LCS								
Total Dissolved Solids			104.4		%		85-115	01-SEP-20
WG3395436-4 MB								
Total Dissolved Solids			<10		mg/L		10	01-SEP-20
WG3395436-7 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-CL	**Water**							
Batch R5208648								
WG3395436-7 MB								
Total Dissolved Solids			<10		mg/L		10	01-SEP-20
Batch R5209883								
WG3396905-2 LCS								
Total Dissolved Solids			100.4		%		85-115	02-SEP-20
WG3396905-1 MB								
Total Dissolved Solids			<10		mg/L		10	02-SEP-20
TKN-L-F-CL	**Water**							
Batch R5208703								
WG3396570-12 LCS								
Total Kjeldahl Nitrogen			97.3		%		75-125	02-SEP-20
WG3396570-15 LCS								
Total Kjeldahl Nitrogen			95.1		%		75-125	02-SEP-20
WG3396570-17 LCS								
Total Kjeldahl Nitrogen			97.3		%		75-125	02-SEP-20
WG3396570-2 LCS								
Total Kjeldahl Nitrogen			103.0		%		75-125	02-SEP-20
WG3396570-4 LCS								
Total Kjeldahl Nitrogen			103.3		%		75-125	02-SEP-20
WG3396570-8 LCS								
Total Kjeldahl Nitrogen			99.7		%		75-125	02-SEP-20
WG3396570-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	02-SEP-20
WG3396570-11 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	02-SEP-20
WG3396570-14 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	02-SEP-20
WG3396570-16 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	02-SEP-20
WG3396570-3 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	02-SEP-20
WG3396570-7 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	02-SEP-20
TSS-L-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TSS-L-CL	**Water**							
Batch R5208732								
WG3395435-10 LCS								
Total Suspended Solids			103.2		%		85-115	01-SEP-20
WG3395435-9 MB								
Total Suspended Solids			<1.0		mg/L		1	01-SEP-20
Batch R5209827								
WG3396900-2 LCS								
Total Suspended Solids			100.5		%		85-115	02-SEP-20
WG3396900-1 MB								
Total Suspended Solids			<1.0		mg/L		1	02-SEP-20
TURBIDITY-CL	**Water**							
Batch R5208429								
WG3396162-3 LCS								
Turbidity			96.4		%		85-115	01-SEP-20
WG3396162-2 MB								
Turbidity			<0.10		NTU		0.1	01-SEP-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	31-AUG-20 09:00	01-SEP-20 20:15	0.25	35	hours	EHTR-FM
	2	31-AUG-20 09:42	01-SEP-20 20:15	0.25	35	hours	EHTR-FM
	3	30-AUG-20 08:30	01-SEP-20 20:15	0.25	60	hours	EHTR-FM
	4	30-AUG-20 15:15	01-SEP-20 20:15	0.25	53	hours	EHTR-FM
	5	30-AUG-20 11:15	01-SEP-20 20:15	0.25	57	hours	EHTR-FM
	6	29-AUG-20 15:40	01-SEP-20 20:15	0.25	77	hours	EHTR-FM
	7	30-AUG-20 18:13	01-SEP-20 20:15	0.25	50	hours	EHTR-FM
pH							
	1	31-AUG-20 09:00	02-SEP-20 13:00	0.25	52	hours	EHTR-FM
	2	31-AUG-20 09:42	02-SEP-20 13:00	0.25	51	hours	EHTR-FM
	3	30-AUG-20 08:30	02-SEP-20 13:00	0.25	77	hours	EHTR-FM
	4	30-AUG-20 15:15	02-SEP-20 13:00	0.25	70	hours	EHTR-FM
	5	30-AUG-20 11:15	02-SEP-20 13:00	0.25	74	hours	EHTR-FM
	6	29-AUG-20 15:40	02-SEP-20 13:00	0.25	93	hours	EHTR-FM
	7	30-AUG-20 18:13	02-SEP-20 13:00	0.25	67	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2496902 were received on 01-SEP-20 08:40.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes 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 pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID: LCO LAEMP Aug 2020

TURNAROUND TIME:

PROJECT/CLIENT INFO

Facility Name	REP
Project Manager	Cait Good
Email	cait.good@teck.com
Address	421 Pine Avenue
City	Sparwood
Province	BC
Postal Code	V0B 2G0
Country	Canada
Phone Number	250-425-8202

LABORATORY

Lab Name	ALS Calgary
Lab Contact	Lyudmyla Shvets
Email	lyudmyla.shvets@alsglobal.com
Address	2559 29 Street NE
City	Calgary
Province	AB
Postal Code	T1Y 7B5
Country	Canada
Phone Number	1 403 407 1794

	Excel	PDF	EDD
cait.good@teck.com	x	x	x
teckcoal@equisonline.com			x
Jings@minnow.ca	x	x	x
carlie.meyer@teck.com	x	x	x
kbatchelar@minnow.ca	x	x	x

SAMPLE DETAILS

L2496902-COFC

ANALYSIS REQUESTED

Filtered - F: Field, L: Lab, FL: Field & Lab, N: None

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	FIL.	N	F	N	N	F	N	F
								PRESERV.		H2SO4	H2SO4		HCL	HNO3	HNO3
								ANALYSIS	TECKCOAL-ROUTINE-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-T-U-CVAF-VA	HG-D-CVAF-VA	TECKCOAL-MET-T-VA	TECKCOAL-MET-D-VA
RG_SLINE_WS_LAEMP_LCO_2020-08_NP	RG_SLINE	WS	No	31-Aug-20	9:00	G	7		1	1	1	1	1	1	1
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		[redacted]						
RG_LI24_WS_LAEMP_LCO_2020-08_NP	RG_LI24	WS	No	31-Aug-20	9:42	G	7		1	1	1	1	1	1	1
RG_LILC3_WS_LAEMP_LCO_2020-08_NP	RG_LILC3	WS	No	30-Aug-20	08:30	G	7		1	1	1	1	1	1	1
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		[redacted]						
RG_LIDCOM_WS_LAEMP_LCO_2020-08_NP	RG_LIDCOM	WS	No	30-Aug-20	15:15	G	7		1	1	1	1	1	1	1
RG_LI8_WS_LAEMP_LCO_2020-08_NP	RG_LI8	WS	No	30-Aug-20	11:15	G	7		1	1	1	1	1	1	1
RG_FRUL_WS_LAEMP_LCO_2020-08_NP	RG_FRUL	WS	No	29-Aug-20	15:40	G	7		1	1	1	1	1	1	1
RG_FO23_WS_LAEMP_LCO_2020-08_NP	RG_FO23	WS	No	30-Aug-20	18:13	G	7		1	1	1	1	1	1	1
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		[redacted]						
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		[redacted]						
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		[redacted]						

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

PO 689999 ; Quote Q78745

RELINQUISHED BY/AFFILIATION

Katharina Batchelar

DATE/TIME

31-Aug-20 17:00

ACCEPTED BY/AFFILIATION

9/1/2020

NB OF BOTTLES RETURNED/DESCRIPTION

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	Katharina Batchelar	Mobile #	778-679-4350
Sampler's Signature	K Batchelar	Date/Time	31-Aug-20 17:00

WATER CHEMISTRY

ALS Laboratory Report L2498675

(Finalized January 19, 2021)

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 03-SEP-20
Report Date: 19-JAN-21 13:27 (MT)
Version: FINAL REV. 2

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2498675

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers:
Legal Site Desc:

Comments: 19-JAN-2021 Alkalinity (Species) result revised on L2498675-1 to -5.

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID	L2498675-1	L2498675-2	L2498675-3	L2498675-4	L2498675-5
		Description	WS	WS	WS	WS	WS
		Sampled Date	01-SEP-20	01-SEP-20	01-SEP-20	01-SEP-20	01-SEP-20
		Sampled Time	12:08	17:09	12:08	12:08	12:08
		Client ID	RG_LCUT_WS_LAEMP_LCO_2020-09_NP	RG_LISP24_WS_LAEMP_LCO_2020-09_NP	RG_RIVER_WS_LAEMP_LCO_2020-09_NP	RG_FBLANK_WS_LAEMP_LCO_2020-09_NP	RG_TRIP_WS_LAEMP_LCO_2020-09_NP
WATER							
Physical Tests	Conductivity (@ 25C) (uS/cm)		906	803	919	<2.0	<2.0
	Hardness (as CaCO3) (mg/L)		543	469	551	<0.50	
	pH (pH)		8.38	8.38	8.38	6.07	5.65
	ORP (mV)		432	474	465	506	412
	Total Suspended Solids (mg/L)		<1.0	<1.0	<1.0	<1.0	<1.0
	Total Dissolved Solids (mg/L)		735 DLHC	616 DLHC	731 DLHC	<10	<10
	Turbidity (NTU)		0.26	0.20	0.20	<0.10	<0.10
Anions and Nutrients	Acidity (as CaCO3) (mg/L)		3.6	<1.0	3.0	1.7	1.7
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)		219	200	216	<1.0	<1.0
	Alkalinity, Carbonate (as CaCO3) (mg/L)		7.8	6.6	7.6	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)		<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)		227	207	223	<1.0	<1.0
	Ammonia as N (mg/L)		0.0221	0.0076	0.0777	0.0067 RRV	0.245 RRV
	Bromide (Br) (mg/L)		<0.25 DLHC	<0.050	<0.25 DLHC	<0.050	<0.050
	Chloride (Cl) (mg/L)		6.50 DLHC	14.0	6.48 DLHC	<0.10	<0.10
	Fluoride (F) (mg/L)		0.14 DLHC	0.195	0.14 DLHC	<0.020	<0.020
	Ion Balance (%)		94.1	96.0	95.7	0.0	0.0
	Nitrate (as N) (mg/L)		16.2 DLHC	8.81	16.4 DLHC	<0.0050	<0.0050
	Nitrite (as N) (mg/L)		<0.0050 DLHC	0.0029	<0.0050 DLHC	<0.0010	<0.0010
	Total Kjeldahl Nitrogen (mg/L)		<0.050 TKNI	<0.050 TKNI	<0.050 TKNI	<0.050	<0.050
	Orthophosphate-Dissolved (as P) (mg/L)		0.0025	0.0013	0.0021	<0.0010	<0.0010
	Phosphorus (P)-Total (mg/L)		0.0042	0.0031	<0.0020	<0.0020	<0.0020
	Sulfate (SO4) (mg/L)		293 DLHC	239	294 DLHC	<0.30	<0.30
	Anion Sum (meq/L)		12.0	10.1	11.9	<0.10	<0.10
	Cation Sum (meq/L)		11.3	9.73	11.4	<0.10	<0.10
	Cation - Anion Balance (%)		-3.1	-2.1	-2.2	0.0	0.0
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)		<0.50	<0.50	<0.50	<0.50	
	Total Organic Carbon (mg/L)		0.76	0.58	<0.50	<0.50	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)		0.0030	0.0034	0.0030	<0.0030	<0.0030
	Antimony (Sb)-Total (mg/L)		0.00040	0.00024	0.00039	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)		0.00018	0.00014	0.00018	<0.00010	<0.00010
	Barium (Ba)-Total (mg/L)		0.0609	0.0576	0.0608	<0.00010	<0.00010
	Beryllium (Be)-Total (ug/L)		<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total (mg/L)		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)		0.021	0.015	0.021	<0.010	<0.010
	Cadmium (Cd)-Total (ug/L)		0.515	0.215	0.489	<0.0050	<0.0050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2498675-1	L2498675-2	L2498675-3	L2498675-4	L2498675-5
	Description	WS	WS	WS	WS	WS
	Sampled Date	01-SEP-20	01-SEP-20	01-SEP-20	01-SEP-20	01-SEP-20
	Sampled Time	12:08	17:09	12:08	12:08	12:08
	Client ID	RG_LCUT_WS_LAEMP_LCO_2020-09_NP	RG_LISP24_WS_LAEMP_LCO_2020-09_NP	RG_RIVER_WS_LAEMP_LCO_2020-09_NP	RG_FBLANK_WS_LAEMP_LCO_2020-09_NP	RG_TRIP_WS_LAEMP_LCO_2020-09_NP
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	130	106	130	<0.050	<0.050
	Chromium (Cr)-Total (mg/L)	0.00013	0.00014	0.00012	<0.00010	<0.00010
	Cobalt (Co)-Total (ug/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	<0.010	0.017	<0.010	<0.010	<0.010
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	0.0669	0.0417	0.0668	<0.0010	<0.0010
	Magnesium (Mg)-Total (mg/L)	59.7	49.4	58.8	<0.10	<0.10
	Manganese (Mn)-Total (mg/L)	0.00021	0.00931	0.00027	<0.00010	<0.00010
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Molybdenum (Mo)-Total (mg/L)	0.00178	0.00291	0.00183	<0.000050	<0.000050
	Nickel (Ni)-Total (mg/L)	0.0123	0.00595	0.0121	<0.00050	<0.00050
	Potassium (K)-Total (mg/L)	1.82	1.39	1.82	<0.050	<0.050
	Selenium (Se)-Total (ug/L)	60.7	33.3	59.1	<0.050	<0.050
	Silicon (Si)-Total (mg/L)	2.44	2.33	2.45	<0.10	<0.10
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	8.76	7.23	8.65	0.251 RRV	<0.050
	Strontium (Sr)-Total (mg/L)	0.249	0.221	0.254	<0.00020	<0.00020
	Thallium (Tl)-Total (mg/L)	0.000017	<0.000010	0.000021	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.00454	0.00345	0.00440	<0.000010	<0.000010
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	0.0199	0.0079	0.0199	<0.0030	<0.0030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	LAB
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	
	Antimony (Sb)-Dissolved (mg/L)	0.00036	0.00022	0.00036	<0.00010	
	Arsenic (As)-Dissolved (mg/L)	0.00014	0.00011	0.00010	<0.00010	
	Barium (Ba)-Dissolved (mg/L)	0.0612	0.0565	0.0604	<0.00010	
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020	<0.020	
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Boron (B)-Dissolved (mg/L)	0.017	0.013	0.017	<0.010	
	Cadmium (Cd)-Dissolved (ug/L)	0.471	0.205	0.475	<0.0050	
	Calcium (Ca)-Dissolved (mg/L)	129	115	133	<0.050	<0.050
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	0.00010	0.00011	<0.00010	
	Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10	<0.10	<0.10	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2498675-1 WS 01-SEP-20 12:08 RG_LCUT_WS_LAEMP_LCO_2020-09_NP	L2498675-2 WS 01-SEP-20 17:09 RG_LISP24_WS_LAEMP_LCO_2020-09_NP	L2498675-3 WS 01-SEP-20 12:08 RG_RIVER_WS_LAEMP_LCO_2020-09_NP	L2498675-4 WS 01-SEP-20 12:08 RG_FBLANK_WS_LAEMP_LCO_2020-09_NP	L2498675-5 WS 01-SEP-20 12:08 RG_TRIP_WS_LAEMP_LCO_2020-09_NP
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	0.00037	<0.00020	0.00035	<0.00020	
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Lithium (Li)-Dissolved (mg/L)	0.0612	0.0399	0.0613	<0.0010	
	Magnesium (Mg)-Dissolved (mg/L)	53.8	44.1	53.0	<0.10	<0.0050
	Manganese (Mn)-Dissolved (mg/L)	0.00016	0.00878	0.00013	<0.00010	
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
	Molybdenum (Mo)-Dissolved (mg/L)	0.00170	0.00283	0.00178	<0.000050	
	Nickel (Ni)-Dissolved (mg/L)	0.0126	0.00588	0.0123	<0.00050	
	Potassium (K)-Dissolved (mg/L)	1.84	1.37	1.83	<0.050	<0.050
	Selenium (Se)-Dissolved (ug/L)	57.4	30.3	56.2	<0.050	
	Silicon (Si)-Dissolved (mg/L)	2.26	2.19	2.20	<0.050	
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Dissolved (mg/L)	8.89	7.32	8.70	0.235 RRV	<0.050
	Strontium (Sr)-Dissolved (mg/L)	0.255	0.219	0.246	<0.00020	
	Thallium (Tl)-Dissolved (mg/L)	0.000019	<0.000010	0.000020	<0.000010	
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Uranium (U)-Dissolved (mg/L)	0.00438	0.00348	0.00451	<0.000010	
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Zinc (Zn)-Dissolved (mg/L)	0.0193	0.0070	0.0191	<0.0010	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2498675-5
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2498675-5
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2498675-5
Matrix Spike	Barium (Ba)-Total	MS-B	L2498675-1, -2, -3, -4, -5
Matrix Spike	Calcium (Ca)-Total	MS-B	L2498675-1, -2, -3, -4, -5
Matrix Spike	Calcium (Ca)-Total	MS-B	L2498675-4
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2498675-1, -2, -3, -4, -5
Matrix Spike	Sodium (Na)-Total	MS-B	L2498675-1, -2, -3, -4, -5
Matrix Spike	Strontium (Sr)-Total	MS-B	L2498675-1, -2, -3, -4, -5
Matrix Spike	Nitrate (as N)	MS-B	L2498675-1, -2, -3, -4, -5
Matrix Spike	Sulfate (SO4)	MS-B	L2498675-1, -2, -3, -4, -5

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". 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.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by

Reference Information

subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-L-IC-N-CL Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

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 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-CL Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL Water Oxidation redution potential by elect. ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

Reference Information

P-T-L-COL-CL	Water	Phosphorus (P)-Total	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL	Water	Orthophosphate-Dissolved (as P)	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL	Water	Total Kjeldahl Nitrogen	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour 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.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L2498675 Report Date: 19-JAN-21

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5214848								
WG3400036-5 LCS								
Acidity (as CaCO3)			92.4		%		85-115	08-SEP-20
WG3400036-4 MB								
Acidity (as CaCO3)			1.6		mg/L		2	08-SEP-20
ALK-MAN-CL	**Water**							
Batch R5217376								
WG3400821-3 LCS								
Alkalinity, Total (as CaCO3)			102.3		%		85-115	09-SEP-20
WG3400821-6 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	09-SEP-20
BE-D-L-CCMS-VA	**Water**							
Batch R5221478								
WG3400961-2 LCS								
Beryllium (Be)-Dissolved			95.7		%		80-120	10-SEP-20
WG3400961-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	10-SEP-20
BE-T-L-CCMS-VA	**Water**							
Batch R5215876								
WG3399371-3 DUP		**L2498675-1**						
Beryllium (Be)-Total		<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	08-SEP-20
WG3399371-2 LCS								
Beryllium (Be)-Total			95.6		%		80-120	08-SEP-20
WG3399371-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	08-SEP-20
WG3399371-4 MS		**L2498675-2**						
Beryllium (Be)-Total			99.4		%		70-130	08-SEP-20
BR-L-IC-N-CL	**Water**							
Batch R5213799								
WG3399738-10 LCS								
Bromide (Br)			99.7		%		85-115	04-SEP-20
WG3399738-9 MB								
Bromide (Br)			<0.050		mg/L		0.05	04-SEP-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5212617								
WG3399145-15 DUP		**L2498675-4**						
Dissolved Organic Carbon		<0.50	<0.50	RPD-NA	mg/L	N/A	20	05-SEP-20
WG3399145-10 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-LOW-CL	**Water**							
Batch R5212617								
WG3399145-10 LCS								
Dissolved Organic Carbon			96.1		%		80-120	05-SEP-20
WG3399145-14 LCS								
Dissolved Organic Carbon			117.3		%		80-120	05-SEP-20
WG3399145-13 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	05-SEP-20
WG3399145-9 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	05-SEP-20
WG3399145-16 MS		**L2498675-4**						
Dissolved Organic Carbon			94.1		%		70-130	05-SEP-20
C-TOT-ORG-LOW-CL	**Water**							
Batch R5212617								
WG3399145-15 DUP		**L2498675-4**						
Total Organic Carbon		<0.50	<0.50	RPD-NA	mg/L	N/A	20	05-SEP-20
WG3399145-10 LCS								
Total Organic Carbon			100.8		%		80-120	05-SEP-20
WG3399145-14 LCS								
Total Organic Carbon			119.0		%		80-120	05-SEP-20
WG3399145-13 MB								
Total Organic Carbon			<0.50		mg/L		0.5	05-SEP-20
WG3399145-9 MB								
Total Organic Carbon			<0.50		mg/L		0.5	05-SEP-20
WG3399145-16 MS		**L2498675-4**						
Total Organic Carbon			101.2		%		70-130	05-SEP-20
CL-L-IC-N-CL	**Water**							
Batch R5213799								
WG3399738-10 LCS								
Chloride (Cl)			105.0		%		85-115	04-SEP-20
WG3399738-9 MB								
Chloride (Cl)			<0.10		mg/L		0.1	04-SEP-20
EC-L-PCT-CL	**Water**							
Batch R5217376								
WG3400821-3 LCS								
Conductivity (@ 25C)			95.3		%		90-110	09-SEP-20
WG3400821-6 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	09-SEP-20
F-IC-N-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-IC-N-CL	**Water**							
Batch R5213799								
WG3399738-10 LCS								
Fluoride (F)			95.9		%		90-110	04-SEP-20
WG3399738-9 MB								
Fluoride (F)			<0.020		mg/L		0.02	04-SEP-20
HG-D-CVAA-VA	**Water**							
Batch R5219467								
WG3401359-3 DUP		**L2498675-4**						
Mercury (Hg)-Dissolved		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	10-SEP-20
WG3401359-2 LCS								
Mercury (Hg)-Dissolved			95.9		%		80-120	10-SEP-20
WG3401359-1 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	10-SEP-20
HG-T-U-CVAF-VA	**Water**							
Batch R5216020								
WG3400309-2 LCS								
Mercury (Hg)-Total			94.0		%		80-120	08-SEP-20
WG3400309-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	08-SEP-20
WG3400309-8 MS		**L2498675-3**						
Mercury (Hg)-Total			94.2		%		70-130	08-SEP-20
MET-D-CCMS-CL	**Water**							
Batch R5224003								
WG3404942-2 LCS		**TMRM**						
Calcium (Ca)-Dissolved			101.8		%		80-120	15-SEP-20
Magnesium (Mg)-Dissolved			103.6		%		80-120	15-SEP-20
Potassium (K)-Dissolved			99.1		%		80-120	15-SEP-20
Sodium (Na)-Dissolved			101.3		%		80-120	15-SEP-20
WG3404942-1 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	15-SEP-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	15-SEP-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	15-SEP-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	15-SEP-20
MET-D-CCMS-VA	**Water**							
Batch R5221478								
WG3400961-2 LCS								
Aluminum (Al)-Dissolved			97.3		%		80-120	10-SEP-20
Antimony (Sb)-Dissolved			94.6		%		80-120	10-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5221478								
WG3400961-2 LCS								
Arsenic (As)-Dissolved			95.2		%		80-120	10-SEP-20
Barium (Ba)-Dissolved			95.8		%		80-120	10-SEP-20
Bismuth (Bi)-Dissolved			108.8		%		80-120	10-SEP-20
Boron (B)-Dissolved			87.9		%		80-120	10-SEP-20
Cadmium (Cd)-Dissolved			92.8		%		80-120	10-SEP-20
Calcium (Ca)-Dissolved			102.1		%		80-120	10-SEP-20
Chromium (Cr)-Dissolved			93.6		%		80-120	10-SEP-20
Cobalt (Co)-Dissolved			96.5		%		80-120	10-SEP-20
Copper (Cu)-Dissolved			92.7		%		80-120	10-SEP-20
Iron (Fe)-Dissolved			92.8		%		80-120	10-SEP-20
Lead (Pb)-Dissolved			102.6		%		80-120	10-SEP-20
Lithium (Li)-Dissolved			98.6		%		80-120	10-SEP-20
Magnesium (Mg)-Dissolved			90.8		%		80-120	10-SEP-20
Manganese (Mn)-Dissolved			95.9		%		80-120	10-SEP-20
Molybdenum (Mo)-Dissolved			98.8		%		80-120	10-SEP-20
Nickel (Ni)-Dissolved			93.6		%		80-120	10-SEP-20
Potassium (K)-Dissolved			96.1		%		80-120	10-SEP-20
Selenium (Se)-Dissolved			95.7		%		80-120	10-SEP-20
Silicon (Si)-Dissolved			95.4		%		60-140	10-SEP-20
Silver (Ag)-Dissolved			96.3		%		80-120	10-SEP-20
Sodium (Na)-Dissolved			95.7		%		80-120	10-SEP-20
Strontium (Sr)-Dissolved			102.7		%		80-120	10-SEP-20
Thallium (Tl)-Dissolved			97.6		%		80-120	10-SEP-20
Tin (Sn)-Dissolved			91.3		%		80-120	10-SEP-20
Titanium (Ti)-Dissolved			90.5		%		80-120	10-SEP-20
Uranium (U)-Dissolved			108.0		%		80-120	10-SEP-20
Vanadium (V)-Dissolved			95.9		%		80-120	10-SEP-20
Zinc (Zn)-Dissolved			90.4		%		80-120	10-SEP-20
WG3400961-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	10-SEP-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	10-SEP-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	10-SEP-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	10-SEP-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	10-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5221478								
WG3400961-1 MB		**NP**						
Boron (B)-Dissolved			<0.010		mg/L		0.01	10-SEP-20
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	10-SEP-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	10-SEP-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	10-SEP-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	10-SEP-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	10-SEP-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	10-SEP-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	10-SEP-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	10-SEP-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	10-SEP-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	10-SEP-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	10-SEP-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	10-SEP-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	10-SEP-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	10-SEP-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	10-SEP-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	10-SEP-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	10-SEP-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	10-SEP-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	10-SEP-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	10-SEP-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	10-SEP-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	10-SEP-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	10-SEP-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	10-SEP-20
Batch R5222091								
WG3402290-3 DUP		**L2498675-4**						
Aluminum (Al)-Dissolved		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	11-SEP-20
Antimony (Sb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	11-SEP-20
Arsenic (As)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	11-SEP-20
Barium (Ba)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	11-SEP-20
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	11-SEP-20
Boron (B)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	11-SEP-20
Cadmium (Cd)-Dissolved		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	11-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5222091								
WG3402290-3 DUP		**L2498675-4**						
Calcium (Ca)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	11-SEP-20
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	11-SEP-20
Cobalt (Co)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	11-SEP-20
Copper (Cu)-Dissolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	11-SEP-20
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	11-SEP-20
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	11-SEP-20
Lithium (Li)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	11-SEP-20
Magnesium (Mg)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	11-SEP-20
Manganese (Mn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	11-SEP-20
Molybdenum (Mo)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	11-SEP-20
Nickel (Ni)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	11-SEP-20
Potassium (K)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	11-SEP-20
Selenium (Se)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	11-SEP-20
Silicon (Si)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	11-SEP-20
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	11-SEP-20
Sodium (Na)-Dissolved		0.235	0.217		mg/L	7.7	20	11-SEP-20
Strontium (Sr)-Dissolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	11-SEP-20
Thallium (Tl)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	11-SEP-20
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	11-SEP-20
Titanium (Ti)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	11-SEP-20
Uranium (U)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	11-SEP-20
Vanadium (V)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	11-SEP-20
Zinc (Zn)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	11-SEP-20
WG3402290-2 LCS								
Aluminum (Al)-Dissolved			99.4		%		80-120	11-SEP-20
Antimony (Sb)-Dissolved			95.4		%		80-120	11-SEP-20
Arsenic (As)-Dissolved			96.1		%		80-120	11-SEP-20
Barium (Ba)-Dissolved			96.0		%		80-120	11-SEP-20
Bismuth (Bi)-Dissolved			96.7		%		80-120	11-SEP-20
Boron (B)-Dissolved			98.6		%		80-120	11-SEP-20
Cadmium (Cd)-Dissolved			97.6		%		80-120	11-SEP-20
Calcium (Ca)-Dissolved			98.6		%		80-120	11-SEP-20
Chromium (Cr)-Dissolved			97.6		%		80-120	11-SEP-20
Cobalt (Co)-Dissolved			98.2		%		80-120	11-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5222091								
WG3402290-2 LCS								
Copper (Cu)-Dissolved			96.4		%		80-120	11-SEP-20
Iron (Fe)-Dissolved			91.8		%		80-120	11-SEP-20
Lead (Pb)-Dissolved			96.8		%		80-120	11-SEP-20
Lithium (Li)-Dissolved			100.1		%		80-120	11-SEP-20
Magnesium (Mg)-Dissolved			96.1		%		80-120	11-SEP-20
Manganese (Mn)-Dissolved			97.8		%		80-120	11-SEP-20
Molybdenum (Mo)-Dissolved			97.5		%		80-120	11-SEP-20
Nickel (Ni)-Dissolved			97.6		%		80-120	11-SEP-20
Potassium (K)-Dissolved			98.5		%		80-120	11-SEP-20
Selenium (Se)-Dissolved			99.5		%		80-120	11-SEP-20
Silicon (Si)-Dissolved			104.3		%		60-140	11-SEP-20
Silver (Ag)-Dissolved			98.5		%		80-120	11-SEP-20
Sodium (Na)-Dissolved			99.2		%		80-120	11-SEP-20
Strontium (Sr)-Dissolved			96.0		%		80-120	11-SEP-20
Thallium (Tl)-Dissolved			97.6		%		80-120	11-SEP-20
Tin (Sn)-Dissolved			96.6		%		80-120	11-SEP-20
Titanium (Ti)-Dissolved			91.6		%		80-120	11-SEP-20
Uranium (U)-Dissolved			91.5		%		80-120	11-SEP-20
Vanadium (V)-Dissolved			100.1		%		80-120	11-SEP-20
Zinc (Zn)-Dissolved			98.4		%		80-120	11-SEP-20
WG3402290-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	11-SEP-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	11-SEP-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	11-SEP-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	11-SEP-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	11-SEP-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	11-SEP-20
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	11-SEP-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	11-SEP-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	11-SEP-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	11-SEP-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	11-SEP-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	11-SEP-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	11-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5222091								
WG3402290-1 MB		**NP**						
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	11-SEP-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	11-SEP-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	11-SEP-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	11-SEP-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	11-SEP-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	11-SEP-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	11-SEP-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	11-SEP-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	11-SEP-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	11-SEP-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	11-SEP-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	11-SEP-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	11-SEP-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	11-SEP-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	11-SEP-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	11-SEP-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	11-SEP-20
MET-T-CCMS-VA	**Water**							
Batch R5215876								
WG3399371-3 DUP		**L2498675-1**						
Aluminum (Al)-Total		0.0030	0.0030		mg/L	1.0	20	08-SEP-20
Antimony (Sb)-Total		0.00040	0.00041		mg/L	3.9	20	08-SEP-20
Arsenic (As)-Total		0.00018	0.00017		mg/L	6.0	20	08-SEP-20
Barium (Ba)-Total		0.0609	0.0605		mg/L	0.6	20	08-SEP-20
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	08-SEP-20
Boron (B)-Total		0.021	0.021		mg/L	0.1	20	08-SEP-20
Cadmium (Cd)-Total		0.000515	0.000490		mg/L	5.0	20	08-SEP-20
Calcium (Ca)-Total		130	127		mg/L	2.0	20	08-SEP-20
Chromium (Cr)-Total		0.00013	0.00013		mg/L	0.8	20	08-SEP-20
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	08-SEP-20
Copper (Cu)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	08-SEP-20
Iron (Fe)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	08-SEP-20
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	08-SEP-20
Lithium (Li)-Total		0.0669	0.0671		mg/L	0.3	20	08-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5215876								
WG3399371-3 DUP		**L2498675-1**						
Magnesium (Mg)-Total		59.7	57.8		mg/L	3.2	20	08-SEP-20
Manganese (Mn)-Total		0.00021	0.00026	J	mg/L	0.00005	0.0002	08-SEP-20
Molybdenum (Mo)-Total		0.00178	0.00185		mg/L	3.9	20	08-SEP-20
Nickel (Ni)-Total		0.0123	0.0122		mg/L	0.5	20	08-SEP-20
Potassium (K)-Total		1.82	1.83		mg/L	0.5	20	08-SEP-20
Selenium (Se)-Total		0.0607	0.0595		mg/L	2.0	20	08-SEP-20
Silicon (Si)-Total		2.44	2.41		mg/L	1.1	20	08-SEP-20
Sodium (Na)-Total		8.76	8.84		mg/L	0.9	20	08-SEP-20
Strontium (Sr)-Total		0.249	0.259		mg/L	3.9	20	08-SEP-20
Thallium (Tl)-Total		0.000017	0.000017		mg/L	2.4	20	08-SEP-20
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	08-SEP-20
Titanium (Ti)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	08-SEP-20
Uranium (U)-Total		0.00454	0.00440		mg/L	3.2	20	08-SEP-20
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	08-SEP-20
Zinc (Zn)-Total		0.0199	0.0205		mg/L	2.7	20	08-SEP-20
WG3399371-2 LCS								
Aluminum (Al)-Total			98.8		%		80-120	08-SEP-20
Antimony (Sb)-Total			110.9		%		80-120	08-SEP-20
Arsenic (As)-Total			96.7		%		80-120	08-SEP-20
Barium (Ba)-Total			99.6		%		80-120	08-SEP-20
Bismuth (Bi)-Total			109.0		%		80-120	08-SEP-20
Boron (B)-Total			96.6		%		80-120	08-SEP-20
Cadmium (Cd)-Total			100.7		%		80-120	08-SEP-20
Calcium (Ca)-Total			97.4		%		80-120	08-SEP-20
Chromium (Cr)-Total			96.2		%		80-120	08-SEP-20
Cobalt (Co)-Total			95.0		%		80-120	08-SEP-20
Copper (Cu)-Total			96.8		%		80-120	08-SEP-20
Iron (Fe)-Total			91.5		%		80-120	08-SEP-20
Lead (Pb)-Total			109.4		%		80-120	08-SEP-20
Lithium (Li)-Total			98.1		%		80-120	08-SEP-20
Magnesium (Mg)-Total			102.1		%		80-120	08-SEP-20
Manganese (Mn)-Total			95.9		%		80-120	08-SEP-20
Molybdenum (Mo)-Total			100.2		%		80-120	08-SEP-20
Nickel (Ni)-Total			95.2		%		80-120	08-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5215876								
WG3399371-2 LCS								
Potassium (K)-Total			98.8		%		80-120	08-SEP-20
Selenium (Se)-Total			106.5		%		80-120	08-SEP-20
Silicon (Si)-Total			101.5		%		80-120	08-SEP-20
Silver (Ag)-Total			105.0		%		80-120	08-SEP-20
Sodium (Na)-Total			100.8		%		80-120	08-SEP-20
Strontium (Sr)-Total			103.8		%		80-120	08-SEP-20
Thallium (Tl)-Total			111.6		%		80-120	08-SEP-20
Tin (Sn)-Total			99.4		%		80-120	08-SEP-20
Titanium (Ti)-Total			94.0		%		80-120	08-SEP-20
Uranium (U)-Total			109.1		%		80-120	08-SEP-20
Vanadium (V)-Total			99.6		%		80-120	08-SEP-20
Zinc (Zn)-Total			95.3		%		80-120	08-SEP-20
WG3399371-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	08-SEP-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	08-SEP-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	08-SEP-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	08-SEP-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	08-SEP-20
Boron (B)-Total			<0.010		mg/L		0.01	08-SEP-20
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	08-SEP-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	08-SEP-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	08-SEP-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	08-SEP-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	08-SEP-20
Iron (Fe)-Total			<0.010		mg/L		0.01	08-SEP-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	08-SEP-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	08-SEP-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	08-SEP-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	08-SEP-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	08-SEP-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	08-SEP-20
Potassium (K)-Total			<0.050		mg/L		0.05	08-SEP-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	08-SEP-20
Silicon (Si)-Total			<0.10		mg/L		0.1	08-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5215876								
WG3399371-1 MB								
Sodium (Na)-Total			<0.050		mg/L		0.05	08-SEP-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	08-SEP-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	08-SEP-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	08-SEP-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	08-SEP-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	08-SEP-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	08-SEP-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	08-SEP-20
WG3399371-4 MS		**L2498675-2**						
Aluminum (Al)-Total			96.9		%		70-130	08-SEP-20
Antimony (Sb)-Total			104.9		%		70-130	08-SEP-20
Arsenic (As)-Total			98.5		%		70-130	08-SEP-20
Barium (Ba)-Total			N/A	MS-B	%		-	08-SEP-20
Bismuth (Bi)-Total			99.3		%		70-130	08-SEP-20
Boron (B)-Total			99.8		%		70-130	08-SEP-20
Cadmium (Cd)-Total			99.1		%		70-130	08-SEP-20
Calcium (Ca)-Total			N/A	MS-B	%		-	08-SEP-20
Chromium (Cr)-Total			96.8		%		70-130	08-SEP-20
Cobalt (Co)-Total			92.1		%		70-130	08-SEP-20
Copper (Cu)-Total			91.3		%		70-130	08-SEP-20
Iron (Fe)-Total			94.8		%		70-130	08-SEP-20
Lead (Pb)-Total			99.6		%		70-130	08-SEP-20
Lithium (Li)-Total			100.3		%		70-130	08-SEP-20
Magnesium (Mg)-Total			N/A	MS-B	%		-	08-SEP-20
Manganese (Mn)-Total			98.6		%		70-130	08-SEP-20
Molybdenum (Mo)-Total			108.2		%		70-130	08-SEP-20
Nickel (Ni)-Total			90.3		%		70-130	08-SEP-20
Potassium (K)-Total			102.7		%		70-130	08-SEP-20
Selenium (Se)-Total			109.9		%		70-130	08-SEP-20
Silicon (Si)-Total			93.6		%		70-130	08-SEP-20
Sodium (Na)-Total			N/A	MS-B	%		-	08-SEP-20
Strontium (Sr)-Total			N/A	MS-B	%		-	08-SEP-20
Thallium (Tl)-Total			100.5		%		70-130	08-SEP-20
Tin (Sn)-Total			102.5		%		70-130	08-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5215876								
WG3399371-4 MS		**L2498675-2**						
Titanium (Ti)-Total			103.1		%		70-130	08-SEP-20
Uranium (U)-Total			110.3		%		70-130	08-SEP-20
Vanadium (V)-Total			102.1		%		70-130	08-SEP-20
Zinc (Zn)-Total			91.6		%		70-130	08-SEP-20
Batch R5215997								
WG3399371-1 MB								
Silver (Ag)-Total			<0.000010		mg/L		0.00001	08-SEP-20
Batch R5222256								
WG3399371-3 DUP		**L2498675-1**						
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	11-SEP-20
WG3399371-4 MS		**L2498675-2**						
Silver (Ag)-Total			97.7		%		70-130	11-SEP-20
Batch R5224054								
WG3404174-5 DUP		**L2498675-4**						
Aluminum (Al)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	15-SEP-20
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	15-SEP-20
Arsenic (As)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	15-SEP-20
Barium (Ba)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	15-SEP-20
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	15-SEP-20
Boron (B)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	15-SEP-20
Cadmium (Cd)-Total		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	15-SEP-20
Calcium (Ca)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	15-SEP-20
Chromium (Cr)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	15-SEP-20
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	15-SEP-20
Copper (Cu)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	15-SEP-20
Iron (Fe)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	15-SEP-20
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	15-SEP-20
Lithium (Li)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	15-SEP-20
Magnesium (Mg)-Total		<0.10	<0.10	RPD-NA	mg/L	N/A	20	15-SEP-20
Manganese (Mn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	15-SEP-20
Molybdenum (Mo)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	15-SEP-20
Nickel (Ni)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	15-SEP-20
Potassium (K)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	15-SEP-20
Selenium (Se)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	15-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5224054								
WG3404174-5 DUP		**L2498675-4**						
Silicon (Si)-Total		<0.10	<0.10	RPD-NA	mg/L	N/A	20	15-SEP-20
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	15-SEP-20
Sodium (Na)-Total		0.251	0.270		mg/L	1.0	20	15-SEP-20
Strontium (Sr)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	15-SEP-20
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	15-SEP-20
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	15-SEP-20
Titanium (Ti)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	15-SEP-20
Uranium (U)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	15-SEP-20
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	15-SEP-20
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	15-SEP-20
WG3404174-2 LCS								
Calcium (Ca)-Total			104.5		%		80-120	15-SEP-20
WG3404174-1 MB								
Calcium (Ca)-Total			<0.050		mg/L		0.05	15-SEP-20
NH3-L-F-CL	**Water**							
Batch R5210223								
WG3397829-22 LCS								
Ammonia as N			96.4		%		85-115	04-SEP-20
WG3397829-21 MB								
Ammonia as N			<0.0050		mg/L		0.005	04-SEP-20
NO2-L-IC-N-CL	**Water**							
Batch R5213799								
WG3399738-10 LCS								
Nitrite (as N)			102.3		%		90-110	04-SEP-20
WG3399738-9 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	04-SEP-20
NO3-L-IC-N-CL	**Water**							
Batch R5213799								
WG3399738-10 LCS								
Nitrate (as N)			106.5		%		90-110	04-SEP-20
WG3399738-9 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	04-SEP-20
ORP-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ORP-CL	**Water**							
Batch R5216098								
WG3400331-1 CRM		**CL-ORP**						
ORP			221		mV		210-230	08-SEP-20
WG3400331-2 DUP		**L2498675-5**						
ORP		412	415	J	mV	2.9	15	08-SEP-20
P-T-L-COL-CL	**Water**							
Batch R5210664								
WG3398750-18 LCS								
Phosphorus (P)-Total			107.3		%		80-120	04-SEP-20
WG3398750-17 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	04-SEP-20
PH-CL	**Water**							
Batch R5217376								
WG3400821-3 LCS								
pH			6.99		pH		6.9-7.1	09-SEP-20
PO4-DO-L-COL-CL	**Water**							
Batch R5210049								
WG3397927-19 DUP		**L2498675-5**						
Orthophosphate-Dissolved (as P)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	03-SEP-20
WG3397927-18 LCS								
Orthophosphate-Dissolved (as P)			99.6		%		80-120	03-SEP-20
WG3397927-17 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	03-SEP-20
WG3397927-20 MS		**L2498675-5**						
Orthophosphate-Dissolved (as P)			103.3		%		70-130	03-SEP-20
SO4-IC-N-CL	**Water**							
Batch R5213799								
WG3399738-10 LCS								
Sulfate (SO4)			105.9		%		90-110	04-SEP-20
WG3399738-9 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	04-SEP-20
SOLIDS-TDS-CL	**Water**							
Batch R5218159								
WG3399663-11 LCS								
Total Dissolved Solids			97.6		%		85-115	08-SEP-20
WG3399663-8 LCS								
Total Dissolved Solids			98.3		%		85-115	08-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-CL	**Water**							
Batch R5218159								
WG3399663-10 MB								
Total Dissolved Solids			<10		mg/L		10	08-SEP-20
WG3399663-7 MB								
Total Dissolved Solids			<10		mg/L		10	08-SEP-20
TKN-L-F-CL	**Water**							
Batch R5212121								
WG3399260-14 LCS								
Total Kjeldahl Nitrogen			90.6		%		75-125	05-SEP-20
WG3399260-18 LCS								
Total Kjeldahl Nitrogen			90.3		%		75-125	05-SEP-20
WG3399260-2 LCS								
Total Kjeldahl Nitrogen			94.6		%		75-125	05-SEP-20
WG3399260-23 LCS								
Total Kjeldahl Nitrogen			87.0		%		75-125	05-SEP-20
WG3399260-6 LCS								
Total Kjeldahl Nitrogen			92.2		%		75-125	05-SEP-20
WG3399260-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	05-SEP-20
WG3399260-13 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	05-SEP-20
WG3399260-17 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	05-SEP-20
WG3399260-22 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	05-SEP-20
WG3399260-5 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	05-SEP-20
TSS-L-CL	**Water**							
Batch R5217721								
WG3399662-8 LCS								
Total Suspended Solids			92.0		%		85-115	08-SEP-20
WG3399662-7 MB								
Total Suspended Solids			<1.0		mg/L		1	08-SEP-20
TURBIDITY-CL	**Water**							
Batch R5210048								
WG3397976-11 LCS								
Turbidity			96.4		%		85-115	03-SEP-20
WG3397976-10 MB								
Turbidity			<0.10		NTU		0.1	03-SEP-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	01-SEP-20 12:08	08-SEP-20 13:00	0.25	169	hours	EHTR-FM
	2	01-SEP-20 17:09	08-SEP-20 13:00	0.25	164	hours	EHTR-FM
	3	01-SEP-20 12:08	08-SEP-20 13:00	0.25	169	hours	EHTR-FM
	4	01-SEP-20 12:08	08-SEP-20 13:00	0.25	169	hours	EHTR-FM
	5	01-SEP-20 12:08	08-SEP-20 13:00	0.25	169	hours	EHTR-FM
pH							
	1	01-SEP-20 12:08	09-SEP-20 12:00	0.25	192	hours	EHTR-FM
	2	01-SEP-20 17:09	09-SEP-20 12:00	0.25	187	hours	EHTR-FM
	3	01-SEP-20 12:08	09-SEP-20 12:00	0.25	192	hours	EHTR-FM
	4	01-SEP-20 12:08	09-SEP-20 12:00	0.25	192	hours	EHTR-FM
	5	01-SEP-20 12:08	09-SEP-20 12:00	0.25	192	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2498675 were received on 03-SEP-20 09:15.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes 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 pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID: LCO LAEMP Aug 2020

TURNAROUND TIME:

PROJECT/CLIENT INFO

Facility Name	REP		
Project Manager	Cait Good		
Email	cait.good@teck.com		
Address	421 Pine Avenue		
City	Sparwood	Province	BC
Postal Code	V0B 2G0	Country	Canada
Phone Number	250-425-8202		

LABORATORY

Lab Name	ALS Calgary		
Lab Contact	Lyudmyla Shvets		
Email	lyudmyla.shvets@alsglobal.com		
Address	2559 29 Street NE		
City	Calgary	Province	AB
Postal Code	T1Y 7B5	Country	Canada
Phone Number	1 403 407 1794		

	Excel	PDF	EDD
cait.good@teck.com	x	x	x
teckcoal@equisonline.com			x
jings@minnow.ca	x	x	x
carlie.meyer@teck.com	x	x	x
kbetchelar@minnow.ca	x	x	x

SAMPLE DETAILS

L2498675-COFC

ANALYSIS REQUESTED

Filtered - F: Field, L: Lab, FL: Field & Lab, N: None

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	Filt.	PRESERV.	TECKCOAL-ROUTINE-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-T-U-CVAF-VA	HG-D-CVAF-VA	TECKCOAL-MET-T-VA	TECKCOAL-MET-D-VA
								N			F	N	N	F	N	F
									H2SO4	H2SO4			HCL	HNO3	HNO3	
								ANALYSIS								
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]												
RG_LCUT_WS_LAEMP_LCO_2020-08_NP	RG_LCUT	WS	No	01-Sept-20	12:08	G	7			1	1	1	1	1	1	1
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]												
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]												
RG_LISP24_WS_LAEMP_LCO_2020-08_NP	RG_LISP24	WS	No	01-Sept-20	17:09	G	7			1	1	1	1	1	1	1
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]												
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]												
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]												
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]												
RG_RIVER_WS_LAEMP_LCO_2020-08_NP	RG_RIVER	WS	No	01-Sept-20	12:08	G	7			1	1	1	1	1	1	1
RG_FBLANK _WS_LAEMP_LCO_2020-08_NP	RG_FBLANK	WS	No	01-Sept-20	12:08	G	7			1	1	1	1	1	1	1
RG_TRIP_WS_LAEMP_LCO_2020-08_NP	RG_TRIP (Lab pre-filled)	WS	No	01-Sept-20	12:08	G	4			1		1	1		1	

(one of each analyses)

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

PO 689999 ; Quote Q78745

RELINQUISHED BY/AFFILIATION

Katharina Batchelar

DATE/TIME

2-Sept-20 16:00

ACCEPTED BY/AFFILIATION

NB OF BOTTLES RETURNED/DESCRIPTION

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	Katharina Batchelar	Mobile #	778-679-4350
Sampler's Signature	K Batchelar	Date/Time	2-Sept-20 16:00

WATER CHEMISTRY

ALS Laboratory Report L2499044

(Finalized September 13, 2020)

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 03-SEP-20
Report Date: 13-SEP-20 13:43 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2499044

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers:
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2499044-1 SE 28-AUG-20 09:46 RG_FO23_SE-1_2020-08-28_946	L2499044-2 SE 28-AUG-20 12:16 RG_FO23_SE-2_2020-08-28_1216	L2499044-3 SE 28-AUG-20 13:48 RG_FO23_SE-3_2020-08-28_1348	L2499044-4 SE 28-AUG-20 13:56 RG_FO23_SE-4_2020-08-28_1356	L2499044-5 SE 28-AUG-20 14:23 RG_FO23_SE-5_2020-08-28_1423
SOIL						
Physical Tests	Moisture (%)	40.0	39.7	57.2	33.1	42.8
	pH (1:9) (pH)					
	pH (1:2 soil:water) (pH)	7.82	7.83	7.50	7.82	7.64
Particle Size	% Gravel (>2mm) (%)	<1.0	<1.0	<1.0	1.5	<1.0
	% Sand (2.00mm - 1.00mm) (%)	1.8	<1.0	2.3	2.4	1.9
	% Sand (1.00mm - 0.50mm) (%)	2.7	3.5	4.9	5.4	6.0
	% Sand (0.50mm - 0.25mm) (%)	10.7	13.6	11.1	14.1	12.8
	% Sand (0.25mm - 0.125mm) (%)	23.7	22.6	13.3	20.9	15.7
	% Sand (0.125mm - 0.063mm) (%)	18.7	15.7	9.4	14.7	12.2
	% Silt (0.063mm - 0.0312mm) (%)	18.5	18.5	25.1	17.0	22.5
	% Silt (0.0312mm - 0.004mm) (%)	19.9	21.1	28.9	19.8	24.8
	% Clay (<4um) (%)	3.8	3.8	5.1	4.2	4.1
	Texture	Sandy loam	Sandy loam	Silt loam	Sandy loam	Sandy loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	4.8	4.8	5.97	3.8	4.5
Metals	Aluminum (Al) (mg/kg)	5100	5300	6130	5420	6990
	Antimony (Sb) (mg/kg)	0.44	0.40	0.45	0.44	0.54
	Arsenic (As) (mg/kg)	4.52	4.84	5.35	4.50	5.46
	Barium (Ba) (mg/kg)	194	202	181	179	201
	Beryllium (Be) (mg/kg)	0.47	0.53	0.63	0.53	0.64
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	7.9	8.8	10.8	7.7	9.8
	Cadmium (Cd) (mg/kg)	1.34	1.68	2.53	1.03	1.44
	Calcium (Ca) (mg/kg)	91800	117000	95000	76100	85900
	Chromium (Cr) (mg/kg)	12.1	11.0	12.9	11.0	13.5
	Cobalt (Co) (mg/kg)	4.72	4.79	5.54	4.60	5.92
	Copper (Cu) (mg/kg)	10.8	10.7	13.2	9.70	14.2
	Iron (Fe) (mg/kg)	11900	12900	14400	12000	15100
	Lead (Pb) (mg/kg)	6.56	6.92	7.90	6.34	8.50
	Lithium (Li) (mg/kg)	8.6	8.6	10.0	8.2	11.6
	Magnesium (Mg) (mg/kg)	15700	20300	17500	14700	16200
	Manganese (Mn) (mg/kg)	546	533	596	553	661
	Mercury (Hg) (mg/kg)	0.0337	0.0378	0.0482	0.0356	0.0426
	Molybdenum (Mo) (mg/kg)	1.23	1.32	1.44	1.29	1.57
	Nickel (Ni) (mg/kg)	24.1	25.2	30.9	22.4	28.1
	Phosphorus (P) (mg/kg)	1160	1380	1480	1190	1340
	Potassium (K) (mg/kg)	1310	1430	1590	1480	1800
	Selenium (Se) (mg/kg)	2.78	2.85	4.23	2.16	3.54

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID Description Sampled Date Sampled Time Client ID	L2499044-6 SE 31-AUG-20 15:30 RG_SLINE_SE-1_2020-08-31_1530	L2499044-7 SE 31-AUG-20 16:25 RG_SLINE_SE-2_2020-08-31_1625	L2499044-8 SE 31-AUG-20 17:00 RG_SLINE_SE-3_2020-08-31_1700	L2499044-9 SE 25-AUG-20 13:10 RG_LIDSL_SE-1_2020-08-25_1310	L2499044-10 SE 01-SEP-20 09:30 RG_LIDSL_SE-2_2020-09-01_930
SOIL							
Physical Tests	Moisture (%)		60.5	84.3	43.0	43.1	63.8
	pH (1:9) (pH)			7.38			
	pH (1:2 soil:water) (pH)		7.77		7.48	7.45	7.34
Particle Size	% Gravel (>2mm) (%)		<1.0	2.8 PSAL	<1.0	<1.0	1.1 PSAL
	% Sand (2.00mm - 1.00mm) (%)		<1.0	9.3 PSAL	<1.0	<1.0	5.2 PSAL
	% Sand (1.00mm - 0.50mm) (%)		2.4	11.5 PSAL	1.7	2.9	15.3 PSAL
	% Sand (0.50mm - 0.25mm) (%)		5.9	4.8 PSAL	8.0	15.6	13.2 PSAL
	% Sand (0.25mm - 0.125mm) (%)		8.2	2.7 PSAL	16.1	27.5	9.8 PSAL
	% Sand (0.125mm - 0.063mm) (%)		12.7	2.1 PSAL	20.0	16.7	7.0 PSAL
	% Silt (0.063mm - 0.0312mm) (%)		30.1	27.2 PSAL	23.5	15.9	21.8 PSAL
	% Silt (0.0312mm - 0.004mm) (%)		35.1	34.1 PSAL	25.9	16.9	23.3 PSAL
	% Clay (<4um) (%)		5.4	5.4 PSAL	4.6	3.8	3.4 PSAL
	Texture		Silt loam	Silt loam	Sandy loam	Sandy loam	Sandy loam
Organic / Inorganic Carbon	Total Organic Carbon (%)		5.3	13.9	4.3	5.10	8.25
Metals	Aluminum (Al) (mg/kg)		6730	4730	5340	6470	5270
	Antimony (Sb) (mg/kg)		0.43	0.78	0.43	0.58	0.51
	Arsenic (As) (mg/kg)		5.10	4.11	4.88	6.23	4.68
	Barium (Ba) (mg/kg)		112	107	135	139	154
	Beryllium (Be) (mg/kg)		0.51	0.45	0.51	0.60	0.47
	Bismuth (Bi) (mg/kg)		<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)		7.7	11.4	7.7	9.2	8.9
	Cadmium (Cd) (mg/kg)		1.09	1.91	1.39	1.77	1.45
	Calcium (Ca) (mg/kg)		77300	58100	111000	89900	86200
	Chromium (Cr) (mg/kg)		15.1	12.2	12.6	12.4	10.0
	Cobalt (Co) (mg/kg)		4.55	3.65	4.11	5.76	4.62
	Copper (Cu) (mg/kg)		11.1	15.9	9.50	13.5	11.4
	Iron (Fe) (mg/kg)		12000	9280	11000	14400	11700
	Lead (Pb) (mg/kg)		8.04	6.27	7.23	9.06	6.96
	Lithium (Li) (mg/kg)		12.4	8.4	9.9	12.0	8.8
	Magnesium (Mg) (mg/kg)		27300	15600	27600	21000	16500
	Manganese (Mn) (mg/kg)		386	330	375	390	325
	Mercury (Hg) (mg/kg)		0.0568	0.123	0.0388	0.0362	0.0375
	Molybdenum (Mo) (mg/kg)		1.69	1.62	1.44	1.85	1.37
	Nickel (Ni) (mg/kg)		21.9	25.8	19.8	37.1	36.0
	Phosphorus (P) (mg/kg)		1100	1220	1130	1280	1110
	Potassium (K) (mg/kg)		1430	1170	1260	1460	1280
	Selenium (Se) (mg/kg)		1.75	6.11	1.24	2.94	2.65

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2499044-11 SE 25-AUG-20 14:15 RG_LIDSL_SE-3_2020-08-25_1415	L2499044-12 SE 01-SEP-20 10:30 RG_LIDSL_SE-4_2020-09-01_1030	L2499044-13 SE 25-AUG-20 15:30 RG_LIDSL_SE-5_2020-08-25_1530	L2499044-14 SE 28-AUG-20 09:46 RG_RIVER_SE-1_2020-08-28_946	
SOIL						
Physical Tests	Moisture (%)	34.6	61.6	67.5	39.6	
	pH (1:9) (pH)					
	pH (1:2 soil:water) (pH)	7.57	7.48	7.43	7.55	
Particle Size	% Gravel (>2mm) (%)	<1.0	<1.0	<1.0	<1.0	
	% Sand (2.00mm - 1.00mm) (%)	3.5	<1.0	1.4	<1.0	
	% Sand (1.00mm - 0.50mm) (%)	11.7	2.1	5.1	2.6	
	% Sand (0.50mm - 0.25mm) (%)	19.5	9.5	15.1	11.5	
	% Sand (0.25mm - 0.125mm) (%)	20.6	15.4	22.1	24.8	
	% Sand (0.125mm - 0.063mm) (%)	15.6	8.6	8.9	13.3	
	% Silt (0.063mm - 0.0312mm) (%)	12.1	21.4	16.4	18.9	
	% Silt (0.0312mm - 0.004mm) (%)	13.1	34.5	24.6	23.6	
	% Clay (<4um) (%)	3.3	7.6	5.8	4.1	
	Texture	Loamy sand	Silt loam	Sandy loam	Sandy loam	
Organic / Inorganic Carbon	Total Organic Carbon (%)	4.2	15.8	12.0	4.5	
Metals	Aluminum (Al) (mg/kg)	6670	5610	7380	5660	
	Antimony (Sb) (mg/kg)	0.52	0.65	0.74	0.51	
	Arsenic (As) (mg/kg)	5.24	4.47	5.95	5.73	
	Barium (Ba) (mg/kg)	209	239	216	214	
	Beryllium (Be) (mg/kg)	0.56	0.59	0.71	0.59	
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	
	Boron (B) (mg/kg)	8.6	7.8	10.1	8.0	
	Cadmium (Cd) (mg/kg)	1.19	1.81	1.76	1.64	
	Calcium (Ca) (mg/kg)	82300	59800	82500	117000	
	Chromium (Cr) (mg/kg)	11.8	11.5	14.5	11.7	
	Cobalt (Co) (mg/kg)	5.07	5.86	6.56	6.08	
	Copper (Cu) (mg/kg)	11.2	16.2	17.4	13.2	
	Iron (Fe) (mg/kg)	13400	11000	14600	15100	
	Lead (Pb) (mg/kg)	7.57	9.09	10.5	8.21	
	Lithium (Li) (mg/kg)	10.6	8.6	11.7	9.9	
	Magnesium (Mg) (mg/kg)	17300	12900	17100	19400	
	Manganese (Mn) (mg/kg)	303	245	316	640	
	Mercury (Hg) (mg/kg)	0.0346	0.0598	0.0481	0.0354	
	Molybdenum (Mo) (mg/kg)	1.38	1.67	2.06	2.29	
	Nickel (Ni) (mg/kg)	27.2	32.9	34.8	29.7	
	Phosphorus (P) (mg/kg)	1190	1160	1350	1460	
	Potassium (K) (mg/kg)	1600	1390	1760	1420	
	Selenium (Se) (mg/kg)	1.35	18.8	14.9	3.16	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2499044-1 SE 28-AUG-20 09:46 RG_FO23_SE-1_2020-08-28_946	L2499044-2 SE 28-AUG-20 12:16 RG_FO23_SE-2_2020-08-28_1216	L2499044-3 SE 28-AUG-20 13:48 RG_FO23_SE-3_2020-08-28_1348	L2499044-4 SE 28-AUG-20 13:56 RG_FO23_SE-4_2020-08-28_1356	L2499044-5 SE 28-AUG-20 14:23 RG_FO23_SE-5_2020-08-28_1423
SOIL						
Metals	Silver (Ag) (mg/kg)	0.12	0.12	0.14	0.11	0.17
	Sodium (Na) (mg/kg)	102	125	118	100	118
	Strontium (Sr) (mg/kg)	89.2	107	99.3	85.4	97.9
	Sulfur (S) (mg/kg)	<1000	1100	1200	<1000	1400
	Thallium (Tl) (mg/kg)	0.177	0.174	0.202	0.185	0.234
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	11.1	9.2	11.7	10.0	12.9
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	0.873	0.975	1.25	0.916	1.14
	Vanadium (V) (mg/kg)	19.0	19.6	22.2	20.1	24.9
	Zinc (Zn) (mg/kg)	97.0	111	144	83.6	109
	Zirconium (Zr) (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	DLCI <0.025	DLCI <0.020	DLCI <0.025	DLCI <0.015	DLCI <0.015
	Acenaphthylene (mg/kg)	<0.0050	<0.0050	DLCI <0.0070	<0.0050	<0.0050
	Acridine (mg/kg)	DLCI <0.040	DLCI <0.040	DLCI <0.050	DLCI <0.020	DLCI <0.030
	Anthracene (mg/kg)	<0.0040	<0.0040	0.0040	<0.0040	<0.0040
	Benz(a)anthracene (mg/kg)	DLCI <0.020	DLCI <0.020	0.026	0.012	0.014
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	0.013	<0.010	<0.010
	Benzo(b&j)fluoranthene (mg/kg)	0.037	0.031	0.046	0.021	0.029
	Benzo(b+j+k)fluoranthene (mg/kg)	0.037	0.031	0.046	0.021	0.029
	Benzo(e)pyrene (mg/kg)	0.039	0.032	0.047	0.024	0.030
	Benzo(g,h,i)perylene (mg/kg)	DLCI <0.020	0.015	DLCI <0.030	0.010	0.013
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Chrysene (mg/kg)	DLCI <0.080	DLCI <0.080	DLCI <0.11	DLCI <0.050	DLCI <0.070
	Dibenz(a,h)anthracene (mg/kg)	DLCI <0.0070	0.0059	0.0075	<0.0050	0.0054
	Fluoranthene (mg/kg)	0.018	0.017	0.025	0.011	0.017
	Fluorene (mg/kg)	0.059	0.051	DLCI <0.060	0.026	0.030
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	1-Methylnaphthalene (mg/kg)	0.337	0.274	0.376	0.189	0.228
	2-Methylnaphthalene (mg/kg)	0.520	0.437	0.585	0.293	0.350
	Naphthalene (mg/kg)	0.174	0.140	0.195	0.100	0.128
	Perylene (mg/kg)	<0.010	<0.010	0.010	<0.010	0.011
	Phenanthrene (mg/kg)	0.294	0.250	0.355	0.177	0.221
	Pyrene (mg/kg)	0.029	0.025	0.037	0.017	0.024
	Quinoline (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Surrogate: d10-Acenaphthene (%)	94.4	91.1	93.9	96.8	100.2

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2499044-6	L2499044-7	L2499044-8	L2499044-9	L2499044-10
	Description	SE	SE	SE	SE	SE
	Sampled Date	31-AUG-20	31-AUG-20	31-AUG-20	25-AUG-20	01-SEP-20
	Sampled Time	15:30	16:25	17:00	13:10	09:30
	Client ID	RG_SLINE_SE-1_2020-08-31_1530	RG_SLINE_SE-2_2020-08-31_1625	RG_SLINE_SE-3_2020-08-31_1700	RG_LIDSL_SE-1_2020-08-25_1310	RG_LIDSL_SE-2_2020-09-01_930
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	0.18	0.16	0.14	0.16	0.11
	Sodium (Na) (mg/kg)	122	88	131	130	134
	Strontium (Sr) (mg/kg)	76.6	79.5	107	97.3	94.3
	Sulfur (S) (mg/kg)	<1000	1000	<1000	<1000	<1000
	Thallium (Tl) (mg/kg)	0.322	0.518	0.280	0.250	0.183
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	18.9	10.0	15.5	10.4	9.4
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	1.39	4.84	1.23	1.55	1.33
	Vanadium (V) (mg/kg)	18.5	17.4	17.1	21.0	17.1
	Zinc (Zn) (mg/kg)	150	181	158	147	115
	Zirconium (Zr) (mg/kg)	<1.0	1.8	<1.0	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0050	DLCI <0.020	0.0597	DLCI <0.0090	DLCI <0.020
	Acenaphthylene (mg/kg)	<0.0050	DLHM <0.015	<0.0050	<0.0050	<0.0050
	Acridine (mg/kg)	<0.010	DLCI <0.040	DLCI <0.020	DLCI <0.020	DLCI <0.030
	Anthracene (mg/kg)	<0.0040	DLHM <0.012	0.0107	<0.0040	<0.0040
	Benz(a)anthracene (mg/kg)	<0.010	DLHM <0.030	DLCI <0.020	<0.010	0.014
	Benzo(a)pyrene (mg/kg)	<0.010	DLHM <0.030	<0.010	<0.010	<0.010
	Benzo(b&j)fluoranthene (mg/kg)	0.019	DLHM 0.046	0.021	0.018	0.030
	Benzo(b+j+k)fluoranthene (mg/kg)	0.019	0.046	0.021	0.018	0.030
	Benzo(e)pyrene (mg/kg)	0.019	DLHM 0.050	0.021	0.022	0.034
	Benzo(g,h,i)perylene (mg/kg)	<0.010	DLHM <0.030	<0.010	<0.010	0.016
	Benzo(k)fluoranthene (mg/kg)	<0.010	DLHM <0.030	<0.010	<0.010	<0.010
	Chrysene (mg/kg)	DLCI <0.050	DLCI <0.13	DLCI <0.050	0.046	DLCI <0.070
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	DLHM <0.015	<0.0050	<0.0050	<0.0050
	Fluoranthene (mg/kg)	<0.010	DLHM <0.030	0.046	<0.010	0.011
	Fluorene (mg/kg)	0.016	DLCI <0.13	0.078	0.023	0.043
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	DLHM <0.030	<0.010	<0.010	<0.010
	1-Methylnaphthalene (mg/kg)	0.069	DLHM 0.276	0.105	0.163	0.225
	2-Methylnaphthalene (mg/kg)	0.097	DLHM 0.462	0.151	0.258	0.346
	Naphthalene (mg/kg)	0.035	DLHM 0.142	0.100	0.085	0.115
	Perylene (mg/kg)	<0.010	DLHM <0.030	<0.010	<0.010	<0.010
	Phenanthrene (mg/kg)	0.097	DLHM 0.299	0.198	0.157	0.222
	Pyrene (mg/kg)	0.017	DLCI <0.050	0.037	0.015	0.021
	Quinoline (mg/kg)	<0.050	DLHM <0.030	<0.050	<0.050	<0.050
	Surrogate: d10-Acenaphthene (%)	87.8	96.2	92.9	92.0	92.0

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2499044-11 SE 25-AUG-20 14:15 RG_LIDSL_SE-3_2020-08-25_1415	L2499044-12 SE 01-SEP-20 10:30 RG_LIDSL_SE-4_2020-09-01_1030	L2499044-13 SE 25-AUG-20 15:30 RG_LIDSL_SE-5_2020-08-25_1530	L2499044-14 SE 28-AUG-20 09:46 RG_RIVER_SE-1_2020-08-28_946	
SOIL						
Metals	Silver (Ag) (mg/kg)	0.12	0.20	0.19	0.13	
	Sodium (Na) (mg/kg)	116	103	132	129	
	Strontium (Sr) (mg/kg)	92.4	84.6	110	112	
	Sulfur (S) (mg/kg)	<1000	1100	1100	1200	
	Thallium (Tl) (mg/kg)	0.203	0.194	0.242	0.206	
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	
	Titanium (Ti) (mg/kg)	9.1	6.9	12.5	11.1	
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	
	Uranium (U) (mg/kg)	0.983	1.56	1.65	1.12	
	Vanadium (V) (mg/kg)	21.6	21.5	25.8	21.7	
	Zinc (Zn) (mg/kg)	106	123	140	116	
	Zirconium (Zr) (mg/kg)	<1.0	1.1	1.4	<1.0	
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0060 DLCI	<0.14 DLCI	<0.12 DLCI	<0.020 DLCI	
	Acenaphthylene (mg/kg)	<0.0050	<0.018 DLCI	<0.010 DLCI	<0.0050	
	Acridine (mg/kg)	<0.020 DLCI	<0.32 DLCI	<0.38 DLCI	<0.040 DLCI	
	Anthracene (mg/kg)	<0.0040	<0.0040	0.0061	<0.0040	
	Benz(a)anthracene (mg/kg)	<0.010	<0.12 DLCI	<0.12 DLCI	0.022	
	Benzo(a)pyrene (mg/kg)	<0.010	0.071	0.073	0.012	
	Benzo(b&j)fluoranthene (mg/kg)	0.015	0.184	0.197	0.039	
	Benzo(b+j+k)fluoranthene (mg/kg)	<0.015	0.196	0.209	0.039	
	Benzo(e)pyrene (mg/kg)	0.015	0.230	0.236	0.039	
	Benzo(g,h,i)perylene (mg/kg)	<0.010	0.092	0.103	0.016	
	Benzo(k)fluoranthene (mg/kg)	<0.010	0.012	0.012	<0.010	
	Chrysene (mg/kg)	0.035	<0.46 DLCI	0.471	<0.090 DLCI	
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	0.0397	<0.045 DLCI	0.0064	
	Fluoranthene (mg/kg)	<0.010	0.081	0.068	0.032	
	Fluorene (mg/kg)	0.018	0.326	0.296	0.046	
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.040 DLCI	<0.040 DLCI	<0.010	
	1-Methylnaphthalene (mg/kg)	0.102	2.15	1.78	0.328	
	2-Methylnaphthalene (mg/kg)	0.155	3.57	2.96	0.521	
	Naphthalene (mg/kg)	0.058	1.10	0.906	0.172	
	Perylene (mg/kg)	<0.010	0.021	0.025	<0.010	
	Phenanthrene (mg/kg)	0.110	1.81	1.65	0.293	
	Pyrene (mg/kg)	0.010	0.181	0.167	0.039	
	Quinoline (mg/kg)	<0.050	<0.050	<0.050	<0.050	
	Surrogate: d10-Acenaphthene (%)	89.7	100.0	96.6	97.1	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2499044-1	L2499044-2	L2499044-3	L2499044-4	L2499044-5
	Description	SE	SE	SE	SE	SE
	Sampled Date	28-AUG-20	28-AUG-20	28-AUG-20	28-AUG-20	28-AUG-20
	Sampled Time	09:46	12:16	13:48	13:56	14:23
	Client ID	RG_FO23_SE-1_2020-08-28_946	RG_FO23_SE-2_2020-08-28_1216	RG_FO23_SE-3_2020-08-28_1348	RG_FO23_SE-4_2020-08-28_1356	RG_FO23_SE-5_2020-08-28_1423
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	108.2	107.2	110.9	115.0	114.9
	Surrogate: d8-Naphthalene (%)	92.4	89.0	89.9	94.5	96.6
	Surrogate: d10-Phenanthrene (%)	100.0	97.7	101.4	103.1	104.0
	IACR:Coarse	<0.050	<0.050	<0.050	<0.050	<0.050
	IACR:Fine	<0.050	<0.050	<0.050	<0.050	<0.050
	B(a)P Total Potency Equivalent (mg/kg)	<0.020	<0.020	0.029	<0.020	<0.020
	IACR (CCME)	0.34	0.32	0.50	0.24	0.31

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2499044-6	L2499044-7	L2499044-8	L2499044-9	L2499044-10
	Description	SE	SE	SE	SE	SE
	Sampled Date	31-AUG-20	31-AUG-20	31-AUG-20	25-AUG-20	01-SEP-20
	Sampled Time	15:30	16:25	17:00	13:10	09:30
	Client ID	RG_SLINE_SE-1_2020-08-31_1530	RG_SLINE_SE-2_2020-08-31_1625	RG_SLINE_SE-3_2020-08-31_1700	RG_LIDSL_SE-1_2020-08-25_1310	RG_LIDSL_SE-2_2020-09-01_930
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	104.7	112.3	113.6	107.2	107.1
	Surrogate: d8-Naphthalene (%)	86.8	94.0	92.0	90.8	92.2
	Surrogate: d10-Phenanthrene (%)	94.8	103.8	102.3	97.8	99.8
	IACR:Coarse	<0.050	<0.050	<0.050	<0.050	<0.050
	IACR:Fine	<0.050	<0.050	<0.050	<0.050	<0.050
	B(a)P Total Potency Equivalent (mg/kg)	<0.020	0.032	<0.020	<0.020	<0.020
	IACR (CCME)	0.20	0.54	0.23	0.21	0.31

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID: L2499044-11 Description: SE Sampled Date: 25-AUG-20 Sampled Time: 14:15 Client ID: RG_LIDSL_SE-3_2020-08-25_1415	Sample ID: L2499044-12 Description: SE Sampled Date: 01-SEP-20 Sampled Time: 10:30 Client ID: RG_LIDSL_SE-4_2020-09-01_1030	Sample ID: L2499044-13 Description: SE Sampled Date: 25-AUG-20 Sampled Time: 15:30 Client ID: RG_LIDSL_SE-5_2020-08-25_1530	Sample ID: L2499044-14 Description: SE Sampled Date: 28-AUG-20 Sampled Time: 09:46 Client ID: RG_RIVER_SE-1_2020-08-28_946	
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	102.9	104.4	105.7	110.8	
	Surrogate: d8-Naphthalene (%)	88.1	92.7	90.7	93.9	
	Surrogate: d10-Phenanthrene (%)	95.5	97.0	96.2	101.4	
	IACR:Coarse	<0.050	0.060	0.064	<0.050	
	IACR:Fine	<0.050	0.115	0.123	<0.050	
	B(a)P Total Potency Equivalent (mg/kg)	<0.020	0.141	0.130	0.026	
	IACR (CCME)	0.18	1.90	2.03	0.43	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLCI	Detection Limit Raised: Chromatographic Interference due to co-elution.
DLHM	Detection Limit Adjusted: Sample has High Moisture Content
PSAL	Limited sample was available for PSA (100g minimum is standard). Measurement Uncertainty for PSA results may be higher than usual.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-TIC-PCT-SK	Soil	Total Inorganic Carbon in Soil	CSSS (2008) P216-217
A known quantity of acetic acid is consumed by reaction with carbonates in the soil. The pH of the resulting solution is measured and compared against a standard curve relating pH to weight of carbonate.			
C-TOC-CALC-SK	Soil	Total Organic Carbon Calculation	CSSS (2008) 21.2
Total Organic Carbon (TOC) is calculated by the difference between total carbon (TC) and total inorganic carbon. (TIC)			
C-TOT-LECO-SK	Soil	Total Carbon by combustion method	CSSS (2008) 21.2
The sample is ignited in a combustion analyzer where carbon in the reduced CO2 gas is determined using a thermal conductivity detector.			
HG-200.2-CVAA-CL	Soil	Mercury in Soil by CVAAS	EPA 200.2/1631E (mod)
Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAAS.			
IC-CACO3-CALC-SK	Soil	Inorganic Carbon as CaCO3 Equivalent	Calculation
MET-200.2-CCMS-CL	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A (mod)
Soil/sediment is dried, disaggregated, and sieved (2 mm). Strong Acid Leachable Metals in the <2mm fraction are solubilized by heated digestion with nitric and hydrochloric acids. Instrumental analysis is by Collision / Reaction Cell ICPMS. Limitations: This method is intended to liberate environmentally available metals. Silicate minerals are not solubilized. Some metals may be only partially recovered (matrix dependent), including Al, Ba, Be, Cr, S, Sr, Ti, Tl, V, W, and Zr. Elemental Sulfur may be poorly recovered by this method. Volatile forms of sulfur (e.g. sulfide, H2S) may be excluded if lost during sampling, storage, or digestion.			
MOISTURE-CL	Soil	% Moisture	CCME PHC in Soil - Tier 1 (mod)
This analysis is carried out gravimetrically by drying the sample at 105 C			
PAH-TMB-H/A-MS-CL	Soil	PAH Tumbler Extraction (Hexane/Acetone)	EPA 3570/8270-GC/MS
This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3545 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure uses a mechanical shaking technique to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone. The extract is then solvent exchanged to toluene. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection (GC/MS). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation. Because the two isomers cannot be readily chromatographically separated, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.			
PH-1:2-CL	Soil	pH in soil (1:2 Soil:Water Extraction)	CSSS Ch. 16
Soil and de-ionized water (by volume) are mixed in a defined ratio. The slurry is allowed to stand, shaken, and then allowed to stand again prior to taking measurements. After equilibration, the pH of the liquid portion of the extract is measured by a pH meter. Field Measurement is recommended where accurate pH measurements are required, due to the 15 minute recommended hold time.			
PH-1:9-CL	Soil	pH (1:9 H2O)	CSSS Ch. 16
Soil and de-ionized water (by volume) are mixed in a defined ratio. The slurry is allowed to stand, shaken, and then allowed to stand again prior to taking measurements. After equilibration, the pH of the liquid portion of the extract is measured by a pH meter. Field Measurement is recommended where accurate pH measurements are required, due to the 15 minute recommended hold time.			
PSA-PIPET-DETAIL-SK	Soil	Particle size - Sieve and Pipette	SSIR-51 METHOD 3.2.1
Particle size distribution is determined by a combination of techniques. Dry sieving is performed for coarse particles, wet sieving for sand particles and the pipette sedimentation method for clay particles.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
SK	ALS ENVIRONMENTAL - SASKATOON, SASKATCHEWAN, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour 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.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TIC-PCT-SK	**Soil**							
Batch R5222708								
WG3400100-1 DUP		**L2499044-9**						
Inorganic Carbon		2.49	2.45		%	1.5	20	12-SEP-20
WG3400100-4 IRM		**08-109_SOIL**						
Inorganic Carbon			107.2		%		80-120	12-SEP-20
WG3400100-2 LCS		**0.5**						
Inorganic Carbon			104.6		%		90-110	12-SEP-20
WG3400100-3 MB								
Inorganic Carbon			<0.050		%		0.05	12-SEP-20
C-TOT-LECO-SK	**Soil**							
Batch R5222793								
WG3401273-2 IRM		**08-109_SOIL**						
Total Carbon by Combustion			101.3		%		80-120	11-SEP-20
WG3401273-4 LCS		**SULFADIAZINE**						
Total Carbon by Combustion			99.5		%		90-110	11-SEP-20
WG3401273-3 MB								
Total Carbon by Combustion			<0.05		%		0.05	11-SEP-20
Batch R5222797								
WG3399319-1 DUP		**L2499044-2**						
Total Carbon by Combustion		7.79	7.95		%	1.9	20	11-SEP-20
WG3399319-2 IRM		**08-109_SOIL**						
Total Carbon by Combustion			99.2		%		80-120	11-SEP-20
WG3399319-4 LCS		**SULFADIAZINE**						
Total Carbon by Combustion			101.4		%		90-110	11-SEP-20
WG3399319-3 MB								
Total Carbon by Combustion			<0.05		%		0.05	11-SEP-20
HG-200.2-CVAA-CL	**Soil**							
Batch R5215576								
WG3399736-14 CRM		**TILL-1**						
Mercury (Hg)			121.9		%		70-130	10-SEP-20
WG3399736-13 LCS								
Mercury (Hg)			113.0		%		80-120	10-SEP-20
WG3399736-11 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	10-SEP-20
MET-200.2-CCMS-CL	**Soil**							
Batch R5215085								
WG3399736-14 CRM		**TILL-1**						
Aluminum (Al)			87.3		%		70-130	08-SEP-20
Antimony (Sb)			99.2		%		70-130	08-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5215085								
WG3399736-14 CRM		**TILL-1**						
Arsenic (As)			92.0		%		70-130	08-SEP-20
Barium (Ba)			90.4		%		70-130	08-SEP-20
Beryllium (Be)			100.9		%		70-130	08-SEP-20
Bismuth (Bi)			93.4		%		70-130	08-SEP-20
Boron (B)			2.6		mg/kg		0-8.2	08-SEP-20
Cadmium (Cd)			91.8		%		70-130	08-SEP-20
Calcium (Ca)			89.2		%		70-130	08-SEP-20
Chromium (Cr)			92.3		%		70-130	08-SEP-20
Cobalt (Co)			92.7		%		70-130	08-SEP-20
Copper (Cu)			96.3		%		70-130	08-SEP-20
Iron (Fe)			93.2		%		70-130	08-SEP-20
Lead (Pb)			93.9		%		70-130	08-SEP-20
Lithium (Li)			92.4		%		70-130	08-SEP-20
Magnesium (Mg)			89.1		%		70-130	08-SEP-20
Manganese (Mn)			88.2		%		70-130	08-SEP-20
Molybdenum (Mo)			90.6		%		70-130	08-SEP-20
Nickel (Ni)			92.0		%		70-130	08-SEP-20
Phosphorus (P)			91.0		%		70-130	08-SEP-20
Potassium (K)			84.1		%		70-130	08-SEP-20
Selenium (Se)			0.30		mg/kg		0.11-0.51	08-SEP-20
Silver (Ag)			0.21		mg/kg		0.13-0.33	08-SEP-20
Sodium (Na)			91.9		%		70-130	08-SEP-20
Strontium (Sr)			93.2		%		70-130	08-SEP-20
Thallium (Tl)			0.119		mg/kg		0.077-0.18	08-SEP-20
Tin (Sn)			1.0		mg/kg		0-3.1	08-SEP-20
Titanium (Ti)			76.5		%		70-130	08-SEP-20
Tungsten (W)			0.13		mg/kg		0-0.66	08-SEP-20
Uranium (U)			91.4		%		70-130	08-SEP-20
Vanadium (V)			91.5		%		70-130	08-SEP-20
Zinc (Zn)			93.9		%		70-130	08-SEP-20
Zirconium (Zr)			0.7		mg/kg		0-1.8	08-SEP-20
WG3399736-13 LCS								
Aluminum (Al)			88.3		%		80-120	08-SEP-20
Antimony (Sb)			100.4		%		80-120	08-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5215085								
WG3399736-13 LCS								
Arsenic (As)			95.5		%		80-120	08-SEP-20
Barium (Ba)			88.1		%		80-120	08-SEP-20
Beryllium (Be)			95.5		%		80-120	08-SEP-20
Bismuth (Bi)			90.1		%		80-120	08-SEP-20
Boron (B)			97.8		%		80-120	08-SEP-20
Cadmium (Cd)			89.1		%		80-120	08-SEP-20
Calcium (Ca)			87.2		%		80-120	08-SEP-20
Chromium (Cr)			87.5		%		80-120	08-SEP-20
Cobalt (Co)			88.0		%		80-120	08-SEP-20
Copper (Cu)			87.3		%		80-120	08-SEP-20
Iron (Fe)			91.7		%		80-120	08-SEP-20
Lead (Pb)			88.8		%		80-120	08-SEP-20
Lithium (Li)			89.0		%		80-120	08-SEP-20
Magnesium (Mg)			88.9		%		80-120	08-SEP-20
Manganese (Mn)			86.2		%		80-120	08-SEP-20
Molybdenum (Mo)			96.6		%		80-120	08-SEP-20
Nickel (Ni)			87.2		%		80-120	08-SEP-20
Potassium (K)			85.9		%		80-120	08-SEP-20
Selenium (Se)			94.6		%		80-120	08-SEP-20
Silver (Ag)			87.2		%		80-120	08-SEP-20
Sodium (Na)			89.4		%		80-120	08-SEP-20
Strontium (Sr)			92.3		%		80-120	08-SEP-20
Sulfur (S)			92.3		%		80-120	08-SEP-20
Thallium (Tl)			89.2		%		80-120	08-SEP-20
Tin (Sn)			96.9		%		80-120	08-SEP-20
Titanium (Ti)			83.2		%		80-120	08-SEP-20
Tungsten (W)			99.5		%		80-120	08-SEP-20
Uranium (U)			86.9		%		80-120	08-SEP-20
Vanadium (V)			88.2		%		80-120	08-SEP-20
Zinc (Zn)			87.2		%		80-120	08-SEP-20
Zirconium (Zr)			100.7		%		80-120	08-SEP-20
WG3399736-11 MB								
Aluminum (Al)			<50		mg/kg		50	08-SEP-20
Antimony (Sb)			<0.10		mg/kg		0.1	08-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5215085								
WG3399736-11 MB								
Arsenic (As)			<0.10		mg/kg		0.1	08-SEP-20
Barium (Ba)			<0.50		mg/kg		0.5	08-SEP-20
Beryllium (Be)			<0.10		mg/kg		0.1	08-SEP-20
Bismuth (Bi)			<0.20		mg/kg		0.2	08-SEP-20
Boron (B)			<5.0		mg/kg		5	08-SEP-20
Cadmium (Cd)			<0.020		mg/kg		0.02	08-SEP-20
Calcium (Ca)			<50		mg/kg		50	08-SEP-20
Chromium (Cr)			<0.50		mg/kg		0.5	08-SEP-20
Cobalt (Co)			<0.10		mg/kg		0.1	08-SEP-20
Copper (Cu)			<0.50		mg/kg		0.5	08-SEP-20
Iron (Fe)			<50		mg/kg		50	08-SEP-20
Lead (Pb)			<0.50		mg/kg		0.5	08-SEP-20
Lithium (Li)			<2.0		mg/kg		2	08-SEP-20
Magnesium (Mg)			<20		mg/kg		20	08-SEP-20
Manganese (Mn)			<1.0		mg/kg		1	08-SEP-20
Molybdenum (Mo)			<0.10		mg/kg		0.1	08-SEP-20
Nickel (Ni)			<0.50		mg/kg		0.5	08-SEP-20
Phosphorus (P)			<50		mg/kg		50	08-SEP-20
Potassium (K)			<100		mg/kg		100	08-SEP-20
Selenium (Se)			<0.20		mg/kg		0.2	08-SEP-20
Silver (Ag)			<0.10		mg/kg		0.1	08-SEP-20
Sodium (Na)			<50		mg/kg		50	08-SEP-20
Strontium (Sr)			<0.50		mg/kg		0.5	08-SEP-20
Sulfur (S)			<1000		mg/kg		1000	08-SEP-20
Thallium (Tl)			<0.050		mg/kg		0.05	08-SEP-20
Tin (Sn)			<2.0		mg/kg		2	08-SEP-20
Titanium (Ti)			<1.0		mg/kg		1	08-SEP-20
Tungsten (W)			<0.50		mg/kg		0.5	08-SEP-20
Uranium (U)			<0.050		mg/kg		0.05	08-SEP-20
Vanadium (V)			<0.20		mg/kg		0.2	08-SEP-20
Zinc (Zn)			<2.0		mg/kg		2	08-SEP-20
Zirconium (Zr)			<1.0		mg/kg		1	08-SEP-20
MOISTURE-CL	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-CL	**Soil**							
Batch R5212476								
WG3399147-2 LCS								
Moisture			98.8		%		90-110	05-SEP-20
WG3399147-1 MB								
Moisture			<0.25		%		0.25	05-SEP-20
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5217077								
WG3400739-3 IRM		**ALS PAH RM2**						
Acenaphthene			97.0		%		60-130	07-SEP-20
Acenaphthylene			115.1		%		60-130	07-SEP-20
Anthracene			117.4		%		60-130	07-SEP-20
Acridine			113.9		%		60-130	07-SEP-20
Benz(a)anthracene			104.1		%		60-130	07-SEP-20
Benzo(a)pyrene			96.2		%		60-130	07-SEP-20
Benzo(b&j)fluoranthene			98.1		%		60-130	07-SEP-20
Benzo(e)pyrene			100.5		%		60-130	07-SEP-20
Benzo(g,h,i)perylene			90.7		%		60-130	07-SEP-20
Benzo(k)fluoranthene			84.1		%		60-130	07-SEP-20
Chrysene			99.8		%		60-130	07-SEP-20
Dibenz(a,h)anthracene			89.8		%		60-130	07-SEP-20
Fluoranthene			96.5		%		60-130	07-SEP-20
Fluorene			99.6		%		60-130	07-SEP-20
Indeno(1,2,3-c,d)pyrene			117.7		%		60-130	07-SEP-20
2-Methylnaphthalene			96.0		%		60-130	07-SEP-20
Naphthalene			98.6		%		50-130	07-SEP-20
Perylene			89.7		%		60-130	07-SEP-20
Phenanthrene			101.1		%		60-130	07-SEP-20
Pyrene			98.0		%		60-130	07-SEP-20
1-Methylnaphthalene			92.1		%		60-130	07-SEP-20
WG3400739-7 IRM		**ALS PAH RM2**						
Acenaphthene			102.3		%		60-130	07-SEP-20
Acenaphthylene			108.1		%		60-130	07-SEP-20
Anthracene			120.8		%		60-130	07-SEP-20
Acridine			104.0		%		60-130	07-SEP-20
Benz(a)anthracene			98.5		%		60-130	07-SEP-20
Benzo(a)pyrene			85.0		%		60-130	07-SEP-20
Benzo(b&j)fluoranthene			89.6		%		60-130	07-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5217077								
WG3400739-7 IRM		**ALS PAH RM2**						
Benzo(e)pyrene			93.4		%		60-130	07-SEP-20
Benzo(g,h,i)perylene			82.0		%		60-130	07-SEP-20
Benzo(k)fluoranthene			76.2		%		60-130	07-SEP-20
Chrysene			94.5		%		60-130	07-SEP-20
Dibenz(a,h)anthracene			87.3		%		60-130	07-SEP-20
Fluoranthene			96.9		%		60-130	07-SEP-20
Fluorene			103.7		%		60-130	07-SEP-20
Indeno(1,2,3-c,d)pyrene			113.1		%		60-130	07-SEP-20
2-Methylnaphthalene			97.0		%		60-130	07-SEP-20
Naphthalene			97.4		%		50-130	07-SEP-20
Perylene			87.5		%		60-130	07-SEP-20
Phenanthrene			104.6		%		60-130	07-SEP-20
Pyrene			98.2		%		60-130	07-SEP-20
1-Methylnaphthalene			94.1		%		60-130	07-SEP-20
WG3400739-2 LCS								
Acenaphthene			95.1		%		60-130	07-SEP-20
Acenaphthylene			88.8		%		60-130	07-SEP-20
Anthracene			88.8		%		60-130	07-SEP-20
Acridine			90.3		%		60-130	07-SEP-20
Benz(a)anthracene			98.1		%		60-130	07-SEP-20
Benzo(a)pyrene			91.1		%		60-130	07-SEP-20
Benzo(b&j)fluoranthene			93.9		%		60-130	07-SEP-20
Benzo(e)pyrene			95.3		%		60-130	07-SEP-20
Benzo(g,h,i)perylene			86.7		%		60-130	07-SEP-20
Benzo(k)fluoranthene			92.8		%		60-130	07-SEP-20
Chrysene			89.1		%		60-130	07-SEP-20
Dibenz(a,h)anthracene			87.2		%		60-130	07-SEP-20
Fluoranthene			91.1		%		60-130	07-SEP-20
Fluorene			90.1		%		60-130	07-SEP-20
Indeno(1,2,3-c,d)pyrene			93.9		%		60-130	07-SEP-20
2-Methylnaphthalene			91.3		%		60-130	07-SEP-20
Naphthalene			97.0		%		50-130	07-SEP-20
Perylene			94.0		%		60-130	07-SEP-20
Phenanthrene			96.1		%		60-130	07-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5217077								
WG3400739-2 LCS								
Pyrene			94.7		%		60-130	07-SEP-20
1-Methylnaphthalene			90.2		%		60-130	07-SEP-20
Quinoline			86.7		%		60-130	07-SEP-20
WG3400739-6 LCS								
Acenaphthene			96.3		%		60-130	07-SEP-20
Acenaphthylene			88.8		%		60-130	07-SEP-20
Anthracene			89.3		%		60-130	07-SEP-20
Acridine			89.2		%		60-130	07-SEP-20
Benz(a)anthracene			97.9		%		60-130	07-SEP-20
Benzo(a)pyrene			89.0		%		60-130	07-SEP-20
Benzo(b&j)fluoranthene			93.5		%		60-130	07-SEP-20
Benzo(e)pyrene			94.3		%		60-130	07-SEP-20
Benzo(g,h,i)perylene			86.5		%		60-130	07-SEP-20
Benzo(k)fluoranthene			90.6		%		60-130	07-SEP-20
Chrysene			90.2		%		60-130	07-SEP-20
Dibenz(a,h)anthracene			86.9		%		60-130	07-SEP-20
Fluoranthene			90.0		%		60-130	07-SEP-20
Fluorene			90.2		%		60-130	07-SEP-20
Indeno(1,2,3-c,d)pyrene			83.9		%		60-130	07-SEP-20
2-Methylnaphthalene			92.5		%		60-130	07-SEP-20
Naphthalene			97.6		%		50-130	07-SEP-20
Perylene			91.2		%		60-130	07-SEP-20
Phenanthrene			96.2		%		60-130	07-SEP-20
Pyrene			94.3		%		60-130	07-SEP-20
1-Methylnaphthalene			91.6		%		60-130	07-SEP-20
Quinoline			87.2		%		60-130	07-SEP-20
WG3400739-1 MB								
Acenaphthene			<0.0050		mg/kg		0.005	07-SEP-20
Acenaphthylene			<0.0050		mg/kg		0.005	07-SEP-20
Anthracene			<0.0040		mg/kg		0.004	07-SEP-20
Acridine			<0.010		mg/kg		0.01	07-SEP-20
Benz(a)anthracene			<0.010		mg/kg		0.01	07-SEP-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	07-SEP-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	07-SEP-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	07-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5217077								
WG3400739-1 MB								
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	07-SEP-20
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	07-SEP-20
Chrysene			<0.010		mg/kg		0.01	07-SEP-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	07-SEP-20
Fluoranthene			<0.010		mg/kg		0.01	07-SEP-20
Fluorene			<0.010		mg/kg		0.01	07-SEP-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	07-SEP-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	07-SEP-20
Naphthalene			<0.010		mg/kg		0.01	07-SEP-20
Perylene			<0.010		mg/kg		0.01	07-SEP-20
Phenanthrene			<0.010		mg/kg		0.01	07-SEP-20
Pyrene			<0.010		mg/kg		0.01	07-SEP-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	07-SEP-20
Quinoline			<0.050		mg/kg		0.05	07-SEP-20
Surrogate: d8-Naphthalene			91.8		%		50-130	07-SEP-20
Surrogate: d10-Acenaphthene			94.3		%		60-130	07-SEP-20
Surrogate: d10-Phenanthrene			101.0		%		60-130	07-SEP-20
Surrogate: d12-Chrysene			113.5		%		60-130	07-SEP-20
WG3400739-5 MB								
Acenaphthene			<0.0050		mg/kg		0.005	07-SEP-20
Acenaphthylene			<0.0050		mg/kg		0.005	07-SEP-20
Anthracene			<0.0040		mg/kg		0.004	07-SEP-20
Acridine			<0.010		mg/kg		0.01	07-SEP-20
Benz(a)anthracene			<0.010		mg/kg		0.01	07-SEP-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	07-SEP-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	07-SEP-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	07-SEP-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	07-SEP-20
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	07-SEP-20
Chrysene			<0.010		mg/kg		0.01	07-SEP-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	07-SEP-20
Fluoranthene			<0.010		mg/kg		0.01	07-SEP-20
Fluorene			<0.010		mg/kg		0.01	07-SEP-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	07-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5217077								
WG3400739-5 MB								
2-Methylnaphthalene			<0.010		mg/kg		0.01	07-SEP-20
Naphthalene			<0.010		mg/kg		0.01	07-SEP-20
Perylene			<0.010		mg/kg		0.01	07-SEP-20
Phenanthrene			<0.010		mg/kg		0.01	07-SEP-20
Pyrene			<0.010		mg/kg		0.01	07-SEP-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	07-SEP-20
Quinoline			<0.050		mg/kg		0.05	07-SEP-20
Surrogate: d8-Naphthalene			92.3		%		50-130	07-SEP-20
Surrogate: d10-Acenaphthene			92.5		%		60-130	07-SEP-20
Surrogate: d10-Phenanthrene			97.2		%		60-130	07-SEP-20
Surrogate: d12-Chrysene			106.5		%		60-130	07-SEP-20
PH-1:2-CL	**Soil**							
Batch R5221938								
WG3402543-6 DUP		**L2499044-1**						
pH (1:2 soil:water)		7.82	7.80	J	pH	0.02	0.2	10-SEP-20
WG3402543-5 IRM		**SAL-STD10**						
pH (1:2 soil:water)			7.63		pH		7.4-8	10-SEP-20
WG3402543-4 LCS								
pH (1:2 soil:water)			7.02		pH		6.8-7.2	10-SEP-20
PH-1:9-CL	**Soil**							
Batch R5221939								
WG3402545-3 DUP		**L2499044-7**						
pH (1:9)		7.38	7.37	J	pH	0.01	0.3	11-SEP-20
WG3402545-2 IRM		**SAL-STD10**						
pH (1:9)			8.13		pH		7.96-8.56	11-SEP-20
WG3402545-1 LCS								
pH (1:9)			7.02		pH		6.7-7.3	11-SEP-20
PSA-PIPET-DETAIL-SK	**Soil**							
Batch R5222433								
WG3400175-2 IRM		**2017-PSA**						
% Sand (2.00mm - 1.00mm)			2.8		%		0-7.6	11-SEP-20
% Sand (1.00mm - 0.50mm)			3.9		%		0-8.9	11-SEP-20
% Sand (0.50mm - 0.25mm)			10.1		%		5.3-15.3	11-SEP-20
% Sand (0.25mm - 0.125mm)			14.8		%		10-20	11-SEP-20
% Sand (0.125mm - 0.063mm)			13.3		%		7.3-17.3	11-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PSA-PIPET-DETAIL-SK	**Soil**							
Batch R5222433								
WG3400175-2 IRM		**2017-PSA**						
% Silt (0.063mm - 0.0312mm)			15.6		%		9.9-19.9	11-SEP-20
% Silt (0.0312mm - 0.004mm)			22.9		%		17.6-27.6	11-SEP-20
% Clay (<4um)			16.7		%		13.4-23.4	11-SEP-20
Batch R5222457								
WG3400197-2 IRM		**2017-PSA**						
% Sand (2.00mm - 1.00mm)			2.5		%		0-7.6	11-SEP-20
% Sand (1.00mm - 0.50mm)			4.0		%		0-8.9	11-SEP-20
% Sand (0.50mm - 0.25mm)			10.4		%		5.3-15.3	11-SEP-20
% Sand (0.25mm - 0.125mm)			16.1		%		10-20	11-SEP-20
% Sand (0.125mm - 0.063mm)			13.9		%		7.3-17.3	11-SEP-20
% Silt (0.063mm - 0.0312mm)			15.5		%		9.9-19.9	11-SEP-20
% Silt (0.0312mm - 0.004mm)			21.2		%		17.6-27.6	11-SEP-20
% Clay (<4um)			16.5		%		13.4-23.4	11-SEP-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes 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 pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID: Regional Effects Program

TURNAROUND TIME: Regular

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	REP			Lab Name	ALS Calgary			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cait Good			Lab Contact	Lyuda Shvets			Email 1:	cait.good@teck.com	x	x	x
Email	cait.good@teck.com			Email	Lyudmyla.Shvets@ALSGlobal.com			Email 2:	carlie.meyer@teck.com	x	x	x
Address	421 Pine Avenue			Address	2559 29 Street NE			Email 3:	teckcoal@equisonline.com			x
								Email 4:	kbatchelar@minnow.ca	x	x	x
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:	jings@minnow.ca	x	x	x
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada					
Phone Number	250-425-8202			Phone Number	403-407-1800			PO number	VPO00689999			

SAMPLE DETAILS — ANALYSIS REQUESTED (Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)

L2499044-COFC

	Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	ANALYSIS: C-TOC-SK	MET-CCME+FULL-CL	MOISTURE-CL - % Moisture	PSA-PIPET-DETAIL-SK Particle Size	PAH-TMB-D/A-MS-CL-PAHs	
	Filt.								N	N	N	N	N	
	PRESERV.								NONE	NONE	NONE	NONE	NONE	
[redacted]														
[redacted]														
1	RG_FO23_SE-1_2020-08-28-946	RG_FO23	SE	No	28-AUG-20	9:46	G	2	x	x	x	x	x	
2	RG_FO23_SE-2_2020-08-28-1216	RG_FO23	SE	No	28-AUG-20	12:16	G	2	x	x	x	x	x	
3	RG_FO23_SE-3_2020-08-28-1348	RG_FO23	SE	No	28-AUG-20	13:48	G	2	x	x	x	x	x	
4	RG_FO23_SE-4_2020-08-28-1356	RG_FO23	SE	No	28-AUG-20	13:56	G	2	x	x	x	x	x	
5	RG_FO23_SE-5_2020-08-28-1423	RG_FO23	SE	No	28-AUG-20	14:23	G	2	x	x	x	x	x	
6	RG_SLINE_SE-1_2020-08-31-1530	RG_SLINE	SE	No	31-AUG-20	15:30	G	2	x	x	x	x	x	time: 15:30
7	RG_SLINE_SE-2_2020-08-31-1625	RG_SLINE	SE	No	31-AUG-20	16:25	G	2	x	x	x	x	x	
8	RG_SLINE_SE-3_2020-08-31-1700	RG_SLINE	SE	No	31-AUG-20	17:00	G	2	x	x	x	x	x	

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
VPO00689999 Quote: Q78745	Katharina Batchelar/Minnow	2-Sept-20 16:00		9/3

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	Katharina Batchelar	Mobile #	778-679-4350
Sampler's Signature	KBatchelar	Date/Time	2-Sept-20 16:00

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Teck

COC ID: **Regional Effects Program** | TURNAROUND TIME: Regular

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	REP			Lab Name	ALS Calgary			Report Format / Distribution	Excel	PDF	EDD
Project Manager	Cait Good			Lab Contact	Lyuda Shvets			Email 1: cait.good@teck.com	X	X	X
Email	cait.good@teck.com			Email	Lyudmyla.Shvets@ALSGlobal.com			Email 2: carlie.meyer@teck.com	X	X	X
Address	421 Pine Avenue			Address	2559 29 Street NE			Email 3: teckcoal@equisonline.com			X
								Email 4: kbatchelar@minnow.ca	X	X	X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5: jings@minnow.ca	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada				
Phone Number	250-425-8202			Phone Number	403-407-1800			PO number	VPO00689999		

SAMPLE DETAILS | **ANALYSIS REQUESTED** (Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)

L2499044-COFC

	Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	C-TOC-SK	MET-CCME+FULL-CL	MOISTURE-CL - % Moisture	PSA-PIPET-DETAIL-SK Particle Size	PAH-TMB-D/A-MS-CL-PAHs
	FBI:								N	N	N	N	N
	PRESERV.								NONE	NONE	NONE	NONE	NONE
	ANALYSIS												
9	RG_LIDSL_SE-1_2020-08-25_1310	RG_LIDSL	SE	No	25-AUG-20	13:10	G	2	x	x	x	x	x
10	RG_LIDSL_SE-2_2020-09-01_930	RG_LIDSL	SE	No	01-SEP-20	9:30	G	2	x	x	x	x	x
11	RG_LIDSL_SE-3_2020-08-25_1415	RG_LIDSL	SE	No	25-AUG-20	14:15	G	2	x	x	x	x	x
12	RG_LIDSL_SE-4_2020-09-01_1030	RG_LIDSL	SE	No	1-SEP-20	10:30	G	2	x	x	x	x	x
13	RG_LIDSL_SE-5_2020-08-25_1530	RG_LIDSL	SE	No	25-AUG-20	15:30	G	2	x	x	x	x	x
14	RG_RIVER-SE-1-2020-08-28_946	RG_F023	SE	No	28-AUG-20	9:46	G	2	X	X	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

VPO00689999

Quote: Q78745

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Katharina Batchelar/Minnow	2-Sept-20 16:00		

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	Katharina Batchelar	Mobile #	778-679-4350
Sampler's Signature	KBatchelar	Date/Time	2-Sept-20 16:00

WATER CHEMISTRY

ALS Laboratory Report L2536065

(Finalized December 9, 2020)

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 02-DEC-20
Report Date: 09-DEC-20 16:31 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2536065

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: Regional Effects
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2536065-1 WS 30-NOV-20 10:30 RG_LI24_WS_LAEMP_LCO_2020-12_NP	L2536065-2 WS 30-NOV-20 13:15 RG_SLINE_WS_LAEMP_LCO_2020-12_NP	L2536065-3 WS 01-DEC-20 13:15 RG_LCUT_WS_LAEMP_LCO_2020-12_NP	L2536065-4 WS 01-DEC-20 10:15 RG_LILC3_WS_LAEMP_LCO_2020-12_NP	L2536065-5 WS 01-DEC-20 14:30 RG_LIDCOM_WS_LAEMP_LCO_2020-12_NP
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	354	361	1070	1160	865
	Hardness (as CaCO3) (mg/L)	211	214	672	689	511
	pH (pH)	8.16	8.23	8.28	8.24	8.31
	ORP (mV)	442	430	441	477	482
	Total Suspended Solids (mg/L)	<1.0	1.2	<1.0	2.7	<1.0
	Total Dissolved Solids (mg/L)	241 DLHC	231 DLHC	831 DLHC	899 DLHC	615 DLHC
	Turbidity (NTU)	<0.10	<0.10	0.11	0.27	0.20
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	123	138	231	219	190
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	3.8
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	123	138	231	219	194
	Ammonia as N (mg/L)	0.0088	0.0184	0.0113	0.0069	0.0075
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.25 DLHC	<0.25 DLHC	<0.25 DLHC
	Chloride (Cl) (mg/L)	0.22	0.37	8.57 DLHC	28.0 DLHC	16.0 DLHC
	Fluoride (F) (mg/L)	0.353	0.325	0.16 DLHC	0.16 DLHC	0.18 DLHC
	Ion Balance (%)	102	101	100	98.4	99.6
	Nitrate (as N) (mg/L)	0.221	0.130	19.6 DLHC	13.5 DLHC	8.54 DLHC
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0050 DLHC	<0.0050 DLHC	<0.0050 DLHC
	Total Kjeldahl Nitrogen (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Orthophosphate-Dissolved (as P) (mg/L)	0.0018	0.0019	0.0026 RRV	<0.0010	0.0026 RRV
	Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020	0.0031	<0.0020	0.0037
	Sulfate (SO4) (mg/L)	82.0	71.2	364 DLHC	404 DLHC	273 DLHC
	Anion Sum (meq/L)	4.20	4.28	13.8	14.5	10.6
	Cation Sum (meq/L)	4.29	4.33	13.9	14.3	10.6
	Cation - Anion Balance (%)	1.1	0.5	0.2	-0.8	-0.2
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
	Total Organic Carbon (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.0038	0.0046	0.0031	0.0046	<0.0030
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	0.00040	0.00030	0.00017
	Arsenic (As)-Total (mg/L)	0.00016	0.00012	0.00015	0.00012	0.00011
	Barium (Ba)-Total (mg/L)	0.0464	0.0397	0.0643	0.0631	0.0762
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	<0.010	0.019	0.018	0.013
	Cadmium (Cd)-Total (ug/L)	0.0102	0.0127	0.343	0.176	0.0848

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2536065-6	L2536065-7			
	Description	WS	WS			
	Sampled Date	30-NOV-20	01-DEC-20			
	Sampled Time	16:00	12:30			
	Client ID	RG_FRUL_WS_LAEMP_LCO_2020-12_NP	RG_RIVER_WS_LAEMP_LCO_2020-12_NP			
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	810	1070			
	Hardness (as CaCO3) (mg/L)	487	666			
	pH (pH)	8.32	8.29			
	ORP (mV)	490	469			
	Total Suspended Solids (mg/L)	1.3	<1.0			
	Total Dissolved Solids (mg/L)	614 DLHC	824 DLHC			
	Turbidity (NTU)	<0.10	0.12			
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	193	228			
	Alkalinity, Carbonate (as CaCO3) (mg/L)	4.8	<1.0			
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Total (as CaCO3) (mg/L)	198	228			
	Ammonia as N (mg/L)	0.0052	<0.0050			
	Bromide (Br) (mg/L)	<0.050	<0.25 DLHC			
	Chloride (Cl) (mg/L)	1.68	8.52 DLHC			
	Fluoride (F) (mg/L)	0.142	0.16 DLHC			
	Ion Balance (%)	101	101			
	Nitrate (as N) (mg/L)	12.5	19.3 DLHC			
	Nitrite (as N) (mg/L)	0.0032	<0.0050 DLHC			
	Total Kjeldahl Nitrogen (mg/L)	<0.050	<0.050			
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	0.0028			
	Phosphorus (P)-Total (mg/L)	<0.0020	0.0038			
	Sulfate (SO4) (mg/L)	232	360 DLHC			
	Anion Sum (meq/L)	9.73	13.7			
	Cation Sum (meq/L)	9.87	13.8			
	Cation - Anion Balance (%)	0.7	0.3			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	<0.50	<0.50			
	Total Organic Carbon (mg/L)	0.64	<0.50			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0039	0.0032			
	Antimony (Sb)-Total (mg/L)	<0.00010	0.00039			
	Arsenic (As)-Total (mg/L)	<0.00010	0.00015			
	Barium (Ba)-Total (mg/L)	0.103	0.0635			
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020			
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050			
	Boron (B)-Total (mg/L)	<0.010	0.019			
	Cadmium (Cd)-Total (ug/L)	0.0059	0.340			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2536065-1	L2536065-2	L2536065-3	L2536065-4	L2536065-5
	Description	WS	WS	WS	WS	WS
	Sampled Date	30-NOV-20	30-NOV-20	01-DEC-20	01-DEC-20	01-DEC-20
	Sampled Time	10:30	13:15	13:15	10:15	14:30
	Client ID	RG_LI24_WS_LAEMP_LCO_2020-12_NP	RG_SLINE_WS_LAEMP_LCO_2020-12_NP	RG_LCUT_WS_LAEMP_LCO_2020-12_NP	RG_LILC3_WS_LAEMP_LCO_2020-12_NP	RG_LIDCOM_WS_LAEMP_LCO_2020-12_NP
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	54.2	53.5	142	148	110
	Chromium (Cr)-Total (mg/L)	0.00019	0.00016	0.00014	0.00013	0.00016
	Cobalt (Co)-Total (ug/L)	<0.10	<0.10	<0.10	0.17	<0.10
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	<0.010	<0.010	<0.010	0.066	<0.010
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	0.0036	0.0036	0.0679	0.0587	0.0363
	Magnesium (Mg)-Total (mg/L)	15.7	16.9	64.9	73.5	49.6
	Manganese (Mn)-Total (mg/L)	<0.00010	0.00022	0.00014	0.0345	0.00224
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Molybdenum (Mo)-Total (mg/L)	0.00102	0.00140	0.00196	0.00363	0.00234
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	0.0107	0.00797	0.00298
	Potassium (K)-Total (mg/L)	0.289	0.369	1.90	1.84	1.21
	Selenium (Se)-Total (ug/L)	3.19	1.60	67.7	50.5	34.6
	Silicon (Si)-Total (mg/L)	1.82	2.07	2.27	2.21	2.37
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	1.75	0.890	9.49	11.7	7.42
	Strontium (Sr)-Total (mg/L)	0.205	0.176	0.267	0.249	0.224
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	0.000013	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.00157	0.00169	0.00461	0.00432	0.00304
	Vanadium (V)-Total (mg/L)	0.00051	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	0.0116	0.0078	0.0031
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	0.00040	0.00030	0.00016
	Arsenic (As)-Dissolved (mg/L)	0.00012	<0.00010	0.00014	<0.00010	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.0489	0.0420	0.0684	0.0633	0.0783
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	0.018	0.016	0.012
	Cadmium (Cd)-Dissolved (ug/L)	0.0110	0.0115	0.359	0.169	0.101
	Calcium (Ca)-Dissolved (mg/L)	58.3	55.8	151	157	118
	Chromium (Cr)-Dissolved (mg/L)	0.00020	0.00013	0.00010	<0.00010	0.00013
	Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10	<0.10	0.13	<0.10

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2536065-6	L2536065-7			
	Description	WS	WS			
	Sampled Date	30-NOV-20	01-DEC-20			
	Sampled Time	16:00	12:30			
	Client ID	RG_FRUL_WS_LAEMP_LCO_2020-12_NP	RG_RIVER_WS_LAEMP_LCO_2020-12_NP			
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	106	140			
	Chromium (Cr)-Total (mg/L)	0.00013	0.00015			
	Cobalt (Co)-Total (ug/L)	<0.10	<0.10			
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050			
	Iron (Fe)-Total (mg/L)	<0.010	<0.010			
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Total (mg/L)	0.0226	0.0676			
	Magnesium (Mg)-Total (mg/L)	48.7	64.3			
	Manganese (Mn)-Total (mg/L)	0.00067	0.00010			
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050			
	Molybdenum (Mo)-Total (mg/L)	0.000991	0.00193			
	Nickel (Ni)-Total (mg/L)	<0.00050	0.0107			
	Potassium (K)-Total (mg/L)	1.24	1.90			
	Selenium (Se)-Total (ug/L)	55.7	66.9			
	Silicon (Si)-Total (mg/L)	2.17	2.26			
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Total (mg/L)	2.51	9.58			
	Strontium (Sr)-Total (mg/L)	0.165	0.256			
	Thallium (Tl)-Total (mg/L)	<0.000010	0.000014			
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010			
	Uranium (U)-Total (mg/L)	0.00225	0.00456			
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050			
	Zinc (Zn)-Total (mg/L)	<0.0030	0.0118			
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD			
	Dissolved Metals Filtration Location	FIELD	FIELD			
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030			
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	0.00042			
	Arsenic (As)-Dissolved (mg/L)	<0.00010	0.00013			
	Barium (Ba)-Dissolved (mg/L)	0.104	0.0671			
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020			
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050			
	Boron (B)-Dissolved (mg/L)	<0.010	0.018			
	Cadmium (Cd)-Dissolved (ug/L)	0.0098	0.340			
	Calcium (Ca)-Dissolved (mg/L)	113	155			
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	0.00012			
	Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2536065-1 WS 30-NOV-20 10:30 RG_LI24_WS_LAEMP_LCO_2020-12_NP	L2536065-2 WS 30-NOV-20 13:15 RG_SLINE_WS_LAEMP_LCO_2020-12_NP	L2536065-3 WS 01-DEC-20 13:15 RG_LCUT_WS_LAEMP_LCO_2020-12_NP	L2536065-4 WS 01-DEC-20 10:15 RG_LILC3_WS_LAEMP_LCO_2020-12_NP	L2536065-5 WS 01-DEC-20 14:30 RG_LIDCOM_WS_LAEMP_LCO_2020-12_NP
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020	<0.00020	0.00031	0.00025	<0.00020
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.0036	0.0035	0.0755	0.0613	0.0363
	Magnesium (Mg)-Dissolved (mg/L)	15.8	18.1	71.5	72.2	52.9
	Manganese (Mn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	0.0287	0.00172
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.00108	0.00139	0.00190	0.00363	0.00233
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	0.0115	0.00761	0.00275
	Potassium (K)-Dissolved (mg/L)	0.273	0.372	2.02	1.84	1.22
	Selenium (Se)-Dissolved (ug/L)	2.82	1.57	69.6	48.6	34.9
	Silicon (Si)-Dissolved (mg/L)	1.68	1.98	2.26	2.11	2.27
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	1.60	0.910	9.84	11.0	7.46
	Strontium (Sr)-Dissolved (mg/L)	0.231	0.183	0.278	0.262	0.230
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	0.000016	<0.000010	<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.00165	0.00171	0.00463	0.00433	0.00304
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	0.0022	0.0027	0.0135	0.0075	0.0035

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2536065-6	L2536065-7			
	Description	WS	WS			
	Sampled Date	30-NOV-20	01-DEC-20			
	Sampled Time	16:00	12:30			
	Client ID	RG_FRUL_WS_LAEMP_LCO_2020-12_NP	RG_RIVER_WS_LAEMP_LCO_2020-12_NP			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020	0.00036			
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010			
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	0.0210	0.0724			
	Magnesium (Mg)-Dissolved (mg/L)	49.9	67.5			
	Manganese (Mn)-Dissolved (mg/L)	0.00027	<0.00010			
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050			
	Molybdenum (Mo)-Dissolved (mg/L)	0.00101	0.00203			
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	0.0111			
	Potassium (K)-Dissolved (mg/L)	1.24	1.97			
	Selenium (Se)-Dissolved (ug/L)	57.0	69.4			
	Silicon (Si)-Dissolved (mg/L)	2.16	2.20			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	2.34	9.44			
	Strontium (Sr)-Dissolved (mg/L)	0.177	0.283			
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	0.000015			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010			
	Uranium (U)-Dissolved (mg/L)	0.00220	0.00473			
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050			
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	0.0134			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Total	MS-B	L2536065-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Calcium (Ca)-Total	MS-B	L2536065-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2536065-1, -2, -3, -4, -5, -6, -7
Matrix Spike	Strontium (Sr)-Total	MS-B	L2536065-1, -2, -3, -4, -5, -6, -7

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". 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.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-L-IC-N-CL	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL	Water	Electrical Conductivity (EC)	APHA 2510B

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 25C.

F-IC-N-CL	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Reference Information

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL Water Oxidation redution potential by elect. ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL Water Phosphorus (P)-Total APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL Water pH APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL Water Orthophosphate-Dissolved (as P) APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Reference Information

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL	Water	Total Kjeldahl Nitrogen	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Regional Effects

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour 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.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5305636								
WG3456395-11 LCS								
Acidity (as CaCO3)			106.9		%		85-115	03-DEC-20
WG3456395-10 MB								
Acidity (as CaCO3)			1.3		mg/L		2	03-DEC-20
ALK-MAN-CL	**Water**							
Batch R5305616								
WG3456403-26 LCS								
Alkalinity, Total (as CaCO3)			98.1		%		85-115	03-DEC-20
WG3456403-25 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	03-DEC-20
BE-D-L-CCMS-VA	**Water**							
Batch R5309048								
WG3457374-2 LCS								
Beryllium (Be)-Dissolved			101.7		%		80-120	07-DEC-20
WG3457374-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	07-DEC-20
BE-T-L-CCMS-VA	**Water**							
Batch R5308750								
WG3457370-5 DUP		**L2536065-1**						
Beryllium (Be)-Total		<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	06-DEC-20
WG3457370-2 LCS								
Beryllium (Be)-Total			95.9		%		80-120	06-DEC-20
WG3457370-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	06-DEC-20
WG3457370-4 MS		**L2536065-2**						
Beryllium (Be)-Total			98.1		%		70-130	06-DEC-20
BR-L-IC-N-CL	**Water**							
Batch R5308521								
WG3457372-6 LCS								
Bromide (Br)			102.4		%		85-115	02-DEC-20
WG3457372-5 MB								
Bromide (Br)			<0.050		mg/L		0.05	02-DEC-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5308564								
WG3457412-10 LCS								
Dissolved Organic Carbon			98.0		%		80-120	05-DEC-20
WG3457412-9 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-LOW-CL	**Water**							
Batch R5308564								
WG3457412-9 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	05-DEC-20
C-TOT-ORG-LOW-CL	**Water**							
Batch R5308564								
WG3457412-10 LCS								
Total Organic Carbon			86.9		%		80-120	05-DEC-20
WG3457412-9 MB								
Total Organic Carbon			<0.50		mg/L		0.5	05-DEC-20
CL-L-IC-N-CL	**Water**							
Batch R5308521								
WG3457372-6 LCS								
Chloride (Cl)			101.1		%		85-115	02-DEC-20
WG3457372-5 MB								
Chloride (Cl)			<0.10		mg/L		0.1	02-DEC-20
EC-L-PCT-CL	**Water**							
Batch R5305616								
WG3456403-26 LCS								
Conductivity (@ 25C)			95.6		%		90-110	03-DEC-20
WG3456403-25 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	03-DEC-20
F-IC-N-CL	**Water**							
Batch R5308521								
WG3457372-6 LCS								
Fluoride (F)			99.0		%		90-110	02-DEC-20
WG3457372-5 MB								
Fluoride (F)			<0.020		mg/L		0.02	02-DEC-20
HG-D-CVAA-VA	**Water**							
Batch R5308568								
WG3457380-3 DUP		**L2536065-1**						
Mercury (Hg)-Dissolved		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	06-DEC-20
WG3457380-2 LCS								
Mercury (Hg)-Dissolved			96.3		%		80-120	06-DEC-20
WG3457380-1 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	06-DEC-20
WG3457380-4 MS		**L2536065-2**						
Mercury (Hg)-Dissolved			85.1		%		70-130	06-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-U-CVAF-VA	**Water**							
Batch R5308565								
WG3457415-2 LCS								
Mercury (Hg)-Total			101.0		%		80-120	06-DEC-20
WG3457415-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	06-DEC-20
WG3457415-4 MS		**L2536065-2**						
Mercury (Hg)-Total			89.1		%		70-130	06-DEC-20
MET-D-CCMS-VA	**Water**							
Batch R5309048								
WG3457374-2 LCS								
Aluminum (Al)-Dissolved			101.8		%		80-120	07-DEC-20
Antimony (Sb)-Dissolved			108.5		%		80-120	07-DEC-20
Arsenic (As)-Dissolved			99.5		%		80-120	07-DEC-20
Barium (Ba)-Dissolved			101.1		%		80-120	07-DEC-20
Bismuth (Bi)-Dissolved			103.3		%		80-120	07-DEC-20
Boron (B)-Dissolved			101.1		%		80-120	07-DEC-20
Cadmium (Cd)-Dissolved			94.7		%		80-120	07-DEC-20
Calcium (Ca)-Dissolved			104.7		%		80-120	07-DEC-20
Chromium (Cr)-Dissolved			101.6		%		80-120	07-DEC-20
Cobalt (Co)-Dissolved			98.1		%		80-120	07-DEC-20
Copper (Cu)-Dissolved			97.2		%		80-120	07-DEC-20
Iron (Fe)-Dissolved			92.5		%		80-120	07-DEC-20
Lead (Pb)-Dissolved			97.5		%		80-120	07-DEC-20
Lithium (Li)-Dissolved			102.2		%		80-120	07-DEC-20
Magnesium (Mg)-Dissolved			100.2		%		80-120	07-DEC-20
Manganese (Mn)-Dissolved			100.7		%		80-120	07-DEC-20
Molybdenum (Mo)-Dissolved			103.8		%		80-120	07-DEC-20
Nickel (Ni)-Dissolved			98.7		%		80-120	07-DEC-20
Potassium (K)-Dissolved			103.6		%		80-120	07-DEC-20
Selenium (Se)-Dissolved			99.9		%		80-120	07-DEC-20
Silicon (Si)-Dissolved			103.3		%		60-140	07-DEC-20
Silver (Ag)-Dissolved			103.3		%		80-120	07-DEC-20
Sodium (Na)-Dissolved			102.5		%		80-120	07-DEC-20
Strontium (Sr)-Dissolved			101.6		%		80-120	07-DEC-20
Thallium (Tl)-Dissolved			101.4		%		80-120	07-DEC-20
Tin (Sn)-Dissolved			96.7		%		80-120	07-DEC-20
Titanium (Ti)-Dissolved			98.4		%		80-120	07-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5309048								
WG3457374-2 LCS								
Uranium (U)-Dissolved			93.2		%		80-120	07-DEC-20
Vanadium (V)-Dissolved			101.4		%		80-120	07-DEC-20
Zinc (Zn)-Dissolved			102.8		%		80-120	07-DEC-20
WG3457374-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	07-DEC-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	07-DEC-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	07-DEC-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	07-DEC-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	07-DEC-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	07-DEC-20
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	07-DEC-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	07-DEC-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	07-DEC-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	07-DEC-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	07-DEC-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	07-DEC-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	07-DEC-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	07-DEC-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	07-DEC-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	07-DEC-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	07-DEC-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	07-DEC-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	07-DEC-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	07-DEC-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	07-DEC-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	07-DEC-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	07-DEC-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	07-DEC-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	07-DEC-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	07-DEC-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	07-DEC-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	07-DEC-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	07-DEC-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	07-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5308750								
WG3457370-5 DUP		**L2536065-1**						
Aluminum (Al)-Total		0.0038	<0.0030	RPD-NA	mg/L	N/A	20	06-DEC-20
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	06-DEC-20
Arsenic (As)-Total		0.00016	0.00016		mg/L	0.3	20	06-DEC-20
Barium (Ba)-Total		0.0464	0.0485		mg/L	4.5	20	06-DEC-20
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	06-DEC-20
Boron (B)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	06-DEC-20
Cadmium (Cd)-Total		0.0000102	0.0000055	J	mg/L	0.000004	0.00001	06-DEC-20
Calcium (Ca)-Total		54.2	55.5		mg/L	2.4	20	06-DEC-20
Chromium (Cr)-Total		0.00019	0.00021		mg/L	9.1	20	06-DEC-20
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	06-DEC-20
Copper (Cu)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	06-DEC-20
Iron (Fe)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	06-DEC-20
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	06-DEC-20
Lithium (Li)-Total		0.0036	0.0037		mg/L	1.0	20	06-DEC-20
Magnesium (Mg)-Total		15.7	15.7		mg/L	0.3	20	06-DEC-20
Manganese (Mn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	06-DEC-20
Molybdenum (Mo)-Total		0.00102	0.00106		mg/L	3.8	20	06-DEC-20
Nickel (Ni)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	06-DEC-20
Potassium (K)-Total		0.289	0.297		mg/L	2.8	20	06-DEC-20
Selenium (Se)-Total		0.00319	0.00319		mg/L	0.0	20	06-DEC-20
Silicon (Si)-Total		1.82	1.80		mg/L	1.2	20	06-DEC-20
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	06-DEC-20
Sodium (Na)-Total		1.75	1.71		mg/L	2.3	20	06-DEC-20
Strontium (Sr)-Total		0.205	0.211		mg/L	2.8	20	06-DEC-20
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	06-DEC-20
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	06-DEC-20
Titanium (Ti)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	06-DEC-20
Uranium (U)-Total		0.00157	0.00160		mg/L	2.1	20	06-DEC-20
Vanadium (V)-Total		0.00051	<0.00050	RPD-NA	mg/L	N/A	20	06-DEC-20
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	06-DEC-20
WG3457370-2 LCS								
Aluminum (Al)-Total			102.2		%		80-120	06-DEC-20
Antimony (Sb)-Total			109.3		%		80-120	06-DEC-20
Arsenic (As)-Total			98.6		%		80-120	06-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5308750								
WG3457370-2 LCS								
Barium (Ba)-Total			96.9		%		80-120	06-DEC-20
Bismuth (Bi)-Total			100.2		%		80-120	06-DEC-20
Boron (B)-Total			94.5		%		80-120	06-DEC-20
Cadmium (Cd)-Total			97.3		%		80-120	06-DEC-20
Calcium (Ca)-Total			96.1		%		80-120	06-DEC-20
Chromium (Cr)-Total			99.95		%		80-120	06-DEC-20
Cobalt (Co)-Total			97.0		%		80-120	06-DEC-20
Copper (Cu)-Total			97.2		%		80-120	06-DEC-20
Iron (Fe)-Total			91.6		%		80-120	06-DEC-20
Lead (Pb)-Total			96.3		%		80-120	06-DEC-20
Lithium (Li)-Total			92.3		%		80-120	06-DEC-20
Magnesium (Mg)-Total			97.3		%		80-120	06-DEC-20
Manganese (Mn)-Total			98.5		%		80-120	06-DEC-20
Molybdenum (Mo)-Total			101.7		%		80-120	06-DEC-20
Nickel (Ni)-Total			96.4		%		80-120	06-DEC-20
Potassium (K)-Total			100.1		%		80-120	06-DEC-20
Selenium (Se)-Total			97.5		%		80-120	06-DEC-20
Silicon (Si)-Total			95.8		%		80-120	06-DEC-20
Silver (Ag)-Total			96.9		%		80-120	06-DEC-20
Sodium (Na)-Total			104.7		%		80-120	06-DEC-20
Strontium (Sr)-Total			106.7		%		80-120	06-DEC-20
Thallium (Tl)-Total			99.4		%		80-120	06-DEC-20
Tin (Sn)-Total			95.6		%		80-120	06-DEC-20
Titanium (Ti)-Total			100.4		%		80-120	06-DEC-20
Uranium (U)-Total			96.6		%		80-120	06-DEC-20
Vanadium (V)-Total			98.5		%		80-120	06-DEC-20
Zinc (Zn)-Total			96.8		%		80-120	06-DEC-20
WG3457370-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	06-DEC-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	06-DEC-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	06-DEC-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	06-DEC-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	06-DEC-20
Boron (B)-Total			<0.010		mg/L		0.01	06-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5308750								
WG3457370-1 MB								
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	06-DEC-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	06-DEC-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	06-DEC-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	06-DEC-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	06-DEC-20
Iron (Fe)-Total			<0.010		mg/L		0.01	06-DEC-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	06-DEC-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	06-DEC-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	06-DEC-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	06-DEC-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	06-DEC-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	06-DEC-20
Potassium (K)-Total			<0.050		mg/L		0.05	06-DEC-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	06-DEC-20
Silicon (Si)-Total			<0.10		mg/L		0.1	06-DEC-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	06-DEC-20
Sodium (Na)-Total			<0.050		mg/L		0.05	06-DEC-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	06-DEC-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	06-DEC-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	06-DEC-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	06-DEC-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	06-DEC-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	06-DEC-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	06-DEC-20
WG3457370-4 MS		**L2536065-2**						
Aluminum (Al)-Total			103.6		%		70-130	06-DEC-20
Antimony (Sb)-Total			97.8		%		70-130	06-DEC-20
Arsenic (As)-Total			104.9		%		70-130	06-DEC-20
Barium (Ba)-Total			N/A	MS-B	%		-	06-DEC-20
Bismuth (Bi)-Total			91.2		%		70-130	06-DEC-20
Boron (B)-Total			103.0		%		70-130	06-DEC-20
Cadmium (Cd)-Total			96.8		%		70-130	06-DEC-20
Calcium (Ca)-Total			N/A	MS-B	%		-	06-DEC-20
Chromium (Cr)-Total			105.3		%		70-130	06-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5308750								
WG3457370-4 MS		**L2536065-2**						
Cobalt (Co)-Total			97.9		%		70-130	06-DEC-20
Copper (Cu)-Total			100.4		%		70-130	06-DEC-20
Iron (Fe)-Total			97.5		%		70-130	06-DEC-20
Lead (Pb)-Total			94.7		%		70-130	06-DEC-20
Lithium (Li)-Total			97.7		%		70-130	06-DEC-20
Magnesium (Mg)-Total			N/A	MS-B	%		-	06-DEC-20
Manganese (Mn)-Total			100.4		%		70-130	06-DEC-20
Molybdenum (Mo)-Total			100.1		%		70-130	06-DEC-20
Nickel (Ni)-Total			98.0		%		70-130	06-DEC-20
Potassium (K)-Total			103.9		%		70-130	06-DEC-20
Selenium (Se)-Total			103.3		%		70-130	06-DEC-20
Silicon (Si)-Total			89.4		%		70-130	06-DEC-20
Silver (Ag)-Total			95.0		%		70-130	06-DEC-20
Sodium (Na)-Total			112.0		%		70-130	06-DEC-20
Strontium (Sr)-Total			N/A	MS-B	%		-	06-DEC-20
Thallium (Tl)-Total			88.0		%		70-130	06-DEC-20
Tin (Sn)-Total			95.8		%		70-130	06-DEC-20
Titanium (Ti)-Total			102.9		%		70-130	06-DEC-20
Uranium (U)-Total			90.2		%		70-130	06-DEC-20
Vanadium (V)-Total			104.6		%		70-130	06-DEC-20
Zinc (Zn)-Total			98.4		%		70-130	06-DEC-20
NH3-L-F-CL	**Water**							
Batch R5307577								
WG3456537-11 DUP		**L2536065-7**						
Ammonia as N		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	03-DEC-20
WG3456537-10 LCS								
Ammonia as N			105.0		%		85-115	03-DEC-20
WG3456537-18 LCS								
Ammonia as N			98.9		%		85-115	03-DEC-20
WG3456537-17 MB								
Ammonia as N			<0.0050		mg/L		0.005	03-DEC-20
WG3456537-9 MB								
Ammonia as N			<0.0050		mg/L		0.005	03-DEC-20
WG3456537-12 MS		**L2536065-7**						
Ammonia as N			82.9		%		75-125	03-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-L-IC-N-CL	**Water**							
Batch R5308521								
WG3457372-6 LCS								
Nitrite (as N)			107.8		%		90-110	02-DEC-20
WG3457372-5 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	02-DEC-20
NO3-L-IC-N-CL	**Water**							
Batch R5308521								
WG3457372-6 LCS								
Nitrate (as N)			101.6		%		90-110	02-DEC-20
WG3457372-5 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	02-DEC-20
ORP-CL	**Water**							
Batch R5306322								
WG3456505-5 CRM		**CL-ORP**						
ORP			221		mV		210-230	03-DEC-20
WG3456505-6 DUP		**L2536065-7**						
ORP		469	479	J	mV	10.4	15	03-DEC-20
P-T-L-COL-CL	**Water**							
Batch R5307324								
WG3456861-10 LCS								
Phosphorus (P)-Total			108.3		%		80-120	04-DEC-20
WG3456861-9 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	04-DEC-20
PH-CL	**Water**							
Batch R5305616								
WG3456403-26 LCS								
pH			7.01		pH		6.9-7.1	03-DEC-20
PO4-DO-L-COL-CL	**Water**							
Batch R5303938								
WG3455648-14 LCS								
Orthophosphate-Dissolved (as P)			100.9		%		80-120	02-DEC-20
WG3455648-13 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	02-DEC-20
SO4-IC-N-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-N-CL	**Water**							
Batch R5308521								
WG3457372-6 LCS								
Sulfate (SO4)			101.3		%		90-110	02-DEC-20
WG3457372-5 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	02-DEC-20
SOLIDS-TDS-CL	**Water**							
Batch R5308829								
WG3457359-11 LCS								
Total Dissolved Solids			100.1		%		85-115	06-DEC-20
WG3457359-8 LCS								
Total Dissolved Solids			101.1		%		85-115	06-DEC-20
WG3457359-10 MB								
Total Dissolved Solids			<10		mg/L		10	06-DEC-20
WG3457359-7 MB								
Total Dissolved Solids			<10		mg/L		10	06-DEC-20
Batch R5309222								
WG3457820-2 LCS								
Total Dissolved Solids			99.5		%		85-115	07-DEC-20
WG3457820-1 MB								
Total Dissolved Solids			<10		mg/L		10	07-DEC-20
Batch R5310138								
WG3458892-3 DUP		**L2536065-3**						
Total Dissolved Solids		831	834		mg/L	0.4	20	09-DEC-20
WG3458892-2 LCS								
Total Dissolved Solids			97.9		%		85-115	09-DEC-20
WG3458892-1 MB								
Total Dissolved Solids			<10		mg/L		10	09-DEC-20
TKN-L-F-CL	**Water**							
Batch R5307176								
WG3456671-16 LCS								
Total Kjeldahl Nitrogen			87.5		%		75-125	04-DEC-20
WG3456671-2 LCS								
Total Kjeldahl Nitrogen			88.2		%		75-125	04-DEC-20
WG3456671-4 LCS								
Total Kjeldahl Nitrogen			86.6		%		75-125	04-DEC-20
WG3456671-6 LCS								
Total Kjeldahl Nitrogen			86.0		%		75-125	04-DEC-20
WG3456671-8 LCS								
Total Kjeldahl Nitrogen			86.7		%		75-125	04-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-L-F-CL	**Water**							
Batch R5307176								
WG3456671-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	04-DEC-20
WG3456671-15 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	04-DEC-20
WG3456671-3 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	04-DEC-20
WG3456671-5 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	04-DEC-20
WG3456671-7 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	04-DEC-20
TSS-L-CL	**Water**							
Batch R5308787								
WG3457358-6 LCS								
Total Suspended Solids			98.2		%		85-115	06-DEC-20
WG3457358-8 LCS								
Total Suspended Solids			105.0		%		85-115	06-DEC-20
WG3457358-5 MB								
Total Suspended Solids			<1.0		mg/L		1	06-DEC-20
WG3457358-7 MB								
Total Suspended Solids			<1.0		mg/L		1	06-DEC-20
Batch R5309206								
WG3457821-2 LCS								
Total Suspended Solids			97.4		%		85-115	07-DEC-20
WG3457821-1 MB								
Total Suspended Solids			<1.0		mg/L		1	07-DEC-20
Batch R5310076								
WG3458891-2 LCS								
Total Suspended Solids			91.1		%		85-115	09-DEC-20
WG3458891-1 MB								
Total Suspended Solids			<1.0		mg/L		1	09-DEC-20
TURBIDITY-CL	**Water**							
Batch R5303921								
WG3455600-11 LCS								
Turbidity			96.9		%		85-115	02-DEC-20
WG3455600-14 LCS								
Turbidity			96.9		%		85-115	02-DEC-20
WG3455600-10 MB								
Turbidity			<0.10		NTU		0.1	02-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TURBIDITY-CL	**Water**							
Batch R5303921								
WG3455600-13 MB								
Turbidity			<0.10		NTU		0.1	02-DEC-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	30-NOV-20 10:30	03-DEC-20 12:15	0.25	74	hours	EHTR-FM
	2	30-NOV-20 13:15	03-DEC-20 12:15	0.25	71	hours	EHTR-FM
	3	01-DEC-20 13:15	03-DEC-20 12:15	0.25	47	hours	EHTR-FM
	4	01-DEC-20 10:15	03-DEC-20 12:15	0.25	50	hours	EHTR-FM
	5	01-DEC-20 14:30	03-DEC-20 12:15	0.25	46	hours	EHTR-FM
	6	30-NOV-20 16:00	03-DEC-20 12:15	0.25	68	hours	EHTR-FM
	7	01-DEC-20 12:30	03-DEC-20 12:15	0.25	48	hours	EHTR-FM
pH							
	1	30-NOV-20 10:30	03-DEC-20 09:00	0.25	71	hours	EHTR-FM
	2	30-NOV-20 13:15	03-DEC-20 09:00	0.25	68	hours	EHTR-FM
	3	01-DEC-20 13:15	03-DEC-20 09:00	0.25	44	hours	EHTR-FM
	4	01-DEC-20 10:15	03-DEC-20 09:00	0.25	47	hours	EHTR-FM
	5	01-DEC-20 14:30	03-DEC-20 09:00	0.25	42	hours	EHTR-FM
	6	30-NOV-20 16:00	03-DEC-20 09:00	0.25	65	hours	EHTR-FM
	7	01-DEC-20 12:30	03-DEC-20 09:00	0.25	44	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2536065 were received on 02-DEC-20 08:50.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes 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 pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID: Regional Effects Program

TURNAROUND TIME: Regular

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program/Line Creek LAEMP			Lab Name	ALS Calgary			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cait Good			Lab Contact	Lyuda Shvets			Email 1:	cait.good@teck.com	X	X	X
Email	cait.good@teck.com			Email	Lyudmyla.Shvets@ALSGlobal.com			Email 2:	carlie.meyer@teck.com	X	X	X
Address	421 Pine Avenue			Address	2559 29 Street NE			Email 3:	teckcoal@equisonline.com			X
								Email 4:	kbatchelar@minnow.ca	X	X	X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:	Carla.FroymanParker@teck.com	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada					
Phone Number	250-425-8202			Phone Number	403-407-1800			PO number	~~VPO00689999~~			

L2536065-COFC

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	N	Y	N	Y	Y	N	N
								PRESERV.	NONE	H2SO4	H2SO4	HCl	HNO3	HNO3	NONE
								ANALYSIS	HG-T-U-CVAF-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-D-CVAF-VA	TECKCOAL-MET-D-VA	TECKCOAL-MET-T-VA	TECKCOAL-ROUTINE-VA
RG-L124-WS-LAEMP-LCO-2020-12-NP	RG-L124	WS	No	Nov 30/20	10:30	G	7		X	X	X	X	X	X	X
RG-SLINE-WS-LAEMP-LCO-2020-12-NP	RG-SLINE	WS	No	Nov 30/20	13:15	G	7		X	X	X	X	X	X	X
RG-LCUT-WS-LAEMP-LCO-2020-12-NP	RG-LCUT	WS	No	Dec 1/20	13:15	G	7		X	X	X	X	X	X	X
RG-L1LC3-WS-LAEMP-LCO-2020-12-NP	RG-L1LC3	WS	No	Dec 1/20	10:15	G	7		X	X	X	X	X	X	X
RG-L1DON-WS-LAEMP-LCO-2020-12-NP	RG-L1DON	WS	No	Dec 1/20	14:30	G	7		X	X	X	X	X	X	X
RG-FRUL-WS-LAEMP-LCO-2020-12-NP	RG-FRUL	WS	No	Nov 30/20	16:00	G	7		X	X	X	X	X	X	X
RG-RIVER-WS-LAEMP-LCO-2020-12-NP	RG-RIVER	WS	No	Dec 1/20	12:30	G	7		X	X	X	X	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
VPO00689999	Rick Smit/Lotic environmental	01/12/20 / 16:30		

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	01-12-20 / 16:30

WATER CHEMISTRY

ALS Laboratory Report L2536458

(Finalized December 12, 2020)

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 03-DEC-20
Report Date: 12-DEC-20 11:56 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2536458

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers:
Legal Site Desc:

Comments:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2536458-1	L2536458-2	L2536458-3	L2536458-4	L2536458-5
Description	WS	WS	WS	WS	WS
Sampled Date	02-DEC-20	02-DEC-20	02-DEC-20	02-DEC-20	02-DEC-20
Sampled Time	09:00	11:00	13:15	16:00	08:30
Client ID	RG_FO23_WS_LAEMP_LCO_2020-12_NP	RG_LI8_WS_LAEMP_LCO_2020-12_NP	RG_LISP24_WS_LAEMP_LCO_2020-12_NP	RG_FBLANK_WS_LAEMP_LCO_2020-12_NP	RG_TRIP_WS_LAEMP_LCO_2020-12_NP
Grouping / **Analyte**					
WATER					
Physical Tests					
Conductivity (@ 25C) (uS/cm)	672	674	880	<2.0	<2.0
Hardness (as CaCO3) (mg/L)	464	444	582	<0.50	<0.50
pH (pH)	8.28	8.28	8.24	5.58	5.44
ORP (mV)	287	207	278	359	329
Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
Total Dissolved Solids (mg/L)	602 DLHC	589 DLHC	792 DLHC	<10	<10
Turbidity (NTU)	0.18	0.13	0.13	<0.10	<0.10
Anions and Nutrients					
Acidity (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	1.7	1.5
Alkalinity, Bicarbonate (as CaCO3) (mg/L)	202	183	210	<1.0	<1.0
Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3) (mg/L)	202	183	210	<1.0	<1.0
Ammonia as N (mg/L)	<0.0050	0.0070	0.0074	<0.0050	<0.0050
Bromide (Br) (mg/L)	<0.050	<0.050	<0.25 DLHC	<0.050	<0.050
Chloride (Cl) (mg/L)	6.39	15.3	24.4 DLHC	<0.10	<0.10
Fluoride (F) (mg/L)	0.205	0.259	0.21 DLHC	<0.020	<0.020
Ion Balance (%)	101	100	97.9	0.0	0.0
Nitrate (as N) (mg/L)	10.1	6.95	10.6 DLHC	<0.0050	<0.0050
Nitrite (as N) (mg/L)	0.0021	<0.0010	<0.0050 DLHC	<0.0010	<0.0010
Total Kjeldahl Nitrogen (mg/L)	<0.050	0.359	0.419	<0.050	<0.050
Orthophosphate-Dissolved (as P) (mg/L)	0.0013	0.0027	0.0015	<0.0010	<0.0010
Phosphorus (P)-Total (mg/L)	<0.0020	0.0024	0.0029	<0.0020	<0.0020
Sulfate (SO4) (mg/L)	214	219	321 DLHC	<0.30	<0.30
Anion Sum (meq/L)	9.39	9.15	12.3	<0.10	<0.10
Cation Sum (meq/L)	9.48	9.19	12.1	<0.10	<0.10
Cation - Anion Balance (%)	0.5	0.2	-1.1	0.0	0.0
Organic / Inorganic Carbon					
Dissolved Organic Carbon (mg/L)	<0.50	0.63	0.69	<0.50	
Total Organic Carbon (mg/L)	0.67	0.53	0.71	<0.50	<0.50
Total Metals					
Aluminum (Al)-Total (mg/L)	<0.0030	<0.0030	0.0039	<0.0030	<0.0030
Antimony (Sb)-Total (mg/L)	0.00010	0.00015	0.00024	<0.00010	<0.00010
Arsenic (As)-Total (mg/L)	0.00011	0.00012	0.00011	<0.00010	<0.00010
Barium (Ba)-Total (mg/L)	0.117	0.0784	0.0607	<0.00010	<0.00010
Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020	<0.020	<0.020
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.010	0.011	0.015	<0.010	<0.010
Cadmium (Cd)-Total (ug/L)	0.0208	0.110	0.151	<0.0050	<0.0050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2536458-1	L2536458-2	L2536458-3	L2536458-4	L2536458-5
	Description	WS	WS	WS	WS	WS
	Sampled Date	02-DEC-20	02-DEC-20	02-DEC-20	02-DEC-20	02-DEC-20
	Sampled Time	09:00	11:00	13:15	16:00	08:30
	Client ID	RG_FO23_WS_LAEMP_LCO_2020-12_NP	RG_LI8_WS_LAEMP_LCO_2020-12_NP	RG_LISP24_WS_LAEMP_LCO_2020-12_NP	RG_FBLANK_WS_LAEMP_LCO_2020-12_NP	RG_TRIP_WS_LAEMP_LCO_2020-12_NP
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	116	108	130	<0.050	<0.050
	Chromium (Cr)-Total (mg/L)	0.00015	0.00016	0.00014	<0.00010	<0.00010
	Cobalt (Co)-Total (ug/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	Copper (Cu)-Total (mg/L)	<0.00050	0.00053	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	<0.010	<0.010	0.038	<0.010	<0.010
	Lead (Pb)-Total (mg/L)	<0.000050	0.000073	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	0.0231	0.0322	0.0488	<0.0010	<0.0010
	Magnesium (Mg)-Total (mg/L)	49.4	47.7	64.6	<0.10	<0.10
	Manganese (Mn)-Total (mg/L)	0.00034	0.00094	0.0193	<0.00010	<0.00010
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Molybdenum (Mo)-Total (mg/L)	0.00142	0.00231	0.00320	<0.000050	<0.000050
	Nickel (Ni)-Total (mg/L)	0.00104	0.00265	0.00602	<0.00050	<0.00050
	Potassium (K)-Total (mg/L)	1.18	1.06	1.57	<0.050	<0.050
	Selenium (Se)-Total (ug/L)	47.3	30.2	42.2	<0.050	<0.050
	Silicon (Si)-Total (mg/L)	2.28	2.25	2.20	<0.10	<0.10
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	4.16	6.72	9.69	<0.050	<0.050
	Strontium (Sr)-Total (mg/L)	0.201	0.229	0.236	<0.00020	<0.00020
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.00250	0.00288	0.00389	<0.000010	<0.000010
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	<0.0030	0.0075	0.0060	<0.0030	<0.0030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	LAB
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	
	Antimony (Sb)-Dissolved (mg/L)	0.00013	0.00015	0.00023	<0.00010	
	Arsenic (As)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Barium (Ba)-Dissolved (mg/L)	0.0990	0.0743	0.0616	<0.00010	
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020	<0.020	
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Boron (B)-Dissolved (mg/L)	<0.010	0.011	0.014	<0.010	
	Cadmium (Cd)-Dissolved (ug/L)	0.0152	0.0372	0.137	<0.0050	
	Calcium (Ca)-Dissolved (mg/L)	105	102	130	<0.050	<0.050
	Chromium (Cr)-Dissolved (mg/L)	0.00015	0.00014	0.00013	<0.00010	
	Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10	<0.10	<0.10	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2536458-1	L2536458-2	L2536458-3	L2536458-4	L2536458-5
	Description	WS	WS	WS	WS	WS
	Sampled Date	02-DEC-20	02-DEC-20	02-DEC-20	02-DEC-20	02-DEC-20
	Sampled Time	09:00	11:00	13:15	16:00	08:30
	Client ID	RG_FO23_WS_LAEMP_LCO_2020-12_NP	RG_LI8_WS_LAEMP_LCO_2020-12_NP	RG_LISP24_WS_LAEMP_LCO_2020-12_NP	RG_FBLANK_WS_LAEMP_LCO_2020-12_NP	RG_TRIP_WS_LAEMP_LCO_2020-12_NP
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Lithium (Li)-Dissolved (mg/L)	0.0246	0.0319	0.0470	<0.0010	
	Magnesium (Mg)-Dissolved (mg/L)	49.1	46.1	62.3	<0.10	<0.0050
	Manganese (Mn)-Dissolved (mg/L)	0.00031	0.00060	0.0151	<0.00010	
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
	Molybdenum (Mo)-Dissolved (mg/L)	0.00136	0.00221	0.00316	<0.000050	
	Nickel (Ni)-Dissolved (mg/L)	0.00099	0.00251	0.00577	<0.00050	
	Potassium (K)-Dissolved (mg/L)	1.20	1.10	1.55	<0.050	<0.050
	Selenium (Se)-Dissolved (ug/L)	51.5	33.2	44.5	<0.050	
	Silicon (Si)-Dissolved (mg/L)	2.32	2.26	2.17	<0.050	
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Dissolved (mg/L)	4.03	6.59	9.46	<0.050	<0.050
	Strontium (Sr)-Dissolved (mg/L)	0.194	0.222	0.235	<0.00020	
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Uranium (U)-Dissolved (mg/L)	0.00242	0.00285	0.00374	<0.000010	
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Zinc (Zn)-Dissolved (mg/L)	0.0014	0.0035	0.0053	<0.0010	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2536458-5
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2536458-5
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2536458-5
Matrix Spike	Barium (Ba)-Total	MS-B	L2536458-3, -4, -5
Matrix Spike	Calcium (Ca)-Total	MS-B	L2536458-3, -4, -5
Matrix Spike	Iron (Fe)-Total	MS-B	L2536458-3, -4, -5
Matrix Spike	Lithium (Li)-Total	MS-B	L2536458-3, -4, -5
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2536458-3, -4, -5
Matrix Spike	Manganese (Mn)-Total	MS-B	L2536458-3, -4, -5
Matrix Spike	Molybdenum (Mo)-Total	MS-B	L2536458-3, -4, -5
Matrix Spike	Potassium (K)-Total	MS-B	L2536458-3, -4, -5
Matrix Spike	Sodium (Na)-Total	MS-B	L2536458-3, -4, -5
Matrix Spike	Strontium (Sr)-Total	MS-B	L2536458-3, -4, -5

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". 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.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by

Reference Information

subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-L-IC-N-CL Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

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 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-CL Water Hardness APHA 2340 B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-CL Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL Water Oxidation redution potential by elect. ASTM D1498

Reference Information

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL	Water	Phosphorus (P)-Total	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL	Water	Orthophosphate-Dissolved (as P)	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL	Water	Total Kjeldahl Nitrogen	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour 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.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5307819								
WG3456838-2 LCS								
Acidity (as CaCO3)			105.5		%		85-115	04-DEC-20
WG3456838-1 MB								
Acidity (as CaCO3)			1.3		mg/L		2	04-DEC-20
ALK-MAN-CL	**Water**							
Batch R5307878								
WG3456782-5 LCS								
Alkalinity, Total (as CaCO3)			100.2		%		85-115	04-DEC-20
WG3456782-4 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	04-DEC-20
BE-D-L-CCMS-VA	**Water**							
Batch R5308750								
WG3457331-2 LCS								
Beryllium (Be)-Dissolved			95.4		%		80-120	06-DEC-20
WG3457331-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	06-DEC-20
BE-T-L-CCMS-VA	**Water**							
Batch R5308750								
WG3457365-2 LCS								
Beryllium (Be)-Total			98.1		%		80-120	06-DEC-20
WG3457365-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	06-DEC-20
Batch R5309041								
WG3457906-2 LCS								
Beryllium (Be)-Total			106.6		%		80-120	07-DEC-20
WG3457906-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	07-DEC-20
BR-L-IC-N-CL	**Water**							
Batch R5307797								
WG3456989-7 DUP		**L2536458-5**						
Bromide (Br)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	03-DEC-20
WG3456989-2 LCS								
Bromide (Br)			99.1		%		85-115	03-DEC-20
WG3456989-6 LCS								
Bromide (Br)			109.7		%		85-115	03-DEC-20
WG3456989-1 MB								
Bromide (Br)			<0.050		mg/L		0.05	03-DEC-20
WG3456989-5								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BR-L-IC-N-CL	**Water**							
Batch R5307797								
WG3456989-5 MB								
Bromide (Br)			<0.050		mg/L		0.05	03-DEC-20
WG3456989-8 MS		**L2536458-5**						
Bromide (Br)			91.5		%		75-125	03-DEC-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5309453								
WG3458239-2 LCS								
Dissolved Organic Carbon			105.7		%		80-120	07-DEC-20
WG3458239-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	07-DEC-20
C-TOT-ORG-LOW-CL	**Water**							
Batch R5309453								
WG3458239-2 LCS								
Total Organic Carbon			105.0		%		80-120	07-DEC-20
WG3458239-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	07-DEC-20
CL-L-IC-N-CL	**Water**							
Batch R5307797								
WG3456989-7 DUP		**L2536458-5**						
Chloride (Cl)		<0.10	<0.10	RPD-NA	mg/L	N/A	20	03-DEC-20
WG3456989-2 LCS								
Chloride (Cl)			103.8		%		85-115	03-DEC-20
WG3456989-6 LCS								
Chloride (Cl)			103.5		%		85-115	03-DEC-20
WG3456989-1 MB								
Chloride (Cl)			<0.10		mg/L		0.1	03-DEC-20
WG3456989-5 MB								
Chloride (Cl)			<0.10		mg/L		0.1	03-DEC-20
WG3456989-8 MS		**L2536458-5**						
Chloride (Cl)			97.9		%		75-125	03-DEC-20
EC-L-PCT-CL	**Water**							
Batch R5307878								
WG3456782-5 LCS								
Conductivity (@ 25C)			92.6		%		90-110	04-DEC-20
WG3456782-4 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	04-DEC-20
F-IC-N-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-IC-N-CL	**Water**							
Batch R5307797								
WG3456989-7 DUP		**L2536458-5**						
Fluoride (F)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	03-DEC-20
WG3456989-2 LCS								
Fluoride (F)			106.1		%		90-110	03-DEC-20
WG3456989-6 LCS								
Fluoride (F)			106.3		%		90-110	03-DEC-20
WG3456989-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	03-DEC-20
WG3456989-5 MB								
Fluoride (F)			<0.020		mg/L		0.02	03-DEC-20
WG3456989-8 MS		**L2536458-5**						
Fluoride (F)			98.7		%		75-125	03-DEC-20
HG-D-CVAA-VA	**Water**							
Batch R5309746								
WG3458817-6 LCS								
Mercury (Hg)-Dissolved			97.2		%		80-120	09-DEC-20
WG3458817-5 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	09-DEC-20
WG3458817-8 MS		**L2536458-1**						
Mercury (Hg)-Dissolved			95.4		%		70-130	09-DEC-20
HG-T-U-CVAF-VA	**Water**							
Batch R5309065								
WG3458011-2 LCS								
Mercury (Hg)-Total			102.8		%		80-120	07-DEC-20
WG3458011-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	07-DEC-20
MET-D-CCMS-CL	**Water**							
Batch R5311998								
WG3460744-2 LCS		**TMRM**						
Calcium (Ca)-Dissolved			100.8		%		80-120	11-DEC-20
Magnesium (Mg)-Dissolved			106.2		%		80-120	11-DEC-20
Potassium (K)-Dissolved			101.7		%		80-120	11-DEC-20
Sodium (Na)-Dissolved			100.4		%		80-120	11-DEC-20
WG3460744-1 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	11-DEC-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	11-DEC-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	11-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-CL	**Water**							
Batch R5311998								
WG3460744-1 MB								
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	11-DEC-20
MET-D-CCMS-VA	**Water**							
Batch R5308750								
WG3457331-2 LCS								
Aluminum (Al)-Dissolved			97.7		%		80-120	06-DEC-20
Antimony (Sb)-Dissolved			104.2		%		80-120	06-DEC-20
Arsenic (As)-Dissolved			99.3		%		80-120	06-DEC-20
Barium (Ba)-Dissolved			99.0		%		80-120	06-DEC-20
Bismuth (Bi)-Dissolved			100.8		%		80-120	06-DEC-20
Boron (B)-Dissolved			93.5		%		80-120	06-DEC-20
Cadmium (Cd)-Dissolved			96.5		%		80-120	06-DEC-20
Calcium (Ca)-Dissolved			96.6		%		80-120	06-DEC-20
Chromium (Cr)-Dissolved			99.99		%		80-120	06-DEC-20
Cobalt (Co)-Dissolved			96.9		%		80-120	06-DEC-20
Copper (Cu)-Dissolved			96.8		%		80-120	06-DEC-20
Iron (Fe)-Dissolved			95.1		%		80-120	06-DEC-20
Lead (Pb)-Dissolved			98.1		%		80-120	06-DEC-20
Lithium (Li)-Dissolved			92.3		%		80-120	06-DEC-20
Magnesium (Mg)-Dissolved			100.7		%		80-120	06-DEC-20
Manganese (Mn)-Dissolved			98.4		%		80-120	06-DEC-20
Molybdenum (Mo)-Dissolved			99.6		%		80-120	06-DEC-20
Nickel (Ni)-Dissolved			96.0		%		80-120	06-DEC-20
Potassium (K)-Dissolved			101.1		%		80-120	06-DEC-20
Selenium (Se)-Dissolved			96.4		%		80-120	06-DEC-20
Silicon (Si)-Dissolved			97.8		%		60-140	06-DEC-20
Silver (Ag)-Dissolved			95.4		%		80-120	06-DEC-20
Sodium (Na)-Dissolved			107.3		%		80-120	06-DEC-20
Strontium (Sr)-Dissolved			101.7		%		80-120	06-DEC-20
Thallium (Tl)-Dissolved			98.2		%		80-120	06-DEC-20
Tin (Sn)-Dissolved			93.6		%		80-120	06-DEC-20
Titanium (Ti)-Dissolved			100.4		%		80-120	06-DEC-20
Uranium (U)-Dissolved			94.3		%		80-120	06-DEC-20
Vanadium (V)-Dissolved			100.6		%		80-120	06-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5308750								
WG3457331-2 LCS								
Zinc (Zn)-Dissolved			95.3		%		80-120	06-DEC-20
WG3457331-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	06-DEC-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	06-DEC-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	06-DEC-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	06-DEC-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	06-DEC-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	06-DEC-20
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	06-DEC-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	06-DEC-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	06-DEC-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	06-DEC-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	06-DEC-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	06-DEC-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	06-DEC-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	06-DEC-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	06-DEC-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	06-DEC-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	06-DEC-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	06-DEC-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	06-DEC-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	06-DEC-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	06-DEC-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	06-DEC-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	06-DEC-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	06-DEC-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	06-DEC-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	06-DEC-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	06-DEC-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	06-DEC-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	06-DEC-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	06-DEC-20
MET-T-CCMS-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5308750								
WG3457365-2 LCS								
Aluminum (Al)-Total			102.7		%		80-120	06-DEC-20
Antimony (Sb)-Total			103.2		%		80-120	06-DEC-20
Arsenic (As)-Total			98.7		%		80-120	06-DEC-20
Barium (Ba)-Total			98.3		%		80-120	06-DEC-20
Bismuth (Bi)-Total			97.6		%		80-120	06-DEC-20
Boron (B)-Total			94.2		%		80-120	06-DEC-20
Cadmium (Cd)-Total			95.8		%		80-120	06-DEC-20
Calcium (Ca)-Total			95.7		%		80-120	06-DEC-20
Chromium (Cr)-Total			99.7		%		80-120	06-DEC-20
Cobalt (Co)-Total			95.1		%		80-120	06-DEC-20
Copper (Cu)-Total			97.1		%		80-120	06-DEC-20
Iron (Fe)-Total			94.3		%		80-120	06-DEC-20
Lead (Pb)-Total			96.4		%		80-120	06-DEC-20
Lithium (Li)-Total			95.3		%		80-120	06-DEC-20
Magnesium (Mg)-Total			99.3		%		80-120	06-DEC-20
Manganese (Mn)-Total			95.7		%		80-120	06-DEC-20
Molybdenum (Mo)-Total			100.0		%		80-120	06-DEC-20
Nickel (Ni)-Total			95.4		%		80-120	06-DEC-20
Potassium (K)-Total			100.1		%		80-120	06-DEC-20
Selenium (Se)-Total			97.7		%		80-120	06-DEC-20
Silicon (Si)-Total			97.4		%		80-120	06-DEC-20
Silver (Ag)-Total			95.0		%		80-120	06-DEC-20
Sodium (Na)-Total			105.3		%		80-120	06-DEC-20
Strontium (Sr)-Total			96.9		%		80-120	06-DEC-20
Thallium (Tl)-Total			99.1		%		80-120	06-DEC-20
Tin (Sn)-Total			93.8		%		80-120	06-DEC-20
Titanium (Ti)-Total			95.3		%		80-120	06-DEC-20
Uranium (U)-Total			91.7		%		80-120	06-DEC-20
Vanadium (V)-Total			99.2		%		80-120	06-DEC-20
Zinc (Zn)-Total			92.7		%		80-120	06-DEC-20
WG3457365-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	06-DEC-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	06-DEC-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	06-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5308750								
WG3457365-1 MB								
Barium (Ba)-Total			<0.00010		mg/L		0.0001	06-DEC-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	06-DEC-20
Boron (B)-Total			<0.010		mg/L		0.01	06-DEC-20
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	06-DEC-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	06-DEC-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	06-DEC-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	06-DEC-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	06-DEC-20
Iron (Fe)-Total			<0.010		mg/L		0.01	06-DEC-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	06-DEC-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	06-DEC-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	06-DEC-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	06-DEC-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	06-DEC-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	06-DEC-20
Potassium (K)-Total			<0.050		mg/L		0.05	06-DEC-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	06-DEC-20
Silicon (Si)-Total			<0.10		mg/L		0.1	06-DEC-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	06-DEC-20
Sodium (Na)-Total			<0.050		mg/L		0.05	06-DEC-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	06-DEC-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	06-DEC-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	06-DEC-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	06-DEC-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	06-DEC-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	06-DEC-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	06-DEC-20
Batch R5309041								
WG3457906-2 LCS								
Aluminum (Al)-Total			105.0		%		80-120	07-DEC-20
Antimony (Sb)-Total			108.4		%		80-120	07-DEC-20
Arsenic (As)-Total			101.1		%		80-120	07-DEC-20
Barium (Ba)-Total			103.9		%		80-120	07-DEC-20
Bismuth (Bi)-Total			103.3		%		80-120	07-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5309041								
WG3457906-2 LCS								
Boron (B)-Total			103.0		%		80-120	07-DEC-20
Cadmium (Cd)-Total			94.9		%		80-120	07-DEC-20
Calcium (Ca)-Total			104.8		%		80-120	07-DEC-20
Chromium (Cr)-Total			102.7		%		80-120	07-DEC-20
Cobalt (Co)-Total			102.6		%		80-120	07-DEC-20
Copper (Cu)-Total			101.0		%		80-120	07-DEC-20
Iron (Fe)-Total			97.0		%		80-120	07-DEC-20
Lead (Pb)-Total			104.1		%		80-120	07-DEC-20
Lithium (Li)-Total			99.0		%		80-120	07-DEC-20
Magnesium (Mg)-Total			103.5		%		80-120	07-DEC-20
Manganese (Mn)-Total			101.3		%		80-120	07-DEC-20
Molybdenum (Mo)-Total			104.0		%		80-120	07-DEC-20
Nickel (Ni)-Total			102.7		%		80-120	07-DEC-20
Potassium (K)-Total			99.6		%		80-120	07-DEC-20
Selenium (Se)-Total			98.1		%		80-120	07-DEC-20
Silicon (Si)-Total			102.5		%		80-120	07-DEC-20
Silver (Ag)-Total			97.1		%		80-120	07-DEC-20
Sodium (Na)-Total			108.4		%		80-120	07-DEC-20
Strontium (Sr)-Total			98.4		%		80-120	07-DEC-20
Thallium (Tl)-Total			106.7		%		80-120	07-DEC-20
Tin (Sn)-Total			95.6		%		80-120	07-DEC-20
Titanium (Ti)-Total			101.9		%		80-120	07-DEC-20
Uranium (U)-Total			93.2		%		80-120	07-DEC-20
Vanadium (V)-Total			102.9		%		80-120	07-DEC-20
Zinc (Zn)-Total			99.6		%		80-120	07-DEC-20
WG3457906-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	07-DEC-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	07-DEC-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	07-DEC-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	07-DEC-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	07-DEC-20
Boron (B)-Total			<0.010		mg/L		0.01	07-DEC-20
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	07-DEC-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	07-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5309041								
WG3457906-1 MB								
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	07-DEC-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	07-DEC-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	07-DEC-20
Iron (Fe)-Total			<0.010		mg/L		0.01	07-DEC-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	07-DEC-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	07-DEC-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	07-DEC-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	07-DEC-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	07-DEC-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	07-DEC-20
Potassium (K)-Total			<0.050		mg/L		0.05	07-DEC-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	07-DEC-20
Silicon (Si)-Total			<0.10		mg/L		0.1	07-DEC-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	07-DEC-20
Sodium (Na)-Total			<0.050		mg/L		0.05	07-DEC-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	07-DEC-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	07-DEC-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	07-DEC-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	07-DEC-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	07-DEC-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	07-DEC-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	07-DEC-20
NH3-L-F-CL	**Water**							
Batch R5308341								
WG3457173-2 LCS								
Ammonia as N			112.1		%		85-115	04-DEC-20
WG3457173-1 MB								
Ammonia as N			<0.0050		mg/L		0.005	04-DEC-20
NO2-L-IC-N-CL	**Water**							
Batch R5307797								
WG3456989-7 DUP		**L2536458-5**						
Nitrite (as N)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	03-DEC-20
WG3456989-2 LCS								
Nitrite (as N)			104.3		%		90-110	03-DEC-20
WG3456989-6 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-L-IC-N-CL	**Water**							
Batch R5307797								
WG3456989-6 LCS								
Nitrite (as N)			103.9		%		90-110	03-DEC-20
WG3456989-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	03-DEC-20
WG3456989-5 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	03-DEC-20
WG3456989-8 MS		**L2536458-5**						
Nitrite (as N)			96.3		%		75-125	03-DEC-20
NO3-L-IC-N-CL	**Water**							
Batch R5307797								
WG3456989-7 DUP		**L2536458-5**						
Nitrate (as N)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	03-DEC-20
WG3456989-2 LCS								
Nitrate (as N)			104.4		%		90-110	03-DEC-20
WG3456989-6 LCS								
Nitrate (as N)			103.7		%		90-110	03-DEC-20
WG3456989-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	03-DEC-20
WG3456989-5 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	03-DEC-20
WG3456989-8 MS		**L2536458-5**						
Nitrate (as N)			98.7		%		75-125	03-DEC-20
ORP-CL	**Water**							
Batch R5306322								
WG3456505-7 CRM		**CL-ORP**						
ORP			223		mV		210-230	03-DEC-20
P-T-L-COL-CL	**Water**							
Batch R5309431								
WG3458407-2 LCS								
Phosphorus (P)-Total			102.3		%		80-120	08-DEC-20
WG3458407-1 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	08-DEC-20
PH-CL	**Water**							
Batch R5307878								
WG3456782-5 LCS								
pH			7.04		pH		6.9-7.1	04-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PO4-DO-L-COL-CL	**Water**							
Batch R5306317								
WG3456408-2 LCS								
Orthophosphate-Dissolved (as P)			96.8		%		80-120	03-DEC-20
WG3456408-6 LCS								
Orthophosphate-Dissolved (as P)			94.4		%		80-120	03-DEC-20
WG3456408-1 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	03-DEC-20
WG3456408-5 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	03-DEC-20
SO4-IC-N-CL	**Water**							
Batch R5307797								
WG3456989-7 DUP		**L2536458-5**						
Sulfate (SO4)		<0.30	<0.30	RPD-NA	mg/L	N/A	20	03-DEC-20
WG3456989-2 LCS								
Sulfate (SO4)			100.9		%		90-110	03-DEC-20
WG3456989-6 LCS								
Sulfate (SO4)			96.4		%		90-110	03-DEC-20
WG3456989-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	03-DEC-20
WG3456989-5 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	03-DEC-20
WG3456989-8 MS		**L2536458-5**						
Sulfate (SO4)			98.0		%		75-125	03-DEC-20
SOLIDS-TDS-CL	**Water**							
Batch R5310138								
WG3458892-5 LCS								
Total Dissolved Solids			99.9		%		85-115	09-DEC-20
WG3458892-4 MB								
Total Dissolved Solids			<10		mg/L		10	09-DEC-20
TKN-L-F-CL	**Water**							
Batch R5308435								
WG3457290-17 DUP		**L2536458-5**						
Total Kjeldahl Nitrogen		<0.050	<0.050	RPD-NA	mg/L	N/A	20	05-DEC-20
WG3457290-12 LCS								
Total Kjeldahl Nitrogen			110.3		%		75-125	05-DEC-20
WG3457290-14 LCS								
Total Kjeldahl Nitrogen			88.2		%		75-125	05-DEC-20
WG3457290-16 LCS								
Total Kjeldahl Nitrogen			87.0		%		75-125	05-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-L-F-CL	**Water**							
Batch R5308435								
WG3457290-2 LCS								
Total Kjeldahl Nitrogen			87.6		%		75-125	05-DEC-20
WG3457290-4 LCS								
Total Kjeldahl Nitrogen			85.9		%		75-125	05-DEC-20
WG3457290-6 LCS								
Total Kjeldahl Nitrogen			86.4		%		75-125	05-DEC-20
WG3457290-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	05-DEC-20
WG3457290-11 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	05-DEC-20
WG3457290-13 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	05-DEC-20
WG3457290-15 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	05-DEC-20
WG3457290-3 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	05-DEC-20
WG3457290-5 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	05-DEC-20
WG3457290-18 MS		**L2536458-5**						
Total Kjeldahl Nitrogen			93.0		%		70-130	05-DEC-20
TSS-L-CL	**Water**							
Batch R5310076								
WG3458891-6 LCS								
Total Suspended Solids			105.3		%		85-115	09-DEC-20
WG3458891-5 MB								
Total Suspended Solids			<1.0		mg/L		1	09-DEC-20
TURBIDITY-CL	**Water**							
Batch R5306330								
WG3455996-19 DUP		**L2536458-4**						
Turbidity		<0.10	<0.10	RPD-NA	NTU	N/A	15	03-DEC-20
WG3455996-21 LCS								
Turbidity			97.9		%		85-115	03-DEC-20
WG3455996-24 LCS								
Turbidity			96.9		%		85-115	03-DEC-20
WG3455996-20 MB								
Turbidity			<0.10		NTU		0.1	03-DEC-20
WG3455996-23 MB								
Turbidity			<0.10		NTU		0.1	03-DEC-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	02-DEC-20 09:00	03-DEC-20 14:00	0.25	29	hours	EHTR-FM
	2	02-DEC-20 11:00	03-DEC-20 14:00	0.25	27	hours	EHTR-FM
	3	02-DEC-20 13:15	03-DEC-20 14:00	0.25	25	hours	EHTR-FM
	4	02-DEC-20 16:00	03-DEC-20 14:00	0.25	22	hours	EHTR-FM
	5	02-DEC-20 08:30	03-DEC-20 14:00	0.25	30	hours	EHTR-FM
pH							
	1	02-DEC-20 09:00	04-DEC-20 09:00	0.25	48	hours	EHTR-FM
	2	02-DEC-20 11:00	04-DEC-20 09:00	0.25	46	hours	EHTR-FM
	3	02-DEC-20 13:15	04-DEC-20 09:00	0.25	44	hours	EHTR-FM
	4	02-DEC-20 16:00	04-DEC-20 09:00	0.25	41	hours	EHTR-FM
	5	02-DEC-20 08:30	04-DEC-20 09:00	0.25	48	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2536458 were received on 03-DEC-20 09:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes 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 pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

Page 1 of 1

COC ID: **Regional Effects Program** | TURNAROUND TIME: Regular

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Site#	Regional Effects Program Line Creek AEMP			Lab Name	ALS Calgary			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cait Good			Lab Contact	Lyuda Shvets			Email 1:	cait.good@teck.com	X	X	X
Email	cait.good@teck.com			Email	Lyudmyla.Shvets@ALSGlobal.com			Email 2:	carlie.meyer@teck.com	X	X	X
Address	421 Pine Avenue			Address	2559 29 Street NE			Email 3:	teckcoal@equisonline.com			X
								Email 4:	kbatchelar@minnow.ca	X	X	X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:	Carla.FroymanParker@teck.com	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada					
Phone Number	250-425-8202			Phone Number	403-407-1800			PO number	VPO00689999			

L2536458-COFC

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	N	Y	N	Y	Y	N	N
								PRESERV.	NONE	H2SO4	H2SO4	HCl	HNO3	HNO3	NONE
								ANALYSIS	HG-T-U-CVAF-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-D-CVAF-VA	TECKCOAL-MET-D-VA	TECKCOAL-MET-T-VA	TECKCOAL-ROUTINE-VA
RG_F023_WS_LAEMP_LCO_2020-12_NP	RG_F023	WS	NO	Dec 2/20	09:00	G	7		X	X	X	X	X	X	X
RG_LIS_WS_LAEMP_LCO_2020-12_NP	RG_LIS	WS	NO	Dec 2/20	11:00	G	7		X	X	X	X	X	X	X
RG_LISP24_WS_LAEMP_LCO_2020-12_NP	RG_LISP24	WS	NO	Dec 2/20	13:15	G	7		X	X	X	X	X	X	X
RG_FBLANK_WS_LAEMP_LCO_2020-12_NP	RG_FBLANK	WS	NO	Dec 2/20	16:00	G	7		X	X	X	X	X	X	X
RG_TRIP_WS_LAEMP_LCO_2020-12_NP	RG_TRIP	WS	NO	Dec 2/20	08:30	G	4		X		X			X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
VPO00689999	Rich Smit / Lotic environmental	2020-12-03 16:30		12/3 9:00

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	Rich Smit	Mobile #	403-586-8241
Sampler's Signature		Date/Time	2020-12-03 / 16:30

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SELENIUM CHEMISTRY

BAL Final Report 2010044

(Finalized March 20, 2020)

BROOKS APPLIED LABS
18804 North Creek Parkway, Ste 100, Bothell, WA 98011 • USA • T: 206 632 6206 F: 206 632 6017 • info@brooksapplied.com

March 20, 2020

Teck Resources Limited - Vancouver
Cait Good
421 Pine Avenue
Sparwood, B.C. CANADA V0B2G0
Cait.Good@teck.com

Re: Regional Effects Program

Ms. Good,

On March 5, 2020, Brooks Applied Labs (BAL) received ten (10) 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) forms. 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.

For trace metals analyses, two fractions were received for each client sample, one unfiltered fraction for total recoverable Se and one field filtered fraction for dissolved Se. However, sample *RG_FO23_WS_20200223_1230* (2010044-16 and 2010044-17) was received in containers which neglected to discern between field filtered and unfiltered fractions. A visual inspection of the various fractions did not provide any information that could be used to distinguish between field filtered or unfiltered fractions. At sample receipt, one fraction was arbitrarily assigned as the unfiltered fraction while the other was logged in as the associated filtered fraction.

Following completion of the analyses, BAL was unable to identify a (filtered)/(not filtered) pattern in samples 2010044-16 and 2010044-17 (*RG_FO23_WS_20200223_1230*), as the selenium results yielded were nearly identical. Results for samples 2010044-16 and 2010044-17 are reported according to the basis assignments used at login, but it is uncertain which fraction underwent a filtration (0.45 µm) step, if any at all, since the selenium results are too similar.

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.

The MDL values for total recoverable and dissolved selenium have been calculated using the standard deviation of the method blanks prepared and analyzed concurrently with the submitted samples. The MRL is typically set by a low calibration standard in the calibration. BAL requires that the MRL is at least 2 times the value of the corresponding MDL. Due to an elevated MDL in

Batch B200795, it was necessary to raise the MRL to 2 times the value of the MDL. Selenium results reported in this work order were greater than the elevated MRL. Non-detects and results close the MRL were re-analyzed and reported in Batch B200899 where lower MRLs were obtained.

Selenium 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, Se speciation was defined as dissolved selenite [*Se(IV)*], selenate [*Se(VI)*], selenocyanate [*SeCN*], methylseleninic acid [*MeSe(IV)*], selenomethionine [*SeMet*], selenosulfate [$SeSO_3$], and dimethylselenoxide [*DMSeO*]. The unknown Se species eluting at the retention time ≈ 3.7 is also reported [*Se Unk A*]. Research at BAL has indicated that [*Se Unk A*] is a product of the oxidation of volatile Se species present in client samples. The total concentration of any remaining unidentified selenium-containing species detected in each sample has also been reported 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 original selenate result for sample *RG_LCUT_WS_20200226_1500* exceeded the calibration curve in sequence 2000321. This sample was reanalyzed at a higher dilution and the concentrations were confirmed for all selenium species. The initial results at the lower dilution have therefore been reported without qualification.

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 RPD of the MS/MSD set was not calculated (N/C).

All data were reported without qualification (aside from concentration qualifiers) and 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/>. 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 9/23/09)

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.

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.

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_LIDCOM_WS_20200224_1014	2010044-01	WS	Sample	02/24/2020	03/05/2020
RG_LIDCOM_WS_20200224_1014	2010044-02	WS	Sample	02/24/2020	03/05/2020
RG_LIDCOM_WS_20200224_1014	2010044-03	WS	Sample	02/24/2020	03/05/2020
RG_LISP24_WS_20200224_1220	2010044-04	WS	Sample	02/24/2020	03/05/2020
RG_LISP24_WS_20200224_1220	2010044-05	WS	Sample	02/24/2020	03/05/2020
RG_LISP24_WS_20200224_1220	2010044-06	WS	Sample	02/24/2020	03/05/2020
RG_LILC3_WS_20200224_1420	2010044-07	WS	Sample	02/24/2020	03/05/2020
RG_LILC3_WS_20200224_1420	2010044-08	WS	Sample	02/24/2020	03/05/2020
RG_LILC3_WS_20200224_1420	2010044-09	WS	Sample	02/24/2020	03/05/2020
RG_LI8_WS_20200225_1435	2010044-10	WS	Sample	02/25/2020	03/05/2020
RG_LI8_WS_20200225_1435	2010044-11	WS	Sample	02/25/2020	03/05/2020
RG_LI8_WS_20200225_1435	2010044-12	WS	Sample	02/25/2020	03/05/2020
RG_FRUL_WS_20200225_1030	2010044-13	WS	Sample	02/25/2020	03/05/2020
RG_FRUL_WS_20200225_1030	2010044-14	WS	Sample	02/25/2020	03/05/2020
RG_FRUL_WS_20200225_1030	2010044-15	WS	Sample	02/25/2020	03/05/2020
RG_FO23_WS_20200223_1230	2010044-16	WS	Sample	02/25/2020	03/05/2020
RG_FO23_WS_20200223_1230	2010044-17	WS	Sample	02/25/2020	03/05/2020
RG_FO23_WS_20200223_1230	2010044-18	WS	Sample	02/25/2020	03/05/2020
RG_DUPLICATE_WS_20200226_09:00	2010044-19	WS	Sample	02/26/2020	03/05/2020
RG_DUPLICATE_WS_20200226_09:00	2010044-20	WS	Sample	02/26/2020	03/05/2020
RG_DUPLICATE_WS_20200226_09:00	2010044-21	WS	Sample	02/26/2020	03/05/2020
RG_FBLANK_WS_20200226_0800	2010044-22	WS	Sample	02/26/2020	03/05/2020
RG_FBLANK_WS_20200226_0800	2010044-23	WS	Sample	02/26/2020	03/05/2020
RG_FBLANK_WS_20200226_0800	2010044-24	WS	Sample	02/26/2020	03/05/2020
RG_SLINE_WS_20200226_1015	2010044-25	WS	Sample	02/26/2020	03/05/2020
RG_SLINE_WS_20200226_1015	2010044-26	WS	Sample	02/26/2020	03/05/2020
RG_SLINE_WS_20200226_1015	2010044-27	WS	Sample	02/26/2020	03/05/2020
RG_LCUT_WS_20200226_1500	2010044-28	WS	Sample	02/26/2020	03/05/2020
RG_LCUT_WS_20200226_1500	2010044-29	WS	Sample	02/26/2020	03/05/2020
RG_LCUT_WS_20200226_1500	2010044-30	WS	Sample	02/26/2020	03/05/2020

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
DMSeO	Water	SOP BAL-4201	03/05/2020	03/07/2020	B200791	2000321
DMSeO	Water	SOP BAL-4201	03/09/2020	03/11/2020	B200814	2000351
MeSe(IV)	Water	SOP BAL-4201	03/05/2020	03/07/2020	B200791	2000321
MeSe(IV)	Water	SOP BAL-4201	03/09/2020	03/11/2020	B200814	2000351
MeSe(IV)	Water	SOP BAL-4201	03/09/2020	03/11/2020	B200814	2000351
Se	Water	EPA 1638 Mod	03/10/2020	03/13/2020	B200795	2000369
Se	Water	EPA 1638 Mod	03/10/2020	03/16/2020	B200899	2000376
Se Unk A	Water	SOP BAL-4201	03/05/2020	03/07/2020	B200791	2000321
Se Unk A	Water	SOP BAL-4201	03/09/2020	03/11/2020	B200814	2000351
Se Unk A	Water	SOP BAL-4201	03/09/2020	03/11/2020	B200814	2000351
Se(IV)	Water	SOP BAL-4201	03/05/2020	03/07/2020	B200791	2000321
Se(IV)	Water	SOP BAL-4201	03/09/2020	03/11/2020	B200814	2000351
Se(IV)	Water	SOP BAL-4201	03/09/2020	03/11/2020	B200814	2000351
Se(VI)	Water	SOP BAL-4201	03/05/2020	03/07/2020	B200791	2000321
Se(VI)	Water	SOP BAL-4201	03/09/2020	03/11/2020	B200814	2000351
Se(VI)	Water	SOP BAL-4201	03/09/2020	03/11/2020	B200814	2000351
SeCN	Water	SOP BAL-4201	03/05/2020	03/07/2020	B200791	2000321
SeCN	Water	SOP BAL-4201	03/09/2020	03/11/2020	B200814	2000351
SeCN	Water	SOP BAL-4201	03/09/2020	03/11/2020	B200814	2000351
SeMet	Water	SOP BAL-4201	03/05/2020	03/07/2020	B200791	2000321
SeMet	Water	SOP BAL-4201	03/09/2020	03/11/2020	B200814	2000351
SeMet	Water	SOP BAL-4201	03/09/2020	03/11/2020	B200814	2000351
SeSO3	Water	SOP BAL-4201	03/05/2020	03/07/2020	B200791	2000321
SeSO3	Water	SOP BAL-4201	03/09/2020	03/11/2020	B200814	2000351
SeSO3	Water	SOP BAL-4201	03/09/2020	03/11/2020	B200814	2000351
Unk Se Sp	Water	SOP BAL-4201	03/05/2020	03/07/2020	B200791	2000321
Unk Se Sp	Water	SOP BAL-4201	03/09/2020	03/11/2020	B200814	2000351
Unk Se Sp	Water	SOP BAL-4201	03/09/2020	03/11/2020	B200814	2000351

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_LIDCOM_WS_20200224_1014										
2010044-01	Se	WS	TR	31.4		0.484	0.968	µg/L	B200795	2000369
RG_LIDCOM_WS_20200224_1014										
2010044-02	Se	WS	D	32.7		0.484	0.968	µg/L	B200795	2000369
RG_LIDCOM_WS_20200224_1014										
2010044-03	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200814	2000351
2010044-03	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200814	2000351
2010044-03	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200814	2000351
2010044-03	Se(IV)	WS	D	0.140		0.050	0.125	µg/L	B200814	2000351
2010044-03	Se(VI)	WS	D	32.5		0.060	0.125	µg/L	B200814	2000351
2010044-03	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B200814	2000351
2010044-03	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200814	2000351
2010044-03	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B200814	2000351
2010044-03	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B200814	2000351
RG_LISP24_WS_20200224_1220										
2010044-04	Se	WS	TR	37.8		0.484	0.968	µg/L	B200795	2000369
RG_LISP24_WS_20200224_1220										
2010044-05	Se	WS	D	35.5		0.484	0.968	µg/L	B200795	2000369
RG_LISP24_WS_20200224_1220										
2010044-06	DMSeO	WS	D	0.017	J	0.010	0.025	µg/L	B200814	2000351
2010044-06	MeSe(IV)	WS	D	0.016	J	0.010	0.025	µg/L	B200814	2000351
2010044-06	Se Unk A	WS	D	0.030		0.010	0.025	µg/L	B200814	2000351
2010044-06	Se(IV)	WS	D	0.319		0.050	0.125	µg/L	B200814	2000351
2010044-06	Se(VI)	WS	D	35.0		0.060	0.125	µg/L	B200814	2000351
2010044-06	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B200814	2000351
2010044-06	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200814	2000351
2010044-06	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B200814	2000351
2010044-06	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B200814	2000351
RG_LILC3_WS_20200224_1420										
2010044-07	Se	WS	TR	47.7		0.484	0.968	µg/L	B200795	2000369
RG_LILC3_WS_20200224_1420										
2010044-08	Se	WS	D	47.8		0.484	0.968	µg/L	B200795	2000369

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_LILC3_WS_20200224_1420										
2010044-09	DMSeO	WS	D	0.022	J	0.010	0.025	µg/L	B200814	2000351
2010044-09	MeSe(IV)	WS	D	0.014	J	0.010	0.025	µg/L	B200814	2000351
2010044-09	Se Unk A	WS	D	0.050		0.010	0.025	µg/L	B200814	2000351
2010044-09	Se(IV)	WS	D	0.402		0.050	0.125	µg/L	B200814	2000351
2010044-09	Se(VI)	WS	D	45.9		0.060	0.125	µg/L	B200814	2000351
2010044-09	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B200814	2000351
2010044-09	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200814	2000351
2010044-09	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B200814	2000351
2010044-09	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B200814	2000351
RG_LI8_WS_20200225_1435										
2010044-10	Se	WS	TR	28.1		0.484	0.968	µg/L	B200795	2000369
RG_LI8_WS_20200225_1435										
2010044-11	Se	WS	D	28.1		0.484	0.968	µg/L	B200795	2000369
RG_LI8_WS_20200225_1435										
2010044-12	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200814	2000351
2010044-12	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200814	2000351
2010044-12	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200814	2000351
2010044-12	Se(IV)	WS	D	0.066	J	0.050	0.125	µg/L	B200814	2000351
2010044-12	Se(VI)	WS	D	19.9		0.060	0.125	µg/L	B200814	2000351
2010044-12	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B200814	2000351
2010044-12	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200814	2000351
2010044-12	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B200814	2000351
2010044-12	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B200814	2000351
RG_FRUL_WS_20200225_1030										
2010044-13	Se	WS	TR	45.7		0.484	0.968	µg/L	B200795	2000369
RG_FRUL_WS_20200225_1030										
2010044-14	Se	WS	D	48.0		0.484	0.968	µg/L	B200795	2000369

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FRUL_WS_20200225_1030										
2010044-15	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200814	2000351
2010044-15	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200814	2000351
2010044-15	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200814	2000351
2010044-15	Se(IV)	WS	D	0.229		0.050	0.125	µg/L	B200814	2000351
2010044-15	Se(VI)	WS	D	39.6		0.060	0.125	µg/L	B200814	2000351
2010044-15	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B200814	2000351
2010044-15	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200814	2000351
2010044-15	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B200814	2000351
2010044-15	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B200814	2000351
RG_FO23_WS_20200223_1230										
2010044-16	Se	WS	TR	41.9		0.484	0.968	µg/L	B200795	2000369
RG_FO23_WS_20200223_1230										
2010044-17	Se	WS	D	41.2		0.484	0.968	µg/L	B200795	2000369
RG_FO23_WS_20200223_1230										
2010044-18	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200814	2000351
2010044-18	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200814	2000351
2010044-18	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200814	2000351
2010044-18	Se(IV)	WS	D	0.175		0.050	0.125	µg/L	B200814	2000351
2010044-18	Se(VI)	WS	D	32.4		0.060	0.125	µg/L	B200814	2000351
2010044-18	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B200814	2000351
2010044-18	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200814	2000351
2010044-18	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B200814	2000351
2010044-18	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B200814	2000351
RG_DUPLICATE_WS_20200226_09:00										
2010044-19	Se	WS	TR	1.82		0.242	0.528	µg/L	B200899	2000376
RG_DUPLICATE_WS_20200226_09:00										
2010044-20	Se	WS	D	1.94		0.242	0.528	µg/L	B200899	2000376

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_DUPLICATE_WS_20200226_09:00										
2010044-21	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200791	2000321
2010044-21	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200791	2000321
2010044-21	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200791	2000321
2010044-21	Se(IV)	WS	D	≤ 0.050	U	0.050	0.125	µg/L	B200791	2000321
2010044-21	Se(VI)	WS	D	1.45		0.060	0.125	µg/L	B200791	2000321
2010044-21	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B200791	2000321
2010044-21	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200791	2000321
2010044-21	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B200791	2000321
2010044-21	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B200791	2000321
RG_FBLANK_WS_20200226_0800										
2010044-22	Se	WS	TR	≤ 0.242	U	0.242	0.528	µg/L	B200899	2000376
RG_FBLANK_WS_20200226_0800										
2010044-23	Se	WS	D	0.336	J	0.242	0.528	µg/L	B200899	2000376
RG_FBLANK_WS_20200226_0800										
2010044-24	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200814	2000351
2010044-24	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200814	2000351
2010044-24	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200814	2000351
2010044-24	Se(IV)	WS	D	≤ 0.050	U	0.050	0.125	µg/L	B200814	2000351
2010044-24	Se(VI)	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B200814	2000351
2010044-24	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B200814	2000351
2010044-24	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200814	2000351
2010044-24	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B200814	2000351
2010044-24	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B200814	2000351
RG_SLINE_WS_20200226_1015										
2010044-25	Se	WS	TR	1.66		0.242	0.528	µg/L	B200899	2000376
RG_SLINE_WS_20200226_1015										
2010044-26	Se	WS	D	1.73		0.242	0.528	µg/L	B200899	2000376

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_SLINE_WS_20200226_1015										
2010044-27	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200791	2000321
2010044-27	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200791	2000321
2010044-27	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200791	2000321
2010044-27	Se(IV)	WS	D	≤ 0.050	U	0.050	0.125	µg/L	B200791	2000321
2010044-27	Se(VI)	WS	D	1.50		0.060	0.125	µg/L	B200791	2000321
2010044-27	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B200791	2000321
2010044-27	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200791	2000321
2010044-27	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B200791	2000321
2010044-27	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B200791	2000321
RG_LCUT_WS_20200226_1500										
2010044-28	Se	WS	TR	357		0.484	0.968	µg/L	B200795	2000369
RG_LCUT_WS_20200226_1500										
2010044-29	Se	WS	D	358		0.484	0.968	µg/L	B200795	2000369
RG_LCUT_WS_20200226_1500										
2010044-30	DMSeO	WS	D	0.016	J	0.010	0.025	µg/L	B200791	2000321
2010044-30	MeSe(IV)	WS	D	0.029		0.010	0.025	µg/L	B200791	2000321
2010044-30	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200791	2000321
2010044-30	Se(IV)	WS	D	0.191		0.050	0.125	µg/L	B200791	2000321
2010044-30	Se(VI)	WS	D	268		0.060	0.125	µg/L	B200791	2000321
2010044-30	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B200791	2000321
2010044-30	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B200791	2000321
2010044-30	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B200791	2000321
2010044-30	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B200791	2000321

Accuracy & Precision Summary

Batch: B200791
Lab Matrix: Water
Method: SOP BAL-4201

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B200791-BS1	**Blank Spike, (1923027)**						
	MeSe(IV)		5.095	5.667	µg/L	111% 75-125	
	Se(IV)		5.000	4.943	µg/L	99% 75-125	
	Se(VI)		5.000	5.016	µg/L	100% 75-125	
	SeCN		5.015	5.060	µg/L	101% 75-125	
	SeMet		4.932	5.097	µg/L	103% 75-125	
B200791-DUP4	**Duplicate, (2010044-21)**						
	DMSeO	ND		ND	µg/L		N/C 25
	MeSe(IV)	ND		ND	µg/L		N/C 25
	Se Unk A	ND		ND	µg/L		N/C 25
	Se(IV)	ND		ND	µg/L		N/C 25
	Se(VI)	1.447		1.484	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
B200791-MS4	**Matrix Spike, (2010044-21)**						
	Se(IV)	ND	4.900	4.893	µg/L	99% 75-125	
	Se(VI)	1.447	5.100	6.413	µg/L	97% 75-125	
	SeCN	ND	4.905	4.770	µg/L	97% 75-125	
	SeMet	ND	0.9885	0.949	µg/L	96% 75-125	
B200791-MSD4	**Matrix Spike Duplicate, (2010044-21)**						
	Se(IV)	ND	4.900	4.894	µg/L	99% 75-125	0.04% 25
	Se(VI)	1.447	5.100	6.357	µg/L	96% 75-125	0.9% 25
	SeCN	ND	4.905	4.565	µg/L	93% 75-125	4% 25
	SeMet	ND	0.9885	0.971	µg/L	98% 75-125	2% 25

Accuracy & Precision Summary

Batch: B200795
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B200795-BS1	**Blank Spike, (1943018)**						
	Se		200.0	195.6	µg/L	98% 75-125	
B200795-BS2	**Blank Spike, (1943018)**						
	Se		200.0	199.4	µg/L	100% 75-125	
B200795-BS3	**Blank Spike, (1943018)**						
	Se		200.0	196.3	µg/L	98% 75-125	
B200795-BS4	**Blank Spike, (1943018)**						
	Se		200.0	195.4	µg/L	98% 75-125	
B200795-BS5	**Blank Spike, (1943018)**						
	Se		200.0	191.9	µg/L	96% 75-125	
B200795-SRM1	**Reference Material (1938018, TMDA 51.5 Reference Standard - Bottle 3 - SRM)**						
	Se		14.30	13.98	µg/L	98% 75-125	
B200795-SRM2	**Reference Material (1938018, TMDA 51.5 Reference Standard - Bottle 3 - SRM)**						
	Se		14.30	13.69	µg/L	96% 75-125	
B200795-SRM3	**Reference Material (1938018, TMDA 51.5 Reference Standard - Bottle 3 - SRM)**						
	Se		14.30	13.29	µg/L	93% 75-125	
B200795-SRM4	**Reference Material (1938018, TMDA 51.5 Reference Standard - Bottle 3 - SRM)**						
	Se		14.30	13.60	µg/L	95% 75-125	
B200795-SRM5	**Reference Material (1938018, TMDA 51.5 Reference Standard - Bottle 3 - SRM)**						
	Se		14.30	14.13	µg/L	99% 75-125	
B200795-DUP2	**Duplicate, (2010044-07)**						
	Se	47.72		48.40	µg/L		1% 20

Accuracy & Precision Summary

Batch: B200795
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B200795-MS2	**Matrix Spike, (2010044-07)**						
	Se	47.72	220.0	266.4	µg/L	99% 75-125	
B200795-MSD2	**Matrix Spike Duplicate, (2010044-07)**						
	Se	47.72	220.0	265.4	µg/L	99% 75-125	0.4% 20

Accuracy & Precision Summary

Batch: B200814
Lab Matrix: Water
Method: SOP BAL-4201

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B200814-BS1	**Blank Spike, (1923027)**						
	MeSe(IV)		5.095	5.690	µg/L	112% 75-125	
	Se(IV)		5.000	5.429	µg/L	109% 75-125	
	Se(VI)		5.000	5.194	µg/L	104% 75-125	
	SeCN		5.015	5.166	µg/L	103% 75-125	
	SeMet		4.932	5.190	µg/L	105% 75-125	
B200814-DUP2	**Duplicate, (2010038-01)**						
	DMSeO	1.028		0.966	µg/L		6% 25
	MeSe(IV)	0.197		0.199	µg/L		1% 25
	Se Unk A	ND		ND	µg/L		N/C 25
	Se(IV)	1.766		1.852	µg/L		5% 25
	Se(VI)	1.102		1.137	µg/L		3% 25
	SeCN	3.209		3.186	µg/L		0.7% 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
B200814-MS2	**Matrix Spike, (2010038-01)**						
	Se(IV)	1.766	4.900	6.233	µg/L	91% 75-125	
	Se(VI)	1.102	5.100	6.239	µg/L	101% 75-125	
	SeCN	3.209	4.905	7.995	µg/L	98% 75-125	
	SeMet	ND	0.9885	0.960	µg/L	97% 75-125	
B200814-MSD2	**Matrix Spike Duplicate, (2010038-01)**						
	Se(IV)	1.766	4.900	6.378	µg/L	94% 75-125	2% 25
	Se(VI)	1.102	5.100	6.063	µg/L	97% 75-125	3% 25
	SeCN	3.209	4.905	7.798	µg/L	94% 75-125	2% 25
	SeMet	ND	0.9885	0.960	µg/L	97% 75-125	0.03% 25

Accuracy & Precision Summary

Batch: B200899
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B200899-BS1	**Blank Spike, (1943018)**						
	Se		200.0	191.7	µg/L	96% 75-125	
B200899-BS2	**Blank Spike, (1943018)**						
	Se		200.0	195.2	µg/L	98% 75-125	
B200899-SRM1	**Reference Material (1938018, TMDA 51.5 Reference Standard - Bottle 3 - SRM)**						
	Se		14.30	13.67	µg/L	96% 75-125	
B200899-SRM2	**Reference Material (1938018, TMDA 51.5 Reference Standard - Bottle 3 - SRM)**						
	Se		14.30	13.67	µg/L	96% 75-125	
B200899-DUP1	**Duplicate, (2010044-22)**						
	Se	ND		ND	µg/L		N/C 20
B200899-MS1	**Matrix Spike, (2010044-22)**						
	Se	ND	220.0	216.4	µg/L	98% 75-125	
B200899-MSD1	**Matrix Spike Duplicate, (2010044-22)**						
	Se	ND	220.0	209.1	µg/L	95% 75-125	3% 20

Method Blanks & Reporting Limits

Batch: B200791
Matrix: Water
Method: SOP BAL-4201
Analyte: DMSeO

Sample	Result	Units
B200791-BLK1	0.00	µg/L
B200791-BLK2	0.00	µg/L
B200791-BLK3	0.00	µg/L
B200791-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Analyte: MeSe(IV)

Sample	Result	Units
B200791-BLK1	0.00	µg/L
B200791-BLK2	0.00	µg/L
B200791-BLK3	0.00	µg/L
B200791-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Analyte: Se Unk A

Sample	Result	Units
B200791-BLK1	0.00	µg/L
B200791-BLK2	0.00	µg/L
B200791-BLK3	0.00	µg/L
B200791-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
B200791-BLK1	0.00	µg/L
B200791-BLK2	0.00	µg/L
B200791-BLK3	0.00	µg/L
B200791-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.010
MRL: 0.025

Analyte: Se(VI)

Sample	Result	Units
B200791-BLK1	0.00	µg/L
B200791-BLK2	0.00	µg/L
B200791-BLK3	0.00	µg/L
B200791-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.012
MRL: 0.025

Analyte: SeCN

Sample	Result	Units
B200791-BLK1	0.00	µg/L
B200791-BLK2	0.00	µg/L
B200791-BLK3	0.00	µg/L
B200791-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.008
MRL: 0.025

Analyte: SeMet

Sample	Result	Units
B200791-BLK1	0.00	µg/L
B200791-BLK2	0.00	µg/L
B200791-BLK3	0.00	µg/L
B200791-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
B200791-BLK1	0.00	µg/L
B200791-BLK2	0.00	µg/L
B200791-BLK3	0.00	µg/L
B200791-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.012
MRL: 0.025

Analyte: Unk Se Sp

Sample	Result	Units
B200791-BLK1	0.00	µg/L
B200791-BLK2	0.00	µg/L
B200791-BLK3	0.00	µg/L
B200791-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.012
MRL: 0.025

Method Blanks & Reporting Limits

Batch: B200795
Matrix: Water
Method: EPA 1638 Mod
Analyte: Se

Sample	Result	Units
B200795-BLK1	0.154	µg/L
B200795-BLK2	0.103	µg/L
B200795-BLK3	0.059	µg/L
B200795-BLK4	0.303	µg/L
B200795-BLK5	0.061	µg/L

Average: 0.136
Limit: 0.880

MDL: 0.440
MRL: 0.880

Method Blanks & Reporting Limits

Batch: B200814
Matrix: Water
Method: SOP BAL-4201
Analyte: DMSeO

Sample	Result	Units
B200814-BLK1	0.00	µg/L
B200814-BLK2	0.00	µg/L
B200814-BLK3	0.00	µg/L
B200814-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Analyte: MeSe(IV)

Sample	Result	Units
B200814-BLK1	0.00	µg/L
B200814-BLK2	0.00	µg/L
B200814-BLK3	0.00	µg/L
B200814-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Analyte: Se Unk A

Sample	Result	Units
B200814-BLK1	0.00	µg/L
B200814-BLK2	0.00	µg/L
B200814-BLK3	0.00	µg/L
B200814-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
B200814-BLK1	0.00	µg/L
B200814-BLK2	0.00	µg/L
B200814-BLK3	0.00	µg/L
B200814-BLK4	0.022	µg/L

Average: 0.006
Limit: 0.025

MDL: 0.010
MRL: 0.025

Analyte: Se(VI)

Sample	Result	Units
B200814-BLK1	0.00	µg/L
B200814-BLK2	0.00	µg/L
B200814-BLK3	0.00	µg/L
B200814-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.012
MRL: 0.025

Analyte: SeCN

Sample	Result	Units
B200814-BLK1	0.00	µg/L
B200814-BLK2	0.00	µg/L
B200814-BLK3	0.00	µg/L
B200814-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.008
MRL: 0.025

Analyte: SeMet

Sample	Result	Units
B200814-BLK1	0.00	µg/L
B200814-BLK2	0.00	µg/L
B200814-BLK3	0.00	µg/L
B200814-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
B200814-BLK1	0.00	µg/L
B200814-BLK2	0.00	µg/L
B200814-BLK3	0.00	µg/L
B200814-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.012
MRL: 0.025

Analyte: Unk Se Sp

Sample	Result	Units
B200814-BLK1	0.00	µg/L
B200814-BLK2	0.00	µg/L
B200814-BLK3	0.00	µg/L
B200814-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.012
MRL: 0.025

Method Blanks & Reporting Limits

Batch: B200899
Matrix: Water
Method: EPA 1638 Mod
Analyte: Se

Sample	Result	Units
B200899-BLK1	0.154	µg/L
B200899-BLK2	0.060	µg/L
B200899-BLK3	0.072	µg/L
B200899-BLK4	0.078	µg/L

Average: 0.091
Limit: 0.480

MDL: 0.220
MRL: 0.480

Sample Containers

Lab ID: 2010044-01 **Report Matrix:** WS **Collected:** 02/24/2020
Sample: RG_LIDCOM_WS_20200224_1014 **Sample Type:** Sample + Sum **Received:** 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	125 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler #2 - 2010044

Lab ID: 2010044-02 **Report Matrix:** WS **Collected:** 02/24/2020
Sample: RG_LIDCOM_WS_20200224_1014 **Sample Type:** Sample + Sum **Received:** 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	125 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler #2 - 2010044

Lab ID: 2010044-03 **Report Matrix:** WS **Collected:** 02/24/2020
Sample: RG_LIDCOM_WS_20200224_1014 **Sample Type:** Sample + Sum **Received:** 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044
C	EXTRA_VOL	125 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044

Lab ID: 2010044-04 **Report Matrix:** WS **Collected:** 02/24/2020
Sample: RG_LISP24_WS_20200224_1220 **Sample Type:** Sample + Sum **Received:** 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	125 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler #2 - 2010044

Lab ID: 2010044-05 **Report Matrix:** WS **Collected:** 02/24/2020
Sample: RG_LISP24_WS_20200224_1220 **Sample Type:** Sample + Sum **Received:** 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	125 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler #2 - 2010044

Sample Containers

Lab ID: 2010044-06 **Report Matrix:** WS **Collected:** 02/24/2020
Sample: RG_LISP24_WS_20200224_1220 **Sample Type:** Sample + Sum **Received:** 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044
C	EXTRA_VOL	125 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044

Lab ID: 2010044-07 **Report Matrix:** WS **Collected:** 02/24/2020
Sample: RG_LILC3_WS_20200224_1420 **Sample Type:** Sample + Sum **Received:** 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	125 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler #2 - 2010044

Lab ID: 2010044-08 **Report Matrix:** WS **Collected:** 02/24/2020
Sample: RG_LILC3_WS_20200224_1420 **Sample Type:** Sample + Sum **Received:** 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	125 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler #2 - 2010044

Lab ID: 2010044-09 **Report Matrix:** WS **Collected:** 02/24/2020
Sample: RG_LILC3_WS_20200224_1420 **Sample Type:** Sample + Sum **Received:** 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044
C	EXTRA_VOL	125 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044

Sample Containers

Lab ID: 2010044-10 **Report Matrix:** WS **Collected:** 02/25/2020
Sample: RG_LI8_WS_20200225_1435 **Sample Type:** Sample + Sum **Received:** 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	125 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler #2 - 2010044

Lab ID: 2010044-11 **Report Matrix:** WS **Collected:** 02/25/2020
Sample: RG_LI8_WS_20200225_1435 **Sample Type:** Sample + Sum **Received:** 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	125 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler #2 - 2010044

Lab ID: 2010044-12 **Report Matrix:** WS **Collected:** 02/25/2020
Sample: RG_LI8_WS_20200225_1435 **Sample Type:** Sample + Sum **Received:** 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044
C	EXTRA_VOL	125 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044

Lab ID: 2010044-13 **Report Matrix:** WS **Collected:** 02/25/2020
Sample: RG_FRUL_WS_20200225_1030 **Sample Type:** Sample + Sum **Received:** 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	125 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler #2 - 2010044

Lab ID: 2010044-14 **Report Matrix:** WS **Collected:** 02/25/2020
Sample: RG_FRUL_WS_20200225_1030 **Sample Type:** Sample + Sum **Received:** 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	125 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler #2 - 2010044

Sample Containers

Lab ID: 2010044-15 **Report Matrix:** WS **Collected:** 02/25/2020
Sample: RG_FRUL_WS_20200225_1030 **Sample Type:** Sample + Sum **Received:** 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044
C	EXTRA_VOL	125 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044

Lab ID: 2010044-16 **Report Matrix:** WS **Collected:** 02/25/2020
Sample: RG_FO23_WS_20200223_1230 **Sample Type:** Sample + Sum **Received:** 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	125 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler #2 - 2010044

Lab ID: 2010044-17 **Report Matrix:** WS **Collected:** 02/25/2020
Sample: RG_FO23_WS_20200223_1230 **Sample Type:** Sample + Sum **Received:** 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	125 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler #2 - 2010044

Lab ID: 2010044-18 **Report Matrix:** WS **Collected:** 02/25/2020
Sample: RG_FO23_WS_20200223_1230 **Sample Type:** Sample + Sum **Received:** 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044
C	EXTRA_VOL	125 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044

Sample Containers

Lab ID: 2010044-19
Sample: RG_DUPLICATE_WS_20200226_09:00
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 02/26/2020
Received: 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	125 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler #2 - 2010044

Lab ID: 2010044-20
Sample: RG_DUPLICATE_WS_20200226_09:00
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 02/26/2020
Received: 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	125 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler #2 - 2010044

Lab ID: 2010044-21
Sample: RG_DUPLICATE_WS_20200226_09:00
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 02/26/2020
Received: 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044
C	EXTRA_VOL	125 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044

Lab ID: 2010044-22
Sample: RG_FBLANK_WS_20200226_0800
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 02/26/2020
Received: 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	125 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler #2 - 2010044

Lab ID: 2010044-23
Sample: RG_FBLANK_WS_20200226_0800
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 02/26/2020
Received: 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	125 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler #2 - 2010044

Sample Containers

Lab ID: 2010044-24 **Report Matrix:** WS **Collected:** 02/26/2020
Sample: RG_FBLANK_WS_20200226_0800 **Sample Type:** Sample + Sum **Received:** 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044
C	EXTRA_VOL	125 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044

Lab ID: 2010044-25 **Report Matrix:** WS **Collected:** 02/26/2020
Sample: RG_SLINE_WS_20200226_1015 **Sample Type:** Sample + Sum **Received:** 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler #2 - 2010044

Lab ID: 2010044-26 **Report Matrix:** WS **Collected:** 02/26/2020
Sample: RG_SLINE_WS_20200226_1015 **Sample Type:** Sample + Sum **Received:** 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler #2 - 2010044

Lab ID: 2010044-27 **Report Matrix:** WS **Collected:** 02/26/2020
Sample: RG_SLINE_WS_20200226_1015 **Sample Type:** Sample + Sum **Received:** 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044
C	EXTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044

Sample Containers

Lab ID: 2010044-28 **Report Matrix:** WS **Collected:** 02/26/2020
Sample: RG_LCUT_WS_20200226_1500 **Sample Type:** Sample + Sum **Received:** 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	125 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler #2 - 2010044

Lab ID: 2010044-29 **Report Matrix:** WS **Collected:** 02/26/2020
Sample: RG_LCUT_WS_20200226_1500 **Sample Type:** Sample + Sum **Received:** 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	125 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler #2 - 2010044

Lab ID: 2010044-30 **Report Matrix:** WS **Collected:** 02/26/2020
Sample: RG_LCUT_WS_20200226_1500 **Sample Type:** Sample + Sum **Received:** 03/05/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044
C	EXTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #2 - 2010044

Shipping Containers

Styrofoam Cooler #2 - 2010044

Received: March 5, 2020 7:00
Tracking No: 78685 via Courier
Coolant Type: Blue Ice
Temperature: 2.6 °C

Description: Styrofoam Cooler #2
Damaged in transit? No
Returned to client? No
Comments: IR #19

Custody seals present? No
Custody seals intact? No
COC present? Yes

Teck

COC ID: Regional Effects Program | **TURNAROUND TIME:** Regular

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	Cait Good			Lab Contact	Ben Wozniak			Email 1:	cait.good@teck.com	x	x	x
Email	cait.good@teck.com			Email	ben@brooksapplied.com			Email 2:	carlie.meyer@teck.com	x	x	x
Address	421 Pine Avenue			Address	18804 North Creek Parkway			Email 3:	teckcoal@equisonline.com			x
								Email 4:	kbatchelar@minnow.ca	x	x	x
City	Sparwood	Province	BC	City	Bothell	Province	WA	Email 5:				
Postal Code	V0B 2G0	Country	Canada	Postal Code	98011	Country	USA					
Phone Number	250-425-8202			Phone Number	206-632-6206			PO number	VPO00616213			

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.	HNO3	HNO3										
								PRESERV.	P	F/P	F										
								ANALYSIS	Total Selenium	Dissolved Selenium	Selenium Speciation									
RG_LIDCOM_WS_20200224_1014	RG_LIDCOM	WS	No	2020/02/24	10:14:00	G	3		1	1	1									
RG_LISP24_WS_20200224_1220	RG_LISP24	WS	No	2020/02/24	12:20:00	G	3		1	1	1									
RG_LILC3_WS_20200224_1420	RG_LILC3	WS	No	2020/02/24	14:20:00	G	3		1	1	1									
RG_LI8_WS_20200225-1435	RG_LI8	WS	No	2020/02/25	14:35:00	G	3		1	1	1									
RG_FRUL_WS_20200225-1030	RG_FRUL	WS	No	2020/02/25	10:30:00	G	3		1	1	1									
RG_FO23_WS_20200225-1230	RG_FO23	WS	No	2020/02/25	12:30:00	G	3		1	1	1									
RG_DUPLICATE_WS_20200226_0900	RG_DUP	WS	NO	2020/02/26	09:00:00	G	3		1	1	1									
RG_FBLANK_WS_20200226_0800	RG_FBLANK	WS	NO	2020/02/26	08:00:00	G	3		1	1	1									
RG_SLINE_WS_20200226_1015	RG_SLINE	WS	NO	2020/02/26	10:15:00	G	#NAM?		1	1	1									
RG_LCUT_WS_20200226_1500	RG_LCUT	WS	NO	2020/02/26	15:00:00	G	#NAM?		1	1	1									

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Line Creek LAEMP - VPO00552669. **Samples for total metals have been preserved in the field. Dissolve metals have been filtered and preserved. Speciation samples have been filtered and frozen.**				3/5/20 7:00

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	MIA OTTO	**Mobile #**	250 464 9531
Sampler's Signature		**Date/Time**	26 Feb 2020 16:30

STRAIGHT BILL OF LADING
NOT NEGOTIABLE

RW HOT SHOT SERVICE INC.

250-425-7447

24 Hour Hot Shot Service

No. 78685

Sparwood, BC	Vancouver, BC	Elkford, BC	Ft. McMurray, AB	Montreal, QC	Shelby, MT
Kamloops, BC	Prince George, BC	Calgary, AB	Hinton, AB	Gillette, WY	
Terrace, BC	Tumbler Ridge, BC	Edmonton, AB	Red Deer, AB	Spokane, WA	

INVOICE TO — DATE: May 4, 2020

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)

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 07:00

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: Andy Nutzhorn

SHIPPER SIGN | CONSIGNEE SIGN

DATE 3-5-20
TIME 07:00

WHITE: Office YELLOW: Carrier PINK: Consignee GOLDENROAD: Shipper

GST # 864540398RT0001

NUMBER OF PIECES RECEIVED

AMOOS PRINTING

5 trays cooler #2 2.6°C IR-19 1 ICE, BLUE 1 ICE
COC

RG Sp samples at 0.7°C & frozen

CM Acid pads. (client) lot#111807Z

Sp Goal Hope 125mL HDPE
LC, CM, RG-SLINE RG

T, D Goal Hope 125mL HDPE
LC, CM, RG-SLINE RG

SELENIUM CHEMISTRY

BAL Final Report 2018043

(Finalized May 18, 2020)

BROOKS APPLIED LABS
18804 North Creek Parkway, Ste 100, Bothell, WA 98011 • USA • T: 206 632 6206 F: 206 632 6017 • info@brooksapplied.com

May 18, 2020

Teck Resources Limited - Vancouver
Cait Good
421 Pine Avenue
Sparwood, B.C. CANADA V0B2G0
Cait.Good@Teck.com

Re: Regional Effects Program

Ms. Good,

On April 30, 2020, Brooks Applied Labs (BAL) received two (2) 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 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 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.

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)*], selenomethionine [*SeMet*], selenosulfate [$SeSO_3$], and dimethylselenoxide [*DMSeO*]. An unknown selenium species eluting between MeSe(IV) and SeMet is also reported [*Se Unk A*]. Research at BAL has indicated that [*Se Unk A*] is a product of the oxidation of volatile selenium species present in some client samples. The total concentration of any remaining unidentified selenium-containing species detected in each sample has also been reported 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).

All data were reported without qualification (aside from concentration qualifiers). 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, 2019; Valid to: June 30, 2020
Certificate Number: E87982-33

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	Ag, As, 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
EPA 1632A	Non-Potable Waters	Inorganic Arsenic, As(III)
	Biological	Inorganic Arsenic
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs
BAL-4200	Non-Potable Waters	Se(IV), Se(VI)
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), and DoD/DOE (3)

Issued by: ANAB

Issued on: January 10, 2020; Valid to: March 30, 2022

Method	Matrix	ISO and Non-Gov. TNI Accredited Analyte(s)	DoD/DOE Accredited Analytes
EPA 1638 Mod EPA 200.8 Mod EPA 6020 Mod BAL-5000	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	Ag, Al, As, Ba, Ca, Cd, Cr, Cu, Fe, Pb, Mg, Mn, Ni, Sb, Se, V, Zn
	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	Ag, As, Cd, Cr, Cu, Pb, Ni, Se, Zn
EPA 1640 Mod	Non-Potable Waters	Ag, As, Be, Cd, Cr, Co, Cu, Pb, Ni, Se, Tl, V, Zn	Not Accredited
EPA 1631E Mod BAL-3100 (waters) BAL-3101 (solids)	Non-Potable Waters, Solids/Chemicals & Biological/Food	Total Mercury	Total Mercury
EPA 1630 Mod BAL-3200	Non-Potable Waters, Solids/Chemicals Biological	Methyl Mercury	Methyl Mercury (excluding Solids/Chemicals)
EPA 1632A Mod BAL-3300	Non-Potable Waters Solids/Chemicals	Inorganic Arsenic, As(III)	Inorganic Arsenic. As(III) for waters only.
	Biological/Food	Inorganic Arsenic	Inorganic Arsenic (excluding Food)
AOAC 2015.01 Mod BAL-5000 by BAL-5040	Food	As, Cd, Hg, Pb	Not Accredited
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs	Not Accredited
	Biological by BAL-4115	Inorganic Arsenic, DMAs, MMAs	Not Accredited
BAL-4101	Food by BAL-4116	Inorganic Arsenic, DMAs, MMAs	Not Accredited
BAL-4200	Non-Potable Waters	Se(IV), Se(VI), SeCN	Not Accredited
BAL-4201	Non-Potable Waters	Se(IV), Se(VI), SeCN, SeMet	Not Accredited
BAL-4300	Non-Potable Waters, Solid/Chemicals	Cr(VI)	Cr(VI)
SM 3500-Fe BAL-4500	Non-Potable Waters	Fe, Fe(II)	Not Accredited
SM2340B	Non-Potable Waters	Hardness	Hardness
SM 2540G EPA 160.3 BAL-0501	Solids/Chemicals & Biological	% Dry Weight	% Dry Weight

(1) ISO/IEC 17025:2017 – Certificate Number ADE-1447.2
(2) Non-Governmental NELAC Institute 2016 Standard – Certificate Number ADE-1447.1
(3) Department of Defense/Energy Consolidated Quality Systems Manual v. 5.3 – Certificate Numbers ADE-1447 for DoD, ADE-1447.3 for DOE.

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_LCUT_WS_20200427-1107_NAL	2018043-01	WS	Sample	04/27/2020	04/30/2020
RG_LCUT_WS_20200427-1107_NAL	2018043-02	WS	Sample	04/27/2020	04/30/2020
RG_LCUT_WS_20200427-1107_NAL	2018043-03	WS	Sample	04/27/2020	04/30/2020
RG_LILC3_WS_20200427-1325_NAL	2018043-04	WS	Sample	04/27/2020	04/30/2020
RG_LILC3_WS_20200427-1325_NAL	2018043-05	WS	Sample	04/27/2020	04/30/2020
RG_LILC3_WS_20200427-1325_NAL	2018043-06	WS	Sample	04/27/2020	04/30/2020

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
DMSeO	Water	SOP BAL-4201	05/04/2020	05/05/2020	B201305	2000591
MeSe(IV)	Water	SOP BAL-4201	05/04/2020	05/05/2020	B201305	2000591
Se	Water	EPA 1638 Mod	04/30/2020	05/02/2020	B201307	2000584
Se Unk A	Water	SOP BAL-4201	05/04/2020	05/05/2020	B201305	2000591
Se(IV)	Water	SOP BAL-4201	05/04/2020	05/05/2020	B201305	2000591
Se(VI)	Water	SOP BAL-4201	05/04/2020	05/05/2020	B201305	2000591
SeCN	Water	SOP BAL-4201	05/04/2020	05/05/2020	B201305	2000591
SeMet	Water	SOP BAL-4201	05/04/2020	05/05/2020	B201305	2000591
SeSO3	Water	SOP BAL-4201	05/04/2020	05/05/2020	B201305	2000591
Unk Se Sp	Water	SOP BAL-4201	05/04/2020	05/05/2020	B201305	2000591

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_LCUT_WS_20200427-1107_NAL										
2018043-01	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201305	2000591
2018043-01	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201305	2000591
2018043-01	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201305	2000591
2018043-01	Se(IV)	WS	D	0.093	J	0.050	0.125	µg/L	B201305	2000591
2018043-01	Se(VI)	WS	D	64.8		0.060	0.125	µg/L	B201305	2000591
2018043-01	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B201305	2000591
2018043-01	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201305	2000591
2018043-01	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201305	2000591
2018043-01	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201305	2000591
RG_LCUT_WS_20200427-1107_NAL										
2018043-02	Se	WS	TR	67.4		0.258	0.528	µg/L	B201307	2000584
RG_LCUT_WS_20200427-1107_NAL										
2018043-03	Se	WS	D	67.6		0.258	0.528	µg/L	B201307	2000584
RG_LILC3_WS_20200427-1325_NAL										
2018043-04	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201305	2000591
2018043-04	MeSe(IV)	WS	D	0.027		0.010	0.025	µg/L	B201305	2000591
2018043-04	Se Unk A	WS	D	0.033		0.010	0.025	µg/L	B201305	2000591
2018043-04	Se(IV)	WS	D	0.205		0.050	0.125	µg/L	B201305	2000591
2018043-04	Se(VI)	WS	D	48.1		0.060	0.125	µg/L	B201305	2000591
2018043-04	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B201305	2000591
2018043-04	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201305	2000591
2018043-04	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201305	2000591
2018043-04	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201305	2000591
RG_LILC3_WS_20200427-1325_NAL										
2018043-05	Se	WS	TR	49.8		0.258	0.528	µg/L	B201307	2000584
RG_LILC3_WS_20200427-1325_NAL										
2018043-06	Se	WS	D	50.4		0.258	0.528	µg/L	B201307	2000584

Accuracy & Precision Summary

Batch: B201305
Lab Matrix: Water
Method: SOP BAL-4201

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B201305-BS1	**Blank Spike, (1923027)**						
	MeSe(IV)		5.095	5.265	µg/L	103% 75-125	
	Se(IV)		5.000	5.270	µg/L	105% 75-125	
	Se(VI)		5.000	5.263	µg/L	105% 75-125	
	SeCN		5.015	5.112	µg/L	102% 75-125	
	SeMet		4.932	4.689	µg/L	95% 75-125	
B201305-DUP1	**Duplicate, (2018024-19)**						
	DMSeO	ND		ND	µg/L		N/C 25
	MeSe(IV)	ND		ND	µg/L		N/C 25
	Se Unk A	ND		ND	µg/L		N/C 25
	Se(IV)	2.286		2.327	µg/L		2% 25
	Se(VI)	120.3		122.7	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
B201305-MS1	**Matrix Spike, (2018024-19)**						
	Se(IV)	2.286	4.900	6.472	µg/L	85% 75-125	
	Se(VI)	120.3	5.100	128.3	µg/L	NR 75-125	
	SeCN	ND	4.905	5.135	µg/L	105% 75-125	
	SeMet	ND	0.9885	1.023	µg/L	103% 75-125	
B201305-MSD1	**Matrix Spike Duplicate, (2018024-19)**						
	Se(IV)	2.286	4.900	6.717	µg/L	90% 75-125	4% 25
	Se(VI)	120.3	5.100	127.1	µg/L	NR 75-125	N/C 25
	SeCN	ND	4.905	5.134	µg/L	105% 75-125	0.02% 25
	SeMet	ND	0.9885	1.002	µg/L	101% 75-125	2% 25

Accuracy & Precision Summary

Batch: B201307
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B201307-BS1	**Blank Spike, (1943020)**						
	Se		200.0	202.6	µg/L	101% 75-125	
B201307-BS2	**Blank Spike, (1943020)**						
	Se		200.0	209.1	µg/L	105% 75-125	
B201307-BS3	**Blank Spike, (1943020)**						
	Se		200.0	201.1	µg/L	101% 75-125	
B201307-SRM1	**Reference Material (1938017, TMDA 51.5 Reference Standard - Bottle 2 - SRM)**						
	Se		14.30	14.62	µg/L	102% 75-125	
B201307-SRM2	**Reference Material (1938017, TMDA 51.5 Reference Standard - Bottle 2 - SRM)**						
	Se		14.30	14.58	µg/L	102% 75-125	
B201307-SRM3	**Reference Material (1938017, TMDA 51.5 Reference Standard - Bottle 2 - SRM)**						
	Se		14.30	14.14	µg/L	99% 75-125	
B201307-DUP4	**Duplicate, (2018037-02)**						
	Se	20.72		21.16	µg/L		2% 20
B201307-MS4	**Matrix Spike, (2018037-02)**						
	Se	20.72	220.0	247.9	µg/L	103% 75-125	
B201307-MSD4	**Matrix Spike Duplicate, (2018037-02)**						
	Se	20.72	220.0	255.5	µg/L	107% 75-125	3% 20

Method Blanks & Reporting Limits

Batch: B201305
Matrix: Water
Method: SOP BAL-4201
Analyte: DMSeO

Sample	Result	Units
B201305-BLK1	0.00	µg/L
B201305-BLK2	0.00	µg/L
B201305-BLK3	0.00	µg/L
B201305-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Analyte: MeSe(IV)

Sample	Result	Units
B201305-BLK1	0.00	µg/L
B201305-BLK2	0.00	µg/L
B201305-BLK3	0.00	µg/L
B201305-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Analyte: Se Unk A

Sample	Result	Units
B201305-BLK1	0.00	µg/L
B201305-BLK2	0.00	µg/L
B201305-BLK3	0.00	µg/L
B201305-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
B201305-BLK1	0.00	µg/L
B201305-BLK2	0.00	µg/L
B201305-BLK3	0.00	µg/L
B201305-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.010
MRL: 0.025

Analyte: Se(VI)

Sample	Result	Units
B201305-BLK1	0.00	µg/L
B201305-BLK2	0.00	µg/L
B201305-BLK3	0.00	µg/L
B201305-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.012
MRL: 0.025

Analyte: SeCN

Sample	Result	Units
B201305-BLK1	0.00	µg/L
B201305-BLK2	0.00	µg/L
B201305-BLK3	0.00	µg/L
B201305-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.008
MRL: 0.025

Analyte: SeMet

Sample	Result	Units
B201305-BLK1	0.00	µg/L
B201305-BLK2	0.00	µg/L
B201305-BLK3	0.00	µg/L
B201305-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
B201305-BLK1	0.00	µg/L
B201305-BLK2	0.00	µg/L
B201305-BLK3	0.00	µg/L
B201305-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.012
MRL: 0.025

Analyte: Unk Se Sp

Sample	Result	Units
B201305-BLK1	0.00	µg/L
B201305-BLK2	0.00	µg/L
B201305-BLK3	0.00	µg/L
B201305-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.012
MRL: 0.025

Method Blanks & Reporting Limits

Batch: B201307
Matrix: Water
Method: EPA 1638 Mod
Analyte: Se

Sample	Result	Units
B201307-BLK1	0.156	µg/L
B201307-BLK2	0.154	µg/L
B201307-BLK3	0.111	µg/L
B201307-BLK4	0.082	µg/L

Average: 0.126
Limit: 0.480

MDL: 0.235
MRL: 0.480

Sample Containers

Lab ID: 2018043-01 **Report Matrix:** WS **Collected:** 04/27/2020
Sample: RG_LCUT_WS_20200427-1107_NAL **Sample Type:** Sample + Sum **Received:** 04/30/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	n/a	none	n/a	n/a	Styrofoam Cooler #3 - 2018043
B	EXTRA_VOL	15 mL	n/a	none	n/a	n/a	Styrofoam Cooler #3 - 2018043
C	EXTRA_VOL	60 mL	n/a	none	n/a	n/a	Styrofoam Cooler #3 - 2018043

Lab ID: 2018043-02 **Report Matrix:** WS **Collected:** 04/27/2020
Sample: RG_LCUT_WS_20200427-1107_NAL **Sample Type:** Sample + Sum **Received:** 04/30/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	n/a	10% HNO3 (BAL)	2011006	<2	Styrofoam Cooler #3 - 2018043

Lab ID: 2018043-03 **Report Matrix:** WS **Collected:** 04/27/2020
Sample: RG_LCUT_WS_20200427-1107_NAL **Sample Type:** Sample + Sum **Received:** 04/30/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	n/a	10% HNO3 (BAL)	2011006	<2	Styrofoam Cooler #3 - 2018043

Lab ID: 2018043-04 **Report Matrix:** WS **Collected:** 04/27/2020
Sample: RG_LILC3_WS_20200427-1325_NAL **Sample Type:** Sample + Sum **Received:** 04/30/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	n/a	none	n/a	n/a	Styrofoam Cooler #3 - 2018043
B	EXTRA_VOL	15 mL	n/a	none	n/a	n/a	Styrofoam Cooler #3 - 2018043
C	EXTRA_VOL	60 mL	n/a	none	n/a	n/a	Styrofoam Cooler #3 - 2018043

Sample Containers

Lab ID: 2018043-05
Sample: RG_LILC3_WS_20200427-1325_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 04/27/2020
Received: 04/30/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	n/a	10% HNO3 (BAL)	2011006	<2	Styrofoam Cooler #3 - 2018043

Lab ID: 2018043-06
Sample: RG_LILC3_WS_20200427-1325_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 04/27/2020
Received: 04/30/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40 mL	n/a	10% HNO3 (BAL)	2011006	<2	Styrofoam Cooler #3 - 2018043

Shipping Containers

Styrofoam Cooler #3 - 2018043

Received: April 30, 2020 7:00
Tracking No: 78824 via Courier
Coolant Type: Blue Ice
Temperature: -0.4 °C

Description: Styrofoam Cooler #3
Damaged in transit? No
Returned to client? No
Comments: IR #20

Custody seals present? No
Custody seals intact? No
COC present? Yes

Teck

COC ID: Regional Effects Program

TURNAROUND TIME: Regular

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	Cait Good			Lab Contact	Ben Wozniak			Email 1:	cait.good@teck.com	X	X	X
Email	cait.good@teck.com			Email	ben@brooksapplied.com			Email 2:	Carlie.Meyer@teck.com	X	X	X
Address	421 Pine Avenue			Address	18804 North Creek Parkway			Email 3:	teckcoal@equisonline.com	X	X	X
City	Sparwood	Province	BC	City	Bothell	Province	WA	Email 4:	kbatchelar@minnow.ca	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	98011	Country	USA	Email 5:				
Phone Number	250-425-8202			Phone Number	206-632-6206			PO number	VPO00690100			

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.	HNO3	HNO3										
PRESERV.									P	F/P	F									
ANALYSIS									Total Selenium	Dissolved Selenium	Selenium Speciation									
RG-LCUT_WS_20220427-1107_NA	RG.LCUT	WS	No	2022/04/27	11:07	G	3		X	X	X									
RG.LILC3_WS_20220427-1325_NA	RG.LILC3	WS	No	2022/04/27	13:25	G	3		X	X	X									

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Line Creek LAEMP - VPO00690100. Samples for total selenium have been preserved in the field. Dissolved selenium have been filtered and preserved. Speciation samples have been filtered and frozen.	Scott Gordon/Lotic Environmental	2022/04/27 15:04	[signature]	4/30/22 7:00

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	Scott Gordon	Mobile #	780-385-0186
Sampler's Signature	[signature]	Date/Time	2022/04/27 15:04

STRAIGHT BILL OF LADING
NOT NEGOTIABLE

RW HOT SHOT SERVICE INC.

250-425-7447

24 Hour Hot Shot Service

No. 78824

Sparwood, BC	Vancouver, BC	Elkford, BC	Ft. McMurray, AB	Montreal, QC	Shelby, MT
Kamloops, BC	Prince George, BC	Calgary, AB	Hinton, AB	Gillette, WY	
Terrace, BC	Tumbler Ridge, BC	Edmonton, AB	Red Deer, AB	Spokane, WA	

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		

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, oin 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 dale 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

WHITE: Office YELLOW: Carrier PINK: Consignee GOLDENROAD: Shipper **GST # 864540398RT0001** NUMBER OF PIECES RECEIVED

AMIGOS PRINTING

Styrocooler #3 COC ✓ Blue Ice → -0.4°C

WL - April 23/24 +10/5

25/26

RG

WLC SP38

11

SELENIUM CHEMISTRY

BAL Final Report 2019010 B

(Finalized June 19, 2020)

BROOKS APPLIED LABS
18804 North Creek Parkway, Ste 100, Bothell, WA 98011 • USA • T: 206 632 6206 F: 206 632 6017 • info@brooksapplied.com

June 19, 2020

Teck Resources Limited - Vancouver
Cait Good
421 Pine Avenue
Sparwood, B.C. CANADA V0B2G0
Cait.Good@Teck.com

Re: LCO

Ms. Good,

On May 7, 2020, Brooks Applied Labs (BAL) received one (1) aqueous sample.

A discrepancy was observed between the field ID present on the chain-of-custody (COC) form and the sample ID listed on the corresponding client container labels. Please see the following table for information on the field ID issues.

Lab ID	Sample ID from COC	Sample ID from Container Label	Collection Date/Time	Analytical Parameter
2019010-28	LC_LCDSSLCC_WS_2020-04-29_1050_NAL	RG_LIDSL_WS_20200429_1050_NAL	04/29/2020 10:50	Total Recoverable Se
2019010-29	LC_LCDSSLCC_WS_2020-04-29_1050_NAL	RG_LIDSL_WS_20200429_1050_NAL	04/29/2020 10:50	Dissolved Se
2019010-30	LC_LCDSSLCC_WS_2020-04-29_1050_NAL	RG_LIDSL_WS_20200429_1050_NAL	04/29/2020 10:50	Selenium Speciation

Per client request, all sample fractions were logged-in and reported using the field IDs listed on the client COC form (column 2 in the above table).

The sample was 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 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 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.

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)*], selenomethionine [*SeMet*], selenosulfate [$SeSO_3$], and dimethylselenoxide [*DMSeO*]. An unknown selenium species eluting between MeSe(IV) and SeMet is also reported [*Se Unk A*]. Research at BAL has indicated that [*Se Unk A*] is a product of the oxidation of volatile selenium species present in some client samples. The total concentration of any remaining unidentified selenium-containing species detected in each sample has also been reported 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).

All data were reported without qualification (aside from concentration qualifiers). 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, 2019; Valid to: June 30, 2020
Certificate Number: E87982-33

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	Ag, As, 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
EPA 1632A	Non-Potable Waters	Inorganic Arsenic, As(III)
	Biological	Inorganic Arsenic
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs
BAL-4200	Non-Potable Waters	Se(IV), Se(VI)
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), and DoD/DOE (3)

Issued by: ANAB

Issued on: January 10, 2020; Valid to: March 30, 2022

Method	Matrix	ISO and Non-Gov. TNI Accredited Analyte(s)	DoD/DOE Accredited Analytes
EPA 1638 Mod EPA 200.8 Mod EPA 6020 Mod BAL-5000	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	Ag, Al, As, Ba, Ca, Cd, Cr, Cu, Fe, Pb, Mg, Mn, Ni, Sb, Se, V, Zn
	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	Ag, As, Cd, Cr, Cu, Pb, Ni, Se, Zn
EPA 1640 Mod	Non-Potable Waters	Ag, As, Be, Cd, Cr, Co, Cu, Pb, Ni, Se, Tl, V, Zn	Not Accredited
EPA 1631E Mod BAL-3100 (waters) BAL-3101 (solids)	Non-Potable Waters, Solids/Chemicals & Biological/Food	Total Mercury	Total Mercury
EPA 1630 Mod BAL-3200	Non-Potable Waters, Solids/Chemicals Biological	Methyl Mercury	Methyl Mercury (excluding Solids/Chemicals)
EPA 1632A Mod BAL-3300	Non-Potable Waters Solids/Chemicals	Inorganic Arsenic, As(III)	Inorganic Arsenic. As(III) for waters only.
	Biological/Food	Inorganic Arsenic	Inorganic Arsenic (excluding Food)
AOAC 2015.01 Mod BAL-5000 by BAL-5040	Food	As, Cd, Hg, Pb	Not Accredited
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs	Not Accredited
	Biological by BAL-4115	Inorganic Arsenic, DMAs, MMAs	Not Accredited
BAL-4101	Food by BAL-4116	Inorganic Arsenic, DMAs, MMAs	Not Accredited
BAL-4200	Non-Potable Waters	Se(IV), Se(VI), SeCN	Not Accredited
BAL-4201	Non-Potable Waters	Se(IV), Se(VI), SeCN, SeMet	Not Accredited
BAL-4300	Non-Potable Waters, Solid/Chemicals	Cr(VI)	Cr(VI)
SM 3500-Fe BAL-4500	Non-Potable Waters	Fe, Fe(II)	Not Accredited
SM2340B	Non-Potable Waters	Hardness	Hardness
SM 2540G EPA 160.3 BAL-0501	Solids/Chemicals & Biological	% Dry Weight	% Dry Weight

(1) ISO/IEC 17025:2017 – Certificate Number ADE-1447.2
(2) Non-Governmental NELAC Institute 2016 Standard – Certificate Number ADE-1447.1
(3) Department of Defense/Energy Consolidated Quality Systems Manual v. 5.3 – Certificate Numbers ADE-1447 for DoD, ADE-1447.3 for DOE.

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
LC_LCDSSLCC_WS_2020-04-29_1050_NAL	2019010-28	WS	Sample	04/29/2020	05/07/2020
LC_LCDSSLCC_WS_2020-04-29_1050_NAL	2019010-29	WS	Sample	04/29/2020	05/07/2020
LC_LCDSSLCC_WS_2020-04-29_1050_NAL	2019010-30	WS	Sample	04/29/2020	05/07/2020

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
DMSeO	Water	SOP BAL-4201	05/05/2020	05/07/2020	B201351	2000603
MeSe(IV)	Water	SOP BAL-4201	05/05/2020	05/07/2020	B201351	2000603
Se	Water	EPA 1638 Mod	05/13/2020	05/14/2020	B201377	2000650
Se Unk A	Water	SOP BAL-4201	05/05/2020	05/07/2020	B201351	2000603
Se(IV)	Water	SOP BAL-4201	05/05/2020	05/07/2020	B201351	2000603
Se(VI)	Water	SOP BAL-4201	05/05/2020	05/07/2020	B201351	2000603
SeCN	Water	SOP BAL-4201	05/05/2020	05/07/2020	B201351	2000603
SeMet	Water	SOP BAL-4201	05/05/2020	05/07/2020	B201351	2000603
SeSO3	Water	SOP BAL-4201	05/05/2020	05/07/2020	B201351	2000603
Unk Se Sp	Water	SOP BAL-4201	05/05/2020	05/07/2020	B201351	2000603

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
LC_LCDSSLCC_WS_2020-04-29_1050_NAL										
2019010-28	Se	WS	TR	40.4		0.170	0.528	µg/L	B201377	2000650
LC_LCDSSLCC_WS_2020-04-29_1050_NAL										
2019010-29	Se	WS	D	38.6		0.170	0.528	µg/L	B201377	2000650
LC_LCDSSLCC_WS_2020-04-29_1050_NAL										
2019010-30	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201351	2000603
2019010-30	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201351	2000603
2019010-30	Se Unk A	WS	D	0.024	J	0.010	0.025	µg/L	B201351	2000603
2019010-30	Se(IV)	WS	D	0.164		0.050	0.125	µg/L	B201351	2000603
2019010-30	Se(VI)	WS	D	32.6		0.060	0.125	µg/L	B201351	2000603
2019010-30	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B201351	2000603
2019010-30	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201351	2000603
2019010-30	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201351	2000603
2019010-30	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201351	2000603

Accuracy & Precision Summary

Batch: B201351
Lab Matrix: Water
Method: SOP BAL-4201

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B201351-BS1	**Blank Spike, (1923027)**						
	MeSe(IV)		5.095	5.047	µg/L	99% 75-125	
	Se(IV)		5.000	5.159	µg/L	103% 75-125	
	Se(VI)		5.000	5.017	µg/L	100% 75-125	
	SeCN		5.015	4.682	µg/L	93% 75-125	
	SeMet		4.932	4.456	µg/L	90% 75-125	
B201351-DUP6	**Duplicate, (2019010-30)**						
	DMSeO	ND		ND	µg/L		N/C 25
	MeSe(IV)	ND		ND	µg/L		N/C 25
	Se Unk A	0.024		0.025	µg/L		3% 25
	Se(IV)	0.164		0.172	µg/L		5% 25
	Se(VI)	32.65		33.05	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
B201351-MS6	**Matrix Spike, (2019010-30)**						
	Se(IV)	0.164	4.900	5.338	µg/L	106% 75-125	
	Se(VI)	32.65	5.100	38.22	µg/L	NR 75-125	
	SeCN	ND	4.905	4.748	µg/L	97% 75-125	
	SeMet	ND	0.9885	0.918	µg/L	93% 75-125	
B201351-MSD6	**Matrix Spike Duplicate, (2019010-30)**						
	Se(IV)	0.164	4.900	4.972	µg/L	98% 75-125	7% 25
	Se(VI)	32.65	5.100	36.88	µg/L	NR 75-125	N/C 25
	SeCN	ND	4.905	4.713	µg/L	96% 75-125	0.7% 25
	SeMet	ND	0.9885	0.904	µg/L	91% 75-125	2% 25

Accuracy & Precision Summary

Batch: B201377
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B201377-BS1	**Blank Spike, (1943020)**						
	Se		200.0	206.2	µg/L	103% 75-125	
B201377-BS2	**Blank Spike, (1943020)**						
	Se		200.0	202.6	µg/L	101% 75-125	
B201377-BS3	**Blank Spike, (1943020)**						
	Se		200.0	204.2	µg/L	102% 75-125	
B201377-BS4	**Blank Spike, (1943020)**						
	Se		200.0	203.7	µg/L	102% 75-125	
B201377-SRM1	**Reference Material (1938019, TMDA 51.5 Reference Standard - Bottle 4 - SRM)**						
	Se		14.30	14.69	µg/L	103% 75-125	
B201377-SRM2	**Reference Material (1938019, TMDA 51.5 Reference Standard - Bottle 4 - SRM)**						
	Se		14.30	14.62	µg/L	102% 75-125	
B201377-SRM3	**Reference Material (1938019, TMDA 51.5 Reference Standard - Bottle 4 - SRM)**						
	Se		14.30	13.96	µg/L	98% 75-125	
B201377-SRM4	**Reference Material (1938019, TMDA 51.5 Reference Standard - Bottle 4 - SRM)**						
	Se		14.30	14.36	µg/L	100% 75-125	
B201377-DUP2	**Duplicate, (2019010-16)**						
	Se	35.96		34.92	µg/L		3% 20
B201377-MS2	**Matrix Spike, (2019010-16)**						
	Se	35.96	220.0	259.9	µg/L	102% 75-125	
B201377-MSD2	**Matrix Spike Duplicate, (2019010-16)**						
	Se	35.96	220.0	261.3	µg/L	102% 75-125	0.5% 20

Method Blanks & Reporting Limits

Batch: B201351
Matrix: Water
Method: SOP BAL-4201
Analyte: DMSeO

Sample	Result	Units
B201351-BLK1	0.00	µg/L
B201351-BLK2	0.00	µg/L
B201351-BLK3	0.00	µg/L
B201351-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Analyte: MeSe(IV)

Sample	Result	Units
B201351-BLK1	0.00	µg/L
B201351-BLK2	0.00	µg/L
B201351-BLK3	0.00	µg/L
B201351-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Analyte: Se Unk A

Sample	Result	Units
B201351-BLK1	0.00	µg/L
B201351-BLK2	0.00	µg/L
B201351-BLK3	0.00	µg/L
B201351-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
B201351-BLK1	0.00	µg/L
B201351-BLK2	0.00	µg/L
B201351-BLK3	0.00	µg/L
B201351-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.010
MRL: 0.025

Analyte: Se(VI)

Sample	Result	Units
B201351-BLK1	0.00	µg/L
B201351-BLK2	0.00	µg/L
B201351-BLK3	0.00	µg/L
B201351-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.012
MRL: 0.025

Analyte: SeCN

Sample	Result	Units
B201351-BLK1	0.00	µg/L
B201351-BLK2	0.00	µg/L
B201351-BLK3	0.00	µg/L
B201351-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.008
MRL: 0.025

Analyte: SeMet

Sample	Result	Units
B201351-BLK1	0.00	µg/L
B201351-BLK2	0.00	µg/L
B201351-BLK3	0.00	µg/L
B201351-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
B201351-BLK1	0.00	µg/L
B201351-BLK2	0.00	µg/L
B201351-BLK3	0.00	µg/L
B201351-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.012
MRL: 0.025

Analyte: Unk Se Sp

Sample	Result	Units
B201351-BLK1	0.00	µg/L
B201351-BLK2	0.00	µg/L
B201351-BLK3	0.00	µg/L
B201351-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.012
MRL: 0.025

Method Blanks & Reporting Limits

Batch: B201377
Matrix: Water
Method: EPA 1638 Mod
Analyte: Se

Sample	Result	Units
B201377-BLK1	0.102	µg/L
B201377-BLK2	0.039	µg/L
B201377-BLK3	0.054	µg/L
B201377-BLK4	0.027	µg/L

Average: 0.055
Limit: 0.480

MDL: 0.155
MRL: 0.480

Sample Containers

Lab ID: 2019010-28
Sample: LC_LCDSSLCC_WS_2020-04-29_1050_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 04/29/2020
Received: 05/07/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2011007	<2	Styrofoam Cooler #2 - 2019010

Lab ID: 2019010-29
Sample: LC_LCDSSLCC_WS_2020-04-29_1050_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 04/29/2020
Received: 05/07/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2011007	<2	Styrofoam Cooler #2 - 2019010

Lab ID: 2019010-30
Sample: LC_LCDSSLCC_WS_2020-04-29_1050_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 04/29/2020
Received: 05/07/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2019010
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2019010
C	EXTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #2 - 2019010

Shipping Containers

Styrofoam Cooler #2 - 2019010

Received: May 7, 2020 7:00
Tracking No: 78909 via Courier
Coolant Type: Ice
Temperature: 1.3 °C

Description: Styrofoam Cooler #2
Damaged in transit? No
Returned to client? No
Comments: IR #19

Custody seals present? No
Custody seals intact? No
COC present? No

Confidential

BAL Final Report 2019010 B

COC ID: Regional Effects Program | **TURNAROUND TIME:** Regular

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO				
Facility Name / Job#	LCO			Lab Name	Brooks Applied Labs			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cait Good			Lab Contact	Ben Wozniak			Email 1:	cait.good@teck.com	x	x	x
Email	cait.good@teck.com			Email	ben@brooksapplied.com			Email 2:	Carlie.Meyer@teck.com	x	x	x
Address	421 Pine Avenue			Address	18804 North Creek Parkway			Email 3:	teckcoal@equisonline.com			x
								Email 4:	kbatchelar@minnow.ca	x	x	x
City	Sparwood	Province	BC	City	Bothell	Province	WA	Email 5:				
Postal Code	V0B 2G0	Country	Canada	Postal Code	98011	Country	USA					
Phone Number	250-425-8257			Phone Number	206-632-6206			PO number	VPO00690100			

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
								HNO3	P	Total Selenium
								HNO3	F/P	Dissolved Selenium
									F	Selenium Speciation
LC_LCDSSLCC_WS_2020-04-29_1050_NAL	LC_LCDSSLCC	WS	No	29-Apr-20	10:50:00 AM	G	3			
								X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Line Creek LAEMP - VPO00690100. Samples for total selenium have been preserved in the field. Dissolved selenium have been filtered and preserved. Speciation samples have been filtered and frozen.	Scott Gordon/Lotic Environmental	April 30, 2020		

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	Scott Gordon	Mobile #	780-385-0186
Sampler's Signature		Date/Time	

STRAIGHT BILL OF LADING
NOT NEGOTIABLE

RW HOT SHOT SERVICE INC.

250-425-7447

24 Hour Hot Shot Service

No. 78909

Sparwood, BC
Kamloops, BC
Terrace, BC
Vancouver, BC
Prince George, BC
Tumbler Ridge, BC
Elkford, BC
Calgary, AB
Edmonton, AB
Ft. McMurray, AB
Hinton, AB
Red Deer, AB
Montreal, QC
Gillette, WY
Spokane, WA
Shelby, MT

INVOICE TO Teck

BILL OF LADING #

DATE May 1/20

SHIPPER (FROM) Teck Coal

PURCHASE ORDER NUMBER

STREET Line Creek Water Treatment

CONSIGNEE (TO) Bucks Alpine Lows

CITY/PROVINCE Sparwood BC

POSTAL CODE

STREET 1 Scan N Creek Rd

CITY/PROVINCE Sparwood BC

POSTAL CODE

SPECIAL INSTRUCTIONS

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)
8	Heaters water Pumps	280 lbs

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

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
DATE
TIME 5-1-2020

NUMBER OF PIECES RECEIVED 8

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 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

WHITE: Office YELLOW: Carrier PINK: Consignee GOLDENROAD: Shipper

GST # 864540398RT0001

Styrofoam cooler #2
COC x
ICE — 1.3°C

WL E SP - 60mL TID 40mL
LCO SP - 60mL

From:	Katharina Batchelar
To:	Jeremy Maute; Good Cait SPO; Meyer Carlie SPO
Cc:	Collette Machado; Cole Cinelli
Subject:	RE: Brooks Final Report/EDD, WO 2019010: Regional Effects Program, REP Project - Confidential
Date:	Friday, June 19, 2020 1:23:46 PM
Attachments:	LCO LAEMP Water Sampling COC_Brooks_20200430.xls

Hi Jeremy,

Thanks for working on these revised reports and for issuing one of the revised reports already.

I have attached a COC form that describes the sample that we would like to have in its own report. Note that the details of this sample have not changed (including date relinquished) with the exception of the sample ID. Please see my responses to your questions in blue below.

Best regards,

Katharina Batchelar
Aquatic Scientist, M.Sc., R.P. Bio.

minnow environmental inc. (A Trinity Consultants Company)
204-1006 Fort Street | Victoria, British Columbia V8V 3K4
Phone: (250) 595-1627 ext. 22
Email: kbatchelar@minnow.ca

From: Jeremy Maute <Jeremy@brooksapplied.com>
Sent: Thursday, June 18, 2020 2:38 PM
To: Katharina Batchelar <KBatchelar@minnow.ca>; Good Cait SPO <Cait.Good@teck.com>; Meyer Carlie SPO <Carlie.Meyer@teck.com>
Cc: Collette Machado <Collette@brooksapplied.com>; Cole Cinelli <cole@brooksapplied.com>
Subject: RE: Brooks Final Report/EDD, WO 2019010: Regional Effects Program, REP Project - Confidential

Hi Katharina,

I am going about working on these revised reports. For the *RG_LIDSL_WS_20200429_1050_NAL* sample, do you have a COC form that describes this sample? You have asked us to, "*change the Sample code for this sample from RG_LIDSL_WS_20200429_1050_NAL to LC_LCDSSLCC_WS_20200429_1050_NAL*". We can certainly support this request, but we are left with no COC form documenting the custody of this sample. I would like to include an appropriate COC form in this report for "*LC_LCDSSLCC_WS_20200429_1050_NAL*", if possible. Do you have that COC form available?

- Also, for the "*LC_LCDSSLCC_WS_20200429_1050_NAL*" Sample, I will use the "*LC_LCDSSLCC*" Term for the Sample location. Let me know if you would have me do otherwise. That is correct. I have included this in the attached COC.
- I will use the date/time collected values initially reported for this sample (4/29/2020 10:50).

These are the date/time values listed on the corresponding container labels. Let me know if your group would prefer another date/time collected value. That is correct. Please use the date and time initially reported for this sample. This is consistent with the attached COC as well.

- For the revised/partitioned report associated with (Lab Sample ID 2019010-28 to 2019010-30), should we use the same (Client Project = **Regional Effects Program**) for reporting? Please use the client project/facility name LCO for this separate report (associated with Lab Sample ID 2019010-28 to 2019010-30).

The report for the remaining samples will be issued shortly. Let me know your thoughts on the details reporting (Lab Sample ID 2019010-28 to 2019010-30).

Regards,

Jeremy Maute
Senior Project Manager
206-753-6116
email: jeremy@brooksapplied.com

BROOKS APPLIED LABS

Meaningful Metals Data and Advanced Speciation Solutions

P: 206-632-6206 | F: 206-632-6017 | **18804 North Creek Parkway, Suite 100, Bothell, WA 98011, USA**

From: Katharina Batchelar <KBatchelar@minnow.ca>
Sent: Monday, June 15, 2020 10:13 AM
To: Jeremy Maute <Jeremy@brooksapplied.com>; Good Cait SPO <Cait.Good@teck.com>; Meyer Carlie SPO <Carlie.Meyer@teck.com>
Cc: Collette Machado <Collette@brooksapplied.com>; Cole Cinelli <cole@brooksapplied.com>
Subject: RE: Brooks Final Report/EDD, WO 2019010: Regional Effects Program, REP Project - Confidential

Hi Jeremy,

We would like to separate some samples from work order 2019010 into separate reports/work orders. Are you able to make this change to the report that has already been issued? If so, please remove the results for sample RG_LIDSL_WS_20200429_1050_NAL from the current report (results for Lab Sample ID 2019010-28 to 2019010-30), and provide these in a separate report. We would also like to change the Sample code for this sample from RG_LIDSL_WS_20200429_1050_NAL to LC_LCDSSLCC_WS_20200429_1050_NAL. Please provide the revised reports to the mailing list used for the original 2019010 report

Please let me know if you have any questions and if there is a reason that you can't make this change.

Thanks very much,

Katharina Batchelar
Aquatic Scientist, M.Sc., R.P. Bio.

minnow environmental inc. (A Trinity Consultants Company)
204-1006 Fort Street | Victoria, British Columbia V8V 3K4
Phone: (250) 595-1627 ext. 22
Email: kbatchelar@minnow.ca

From: Jeremy Maute <Jeremy@brooksapplied.com>
Sent: Friday, May 22, 2020 8:02 PM
To: Good Cait SPO <Cait.Good@teck.com>; Meyer Carlie SPO <Carlie.Meyer@teck.com>; Katharina Batchelar <KBatchelar@minnow.ca>
Cc: teck.lab.results@teck.com; Collette Machado <Collette@brooksapplied.com>; Cole Cinelli <cole@brooksapplied.com>
Subject: Brooks Final Report/EDD, WO 2019010: Regional Effects Program, REP Project - Confidential

Attached are the report and EDD for COC ID ***Regional Effects Program***, associated with the REP project.

As always, please contact us if there are any questions about this data.

Best regards,

Jeremy Maute
Senior Project Manager
206-753-6116
email: jeremy@brooksapplied.com

BROOKS APPLIED LABS

Meaningful Metals Data and Advanced Speciation Solutions

P: 206-632-6206 | F: 206-632-6017 | **18804 North Creek Parkway, Suite 100, Bothell, WA 98011, USA**

SELENIUM CHEMISTRY

BAL Final Report 2030045

(Finalized August 7, 2020)

BROOKS APPLIED LABS
18804 North Creek Parkway, Ste 100, Bothell, WA 98011 • USA • T: 206 632 6206 F: 206 632 6017 • info@brooksapplied.com

August 7, 2020

Teck Resources Limited - Vancouver
Cait Good
421 Pine Avenue
Sparwood, B.C. CANADA V0B2G0
Cait.Good@Teck.com

Re: Regional Effects Program

Ms. Good,

On July 23, 2020, Brooks Applied Labs (BAL) received twenty (20) 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 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 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.

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)*], selenomethionine [*SeMet*], selenosulfate [$SeSO_3$], and dimethylselenoxide [*DMSeO*]. An unknown selenium species eluting between MeSe(IV) and SeMet is also reported [*Se Unk A*]. Research at BAL has indicated that [*Se Unk A*] is a product of the oxidation of volatile selenium species present in some client samples. The total concentration of any remaining unidentified selenium-containing species detected in each sample has also been reported 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 instrument sensitivity drifted after the initial calibration in sequence 2000943, so a second calibration was analyzed after the samples. This second calibration was applied to the entire sequence. The recoveries of all continuing calibration verification (CCV) standards and matrix spike sets were within acceptance limits, demonstrating the suitability of this approach.

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).

All data were reported without qualification (aside from concentration qualifiers). 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	**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, 2019; Valid to: June 30, 2020
Certificate Number: E87982-33

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	Ag, As, 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
EPA 1632A	Non-Potable Waters	Inorganic Arsenic, As(III)
	Biological	Inorganic Arsenic
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs
BAL-4200	Non-Potable Waters	Se(IV), Se(VI)
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), and DoD/DOE (3)

Issued by: ANAB

Issued on: January 10, 2020; Valid to: March 30, 2022

Method	Matrix	ISO and Non-Gov. TNI Accredited Analyte(s)	DoD/DOE Accredited Analytes
EPA 1638 Mod EPA 200.8 Mod EPA 6020 Mod BAL-5000	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	Ag, Al, As, Ba, Ca, Cd, Cr, Cu, Fe, Pb, Mg, Mn, Ni, Sb, Se, V, Zn
	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	Ag, As, Cd, Cr, Cu, Pb, Ni, Se, Zn
EPA 1640 Mod	Non-Potable Waters	Ag, As, Be, Cd, Cr, Co, Cu, Pb, Ni, Se, Tl, V, Zn	Not Accredited
EPA 1631E Mod BAL-3100 (waters) BAL-3101 (solids)	Non-Potable Waters, Solids/Chemicals & Biological/Food	Total Mercury	Total Mercury
EPA 1630 Mod BAL-3200	Non-Potable Waters, Solids/Chemicals Biological	Methyl Mercury	Methyl Mercury (excluding Solids/Chemicals)
EPA 1632A Mod BAL-3300	Non-Potable Waters Solids/Chemicals	Inorganic Arsenic, As(III)	Inorganic Arsenic. As(III) for waters only.
	Biological/Food	Inorganic Arsenic	Inorganic Arsenic (excluding Food)
AOAC 2015.01 Mod BAL-5000 by BAL-5040	Food	As, Cd, Hg, Pb	Not Accredited
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs	Not Accredited
	Biological by BAL-4115	Inorganic Arsenic, DMAs, MMAs	Not Accredited
BAL-4101	Food by BAL-4116	Inorganic Arsenic, DMAs, MMAs	Not Accredited
BAL-4200	Non-Potable Waters	Se(IV), Se(VI), SeCN	Not Accredited
BAL-4201	Non-Potable Waters	Se(IV), Se(VI), SeCN, SeMet	Not Accredited
BAL-4300	Non-Potable Waters, Solid/Chemicals	Cr(VI)	Cr(VI)
SM 3500-Fe BAL-4500	Non-Potable Waters	Fe, Fe(II)	Not Accredited
SM2340B	Non-Potable Waters	Hardness	Hardness
SM 2540G EPA 160.3 BAL-0501	Solids/Chemicals & Biological	% Dry Weight	% Dry Weight

(1) ISO/IEC 17025:2017 – Certificate Number ADE-1447.2
(2) Non-Governmental NELAC Institute 2016 Standard – Certificate Number ADE-1447.1
(3) Department of Defense/Energy Consolidated Quality Systems Manual v. 5.3 – Certificate Numbers ADE-1447 for DoD, ADE-1447.3 for DOE.

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_LCUT_WS_2020-07-13_N_NAL	2030045-01	WS	Sample	07/13/2020	07/23/2020
RG_LCUT_WS_2020-07-13_N_NAL	2030045-02	WS	Sample	07/13/2020	07/23/2020
RG_LCUT_WS_2020-07-13_N	2030045-03	WS	Sample	07/13/2020	07/23/2020
RG_LI24_WS_2020-07-14_N_NAL	2030045-04	WS	Sample	07/14/2020	07/23/2020
RG_LI24_WS_2020-07-14_N_NAL	2030045-05	WS	Sample	07/14/2020	07/23/2020
RG_LI24_WS_2020-07-14_N	2030045-06	WS	Sample	07/14/2020	07/23/2020
RG_SLINE_WS_2020-07-14_N_NAL	2030045-07	WS	Sample	07/14/2020	07/23/2020
RG_SLINE_WS_2020-07-14_N_NAL	2030045-08	WS	Sample	07/14/2020	07/23/2020
RG_SLINE_WS_2020-07-14_N	2030045-09	WS	Sample	07/14/2020	07/23/2020
RG_LIDCOM_WS_2020-07-14_N_NAL	2030045-10	WS	Sample	07/14/2020	07/23/2020
RG_LIDCOM_WS_2020-07-14_N_NAL	2030045-11	WS	Sample	07/14/2020	07/23/2020
RG_LIDCOM_WS_2020-07-14_N	2030045-12	WS	Sample	07/14/2020	07/23/2020
RG_LILC3_WS_2020-07-15_N_NAL	2030045-13	WS	Sample	07/15/2020	07/23/2020
RG_LILC3_WS_2020-07-15_N_NAL	2030045-14	WS	Sample	07/15/2020	07/23/2020
RG_LILC3_WS_2020-07-15_N	2030045-15	WS	Sample	07/15/2020	07/23/2020
RG_LISP24_WS_2020-07-15_N_NAL	2030045-16	WS	Sample	07/15/2020	07/23/2020
RG_LISP24_WS_2020-07-15_N_NAL	2030045-17	WS	Sample	07/15/2020	07/23/2020
RG_LISP24_WS_2020-07-15_N	2030045-18	WS	Sample	07/15/2020	07/23/2020
RG_LI8_WS_2020-07-15_N_NAL	2030045-19	WS	Sample	07/15/2020	07/23/2020
RG_LI8_WS_2020-07-15_N_NAL	2030045-20	WS	Sample	07/15/2020	07/23/2020
RG_LI8_WS_2020-07-15_N_NAL	2030045-21	WS	Sample	07/15/2020	07/23/2020
RG_RIVER_WS_2020-07-15_N_NAL	2030045-22	WS	Sample	07/15/2020	07/23/2020
RG_RIVER_WS_2020-07-15_N_NAL	2030045-23	WS	Sample	07/15/2020	07/23/2020
RG_RIVER_WS_2020-07-15_N	2030045-24	WS	Sample	07/15/2020	07/23/2020
RG_FO23_WS_2020-07-16_N_NAL	2030045-25	WS	Sample	07/16/2020	07/23/2020
RG_FO23_WS_2020-07-16_N_NAL	2030045-26	WS	Sample	07/16/2020	07/23/2020
RG_FO23_WS_2020-07-16_N	2030045-27	WS	Sample	07/16/2020	07/23/2020
RG_FRUL_WS_2020-07-16_N_NAL	2030045-28	WS	Sample	07/16/2020	07/23/2020
RG_FRUL_WS_2020-07-16_N_NAL	2030045-29	WS	Sample	07/16/2020	07/23/2020
RG_FRUL_WS_2020-07-16_N	2030045-30	WS	Sample	07/16/2020	07/23/2020

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
DMSeO	Water	SOP BAL-4201	07/23/2020	07/24/2020	B202097	2000943
MeSe(IV)	Water	SOP BAL-4201	07/23/2020	07/24/2020	B202097	2000943
Se	Water	EPA 1638 Mod	07/24/2020	07/28/2020	B202074	2000954
Se Unk A	Water	SOP BAL-4201	07/23/2020	07/24/2020	B202097	2000943
Se(IV)	Water	SOP BAL-4201	07/23/2020	07/24/2020	B202097	2000943
Se(VI)	Water	SOP BAL-4201	07/23/2020	07/24/2020	B202097	2000943
SeCN	Water	SOP BAL-4201	07/23/2020	07/24/2020	B202097	2000943
SeMet	Water	SOP BAL-4201	07/23/2020	07/24/2020	B202097	2000943
SeSO3	Water	SOP BAL-4201	07/23/2020	07/24/2020	B202097	2000943
Unk Se Sp	Water	SOP BAL-4201	07/23/2020	07/24/2020	B202097	2000943

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_LCUT_WS_2020-07-13_N_NAL										
2030045-01	Se	WS	TR	30.7		0.053	0.528	µg/L	B202074	2000954
RG_LCUT_WS_2020-07-13_N_NAL										
2030045-02	Se	WS	D	31.3		0.053	0.528	µg/L	B202074	2000954
RG_LCUT_WS_2020-07-13_N										
2030045-03	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-03	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-03	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-03	Se(IV)	WS	D	0.075	J	0.050	0.125	µg/L	B202097	2000943
2030045-03	Se(VI)	WS	D	29.7		0.060	0.125	µg/L	B202097	2000943
2030045-03	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202097	2000943
2030045-03	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-03	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202097	2000943
2030045-03	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202097	2000943
RG_LI24_WS_2020-07-14_N_NAL										
2030045-04	Se	WS	TR	1.98		0.053	0.528	µg/L	B202074	2000954
RG_LI24_WS_2020-07-14_N_NAL										
2030045-05	Se	WS	D	2.08		0.053	0.528	µg/L	B202074	2000954
RG_LI24_WS_2020-07-14_N										
2030045-06	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-06	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-06	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-06	Se(IV)	WS	D	≤ 0.050	U	0.050	0.125	µg/L	B202097	2000943
2030045-06	Se(VI)	WS	D	1.36		0.060	0.125	µg/L	B202097	2000943
2030045-06	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202097	2000943
2030045-06	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-06	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202097	2000943
2030045-06	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202097	2000943
RG_SLINE_WS_2020-07-14_N_NAL										
2030045-07	Se	WS	TR	0.742		0.053	0.528	µg/L	B202074	2000954
RG_SLINE_WS_2020-07-14_N_NAL										
2030045-08	Se	WS	D	0.757		0.053	0.528	µg/L	B202074	2000954

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_SLINE_WS_2020-07-14_N										
2030045-09	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-09	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-09	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-09	Se(IV)	WS	D	≤ 0.050	U	0.050	0.125	µg/L	B202097	2000943
2030045-09	Se(VI)	WS	D	0.706		0.060	0.125	µg/L	B202097	2000943
2030045-09	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202097	2000943
2030045-09	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-09	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202097	2000943
2030045-09	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202097	2000943
RG_LIDCOM_WS_2020-07-14_N_NAL										
2030045-10	Se	WS	TR	25.3		0.053	0.528	µg/L	B202074	2000954
RG_LIDCOM_WS_2020-07-14_N_NAL										
2030045-11	Se	WS	D	25.3		0.053	0.528	µg/L	B202074	2000954
RG_LIDCOM_WS_2020-07-14_N										
2030045-12	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-12	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-12	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-12	Se(IV)	WS	D	0.057	J	0.050	0.125	µg/L	B202097	2000943
2030045-12	Se(VI)	WS	D	20.9		0.060	0.125	µg/L	B202097	2000943
2030045-12	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202097	2000943
2030045-12	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-12	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202097	2000943
2030045-12	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202097	2000943
RG_LILC3_WS_2020-07-15_N_NAL										
2030045-13	Se	WS	TR	40.3		0.053	0.528	µg/L	B202074	2000954
RG_LILC3_WS_2020-07-15_N_NAL										
2030045-14	Se	WS	D	40.2		0.053	0.528	µg/L	B202074	2000954

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_LILC3_WS_2020-07-15_N										
2030045-15	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-15	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-15	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-15	Se(IV)	WS	D	0.073	J	0.050	0.125	µg/L	B202097	2000943
2030045-15	Se(VI)	WS	D	34.3		0.060	0.125	µg/L	B202097	2000943
2030045-15	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202097	2000943
2030045-15	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-15	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202097	2000943
2030045-15	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202097	2000943
RG_LISP24_WS_2020-07-15_N_NAL										
2030045-16	Se	WS	TR	29.7		0.053	0.528	µg/L	B202074	2000954
RG_LISP24_WS_2020-07-15_N_NAL										
2030045-17	Se	WS	D	28.8		0.053	0.528	µg/L	B202074	2000954
RG_LISP24_WS_2020-07-15_N										
2030045-18	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-18	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-18	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-18	Se(IV)	WS	D	0.064	J	0.050	0.125	µg/L	B202097	2000943
2030045-18	Se(VI)	WS	D	28.6		0.060	0.125	µg/L	B202097	2000943
2030045-18	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202097	2000943
2030045-18	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-18	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202097	2000943
2030045-18	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202097	2000943
RG_LI8_WS_2020-07-15_N_NAL										
2030045-19	Se	WS	TR	24.5		0.053	0.528	µg/L	B202074	2000954
RG_LI8_WS_2020-07-15_N_NAL										
2030045-20	Se	WS	D	24.9		0.053	0.528	µg/L	B202074	2000954

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_LI8_WS_2020-07-15_N_NAL										
2030045-21	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-21	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-21	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-21	Se(IV)	WS	D	≤ 0.050	U	0.050	0.125	µg/L	B202097	2000943
2030045-21	Se(VI)	WS	D	23.5		0.060	0.125	µg/L	B202097	2000943
2030045-21	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202097	2000943
2030045-21	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-21	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202097	2000943
2030045-21	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202097	2000943
RG_RIVER_WS_2020-07-15_N_NAL										
2030045-22	Se	WS	TR	25.0		0.053	0.528	µg/L	B202074	2000954
RG_RIVER_WS_2020-07-15_N_NAL										
2030045-23	Se	WS	D	24.5		0.053	0.528	µg/L	B202074	2000954
RG_RIVER_WS_2020-07-15_N										
2030045-24	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-24	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-24	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-24	Se(IV)	WS	D	≤ 0.050	U	0.050	0.125	µg/L	B202097	2000943
2030045-24	Se(VI)	WS	D	23.1		0.060	0.125	µg/L	B202097	2000943
2030045-24	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202097	2000943
2030045-24	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-24	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202097	2000943
2030045-24	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202097	2000943
RG_FO23_WS_2020-07-16_N_NAL										
2030045-25	Se	WS	TR	28.9		0.053	0.528	µg/L	B202074	2000954
RG_FO23_WS_2020-07-16_N_NAL										
2030045-26	Se	WS	D	27.6		0.053	0.528	µg/L	B202074	2000954

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FO23_WS_2020-07-16_N										
2030045-27	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-27	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-27	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-27	Se(IV)	WS	D	0.189		0.050	0.125	µg/L	B202097	2000943
2030045-27	Se(VI)	WS	D	27.5		0.060	0.125	µg/L	B202097	2000943
2030045-27	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202097	2000943
2030045-27	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-27	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202097	2000943
2030045-27	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202097	2000943
RG_FRUL_WS_2020-07-16_N_NAL										
2030045-28	Se	WS	TR	31.0		0.053	0.528	µg/L	B202074	2000954
RG_FRUL_WS_2020-07-16_N_NAL										
2030045-29	Se	WS	D	29.7		0.053	0.528	µg/L	B202074	2000954
RG_FRUL_WS_2020-07-16_N										
2030045-30	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-30	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-30	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-30	Se(IV)	WS	D	0.215		0.050	0.125	µg/L	B202097	2000943
2030045-30	Se(VI)	WS	D	29.1		0.060	0.125	µg/L	B202097	2000943
2030045-30	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202097	2000943
2030045-30	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202097	2000943
2030045-30	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202097	2000943
2030045-30	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202097	2000943

Accuracy & Precision Summary

Batch: B202074
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B202074-BS1	**Blank Spike, (1940023)**						
	Se		200.0	198.3	µg/L	99% 75-125	
B202074-BS2	**Blank Spike, (1940023)**						
	Se		200.0	202.7	µg/L	101% 75-125	
B202074-BS3	**Blank Spike, (1940023)**						
	Se		200.0	202.5	µg/L	101% 75-125	
B202074-BS4	**Blank Spike, (1940023)**						
	Se		200.0	203.2	µg/L	102% 75-125	
B202074-SRM1	**Reference Material (2026013, NIST 1643f)**						
	Se		11.70	11.61	µg/L	99% 75-125	
B202074-SRM2	**Reference Material (2026013, NIST 1643f)**						
	Se		11.70	11.35	µg/L	97% 75-125	
B202074-SRM3	**Reference Material (2026013, NIST 1643f)**						
	Se		11.70	11.02	µg/L	94% 75-125	
B202074-SRM4	**Reference Material (2026013, NIST 1643f)**						
	Se		11.70	11.12	µg/L	95% 75-125	
B202074-DUP5	**Duplicate, (2030045-07)**						
	Se	0.742		0.730	µg/L		2% 20
B202074-MS5	**Matrix Spike, (2030045-07)**						
	Se	0.742	220.0	225.7	µg/L	102% 75-125	
B202074-MSD5	**Matrix Spike Duplicate, (2030045-07)**						
	Se	0.742	220.0	222.5	µg/L	101% 75-125	1% 20

Accuracy & Precision Summary

Batch: B202074
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B202074-DUP6	**Duplicate, (2030045-16)**						
	Se	29.70		29.80	µg/L		0.3% 20
B202074-MS6	**Matrix Spike, (2030045-16)**						
	Se	29.70	220.0	253.9	µg/L	102% 75-125	
B202074-MSD6	**Matrix Spike Duplicate, (2030045-16)**						
	Se	29.70	220.0	255.0	µg/L	102% 75-125	0.4% 20
B202074-DUP7	**Duplicate, (2030045-28)**						
	Se	31.01		30.47	µg/L		2% 20
B202074-MS7	**Matrix Spike, (2030045-28)**						
	Se	31.01	220.0	256.5	µg/L	102% 75-125	
B202074-MSD7	**Matrix Spike Duplicate, (2030045-28)**						
	Se	31.01	220.0	258.7	µg/L	104% 75-125	0.9% 20

Accuracy & Precision Summary

Batch: B202097
Lab Matrix: Water
Method: SOP BAL-4201

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B202097-BS1	**Blank Spike, (1923027)**						
	MeSe(IV)		5.095	6.032	µg/L	118% 75-125	
	Se(IV)		5.000	5.323	µg/L	106% 75-125	
	Se(VI)		5.000	5.033	µg/L	101% 75-125	
	SeCN		5.015	5.227	µg/L	104% 75-125	
	SeMet		4.932	5.360	µg/L	109% 75-125	
B202097-DUP4	**Duplicate, (2030045-12)**						
	DMSeO	ND		ND	µg/L		N/C 25
	MeSe(IV)	ND		ND	µg/L		N/C 25
	Se Unk A	ND		ND	µg/L		N/C 25
	Se(IV)	0.057		0.055	µg/L		4% 25
	Se(VI)	20.88		21.12	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
B202097-MS4	**Matrix Spike, (2030045-12)**						
	Se(IV)	0.057	4.900	4.803	µg/L	97% 75-125	
	Se(VI)	20.88	5.100	25.53	µg/L	NR 75-125	
	SeCN	ND	4.905	4.179	µg/L	85% 75-125	
	SeMet	ND	0.9885	0.849	µg/L	86% 75-125	
B202097-MSD4	**Matrix Spike Duplicate, (2030045-12)**						
	Se(IV)	0.057	4.900	4.904	µg/L	99% 75-125	2% 25
	Se(VI)	20.88	5.100	25.91	µg/L	NR 75-125	N/C 25
	SeCN	ND	4.905	4.325	µg/L	88% 75-125	3% 25
	SeMet	ND	0.9885	0.873	µg/L	88% 75-125	3% 25

Method Blanks & Reporting Limits

Batch: B202074
Matrix: Water
Method: EPA 1638 Mod
Analyte: Se

Sample	Result	Units
B202074-BLK1	-0.007	µg/L
B202074-BLK2	0.001	µg/L
B202074-BLK3	-0.011	µg/L
B202074-BLK4	0.003	µg/L

Average: -0.004
Limit: 0.480

MDL: 0.048
MRL: 0.480

Method Blanks & Reporting Limits

Batch: B202097
Matrix: Water
Method: SOP BAL-4201
Analyte: DMSeO

Sample	Result	Units
B202097-BLK1	0.00	µg/L
B202097-BLK2	0.00	µg/L
B202097-BLK3	0.00	µg/L
B202097-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Analyte: MeSe(IV)

Sample	Result	Units
B202097-BLK1	0.00	µg/L
B202097-BLK2	0.00	µg/L
B202097-BLK3	0.00	µg/L
B202097-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Analyte: Se Unk A

Sample	Result	Units
B202097-BLK1	0.00	µg/L
B202097-BLK2	0.00	µg/L
B202097-BLK3	0.00	µg/L
B202097-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
B202097-BLK1	0.00	µg/L
B202097-BLK2	0.002	µg/L
B202097-BLK3	0.002	µg/L
B202097-BLK4	0.00	µg/L

Average: 0.001
Limit: 0.025
MDL: 0.010
MRL: 0.025

Analyte: Se(VI)

Sample	Result	Units
B202097-BLK1	0.00	µg/L
B202097-BLK2	0.00	µg/L
B202097-BLK3	0.00	µg/L
B202097-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025
MDL: 0.012
MRL: 0.025

Analyte: SeCN

Sample	Result	Units
B202097-BLK1	0.00	µg/L
B202097-BLK2	0.00	µg/L
B202097-BLK3	0.00	µg/L
B202097-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025
MDL: 0.008
MRL: 0.025

Analyte: SeMet

Sample	Result	Units
B202097-BLK1	0.00	µg/L
B202097-BLK2	0.00	µg/L
B202097-BLK3	0.00	µg/L
B202097-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
B202097-BLK1	0.00	µg/L
B202097-BLK2	0.00	µg/L
B202097-BLK3	0.00	µg/L
B202097-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.012
MRL: 0.025

Analyte: Unk Se Sp

Sample	Result	Units
B202097-BLK1	0.00	µg/L
B202097-BLK2	0.00	µg/L
B202097-BLK3	0.00	µg/L
B202097-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.012
MRL: 0.025

Sample Containers

Lab ID: 2030045-01 **Report Matrix:** WS **Collected:** 07/13/2020
Sample: RG_LCUT_WS_2020-07-13_N_NAL **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2024037	<2	Styrofoam Cooler #2 - 2030045

Lab ID: 2030045-02 **Report Matrix:** WS **Collected:** 07/13/2020
Sample: RG_LCUT_WS_2020-07-13_N_NAL **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2024037	<2	Styrofoam Cooler #2 - 2030045

Lab ID: 2030045-03 **Report Matrix:** WS **Collected:** 07/13/2020
Sample: RG_LCUT_WS_2020-07-13_N **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045
C	EXTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045

Lab ID: 2030045-04 **Report Matrix:** WS **Collected:** 07/14/2020
Sample: RG_LI24_WS_2020-07-14_N_NAL **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2024037	<2	Styrofoam Cooler #2 - 2030045

Lab ID: 2030045-05 **Report Matrix:** WS **Collected:** 07/14/2020
Sample: RG_LI24_WS_2020-07-14_N_NAL **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2024037	<2	Styrofoam Cooler #2 - 2030045

Sample Containers

Lab ID: 2030045-06 **Report Matrix:** WS **Collected:** 07/14/2020
Sample: RG_LI24_WS_2020-07-14_N **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045
C	EXTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045

Lab ID: 2030045-07 **Report Matrix:** WS **Collected:** 07/14/2020
Sample: RG_SLINE_WS_2020-07-14_N_NAL **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2024037	<2	Styrofoam Cooler #2 - 2030045

Lab ID: 2030045-08 **Report Matrix:** WS **Collected:** 07/14/2020
Sample: RG_SLINE_WS_2020-07-14_N_NAL **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2024037	<2	Styrofoam Cooler #2 - 2030045

Lab ID: 2030045-09 **Report Matrix:** WS **Collected:** 07/14/2020
Sample: RG_SLINE_WS_2020-07-14_N **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045
C	EXTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045

Sample Containers

Lab ID: 2030045-10 **Report Matrix:** WS **Collected:** 07/14/2020
Sample: RG_LIDCOM_WS_2020-07-14_N_NAL **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2024037	<2	Styrofoam Cooler #2 - 2030045

Lab ID: 2030045-11 **Report Matrix:** WS **Collected:** 07/14/2020
Sample: RG_LIDCOM_WS_2020-07-14_N_NAL **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2024037	<2	Styrofoam Cooler #2 - 2030045

Lab ID: 2030045-12 **Report Matrix:** WS **Collected:** 07/14/2020
Sample: RG_LIDCOM_WS_2020-07-14_N **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045
C	EXTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045

Lab ID: 2030045-13 **Report Matrix:** WS **Collected:** 07/15/2020
Sample: RG_LILC3_WS_2020-07-15_N_NAL **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2024037	<2	Styrofoam Cooler #2 - 2030045

Lab ID: 2030045-14 **Report Matrix:** WS **Collected:** 07/15/2020
Sample: RG_LILC3_WS_2020-07-15_N_NAL **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2024037	<2	Styrofoam Cooler #2 - 2030045

Sample Containers

Lab ID: 2030045-15 **Report Matrix:** WS **Collected:** 07/15/2020
Sample: RG_LILC3_WS_2020-07-15_N **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045
C	EXTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045

Lab ID: 2030045-16 **Report Matrix:** WS **Collected:** 07/15/2020
Sample: RG_LISP24_WS_2020-07-15_N_NAL **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2024037	<2	Styrofoam Cooler #2 - 2030045

Lab ID: 2030045-17 **Report Matrix:** WS **Collected:** 07/15/2020
Sample: RG_LISP24_WS_2020-07-15_N_NAL **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2024037	<2	Styrofoam Cooler #2 - 2030045

Lab ID: 2030045-18 **Report Matrix:** WS **Collected:** 07/15/2020
Sample: RG_LISP24_WS_2020-07-15_N **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045
C	EXTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045

Sample Containers

Lab ID: 2030045-19 **Report Matrix:** WS **Collected:** 07/15/2020
Sample: RG_LI8_WS_2020-07-15_N_NAL **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2024037	<2	Styrofoam Cooler #2 - 2030045

Lab ID: 2030045-20 **Report Matrix:** WS **Collected:** 07/15/2020
Sample: RG_LI8_WS_2020-07-15_N_NAL **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2024037	<2	Styrofoam Cooler #2 - 2030045

Lab ID: 2030045-21 **Report Matrix:** WS **Collected:** 07/15/2020
Sample: RG_LI8_WS_2020-07-15_N_NAL **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045
C	EXTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045

Lab ID: 2030045-22 **Report Matrix:** WS **Collected:** 07/15/2020
Sample: RG_RIVER_WS_2020-07-15_N_NAL **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2024037	<2	Styrofoam Cooler #2 - 2030045

Lab ID: 2030045-23 **Report Matrix:** WS **Collected:** 07/15/2020
Sample: RG_RIVER_WS_2020-07-15_N_NAL **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2024037	<2	Styrofoam Cooler #2 - 2030045

Sample Containers

Lab ID: 2030045-24 **Report Matrix:** WS **Collected:** 07/15/2020
Sample: RG_RIVER_WS_2020-07-15_N **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045
C	EXTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045

Lab ID: 2030045-25 **Report Matrix:** WS **Collected:** 07/16/2020
Sample: RG_FO23_WS_2020-07-16_N_NAL **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2024037	<2	Styrofoam Cooler #2 - 2030045

Lab ID: 2030045-26 **Report Matrix:** WS **Collected:** 07/16/2020
Sample: RG_FO23_WS_2020-07-16_N_NAL **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2024037	<2	Styrofoam Cooler #2 - 2030045

Lab ID: 2030045-27 **Report Matrix:** WS **Collected:** 07/16/2020
Sample: RG_FO23_WS_2020-07-16_N **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045
C	EXTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045

Sample Containers

Lab ID: 2030045-28 **Report Matrix:** WS **Collected:** 07/16/2020
Sample: RG_FRUL_WS_2020-07-16_N_NAL **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2024037	<2	Styrofoam Cooler #2 - 2030045

Lab ID: 2030045-29 **Report Matrix:** WS **Collected:** 07/16/2020
Sample: RG_FRUL_WS_2020-07-16_N_NAL **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2024037	<2	Styrofoam Cooler #2 - 2030045

Lab ID: 2030045-30 **Report Matrix:** WS **Collected:** 07/16/2020
Sample: RG_FRUL_WS_2020-07-16_N **Sample Type:** Sample + Sum **Received:** 07/23/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045
C	EXTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #2 - 2030045

Shipping Containers

Styrofoam Cooler #2 - 2030045

Received: July 23, 2020 7:00
Tracking No: 80124 via Courier
Coolant Type: Blue Ice
Temperature: 5.8 °C

Description: Styrofoam Cooler #2
Damaged in transit? No
Returned to client? No
Comments: IR #19

Custody seals present? No
Custody seals intact? No
COC present? No

Teck

Page 1 of 2

COC ID: Regional Effects Program

TURNAROUND TIME: Regular

PROJECT/CLIENT INFO

Facility Name / Job#	Regional Effects Program
Project Manager	Cait Good
Email	cait.good@teck.com
Address	421 Pine Avenue
City	Sparwood
Province	BC
Postal Code	V0B 2G0
Country	Canada
Phone Number	250-425-8202

LABORATORY

Lab Name	Brooks Applied Labs
Lab Contact	Ben Wozniak
Email	ben@brooksapplied.com
Address	18804 North Creek Parkway
City	Bothell
Province	WA
Postal Code	98011
Country	USA
Phone Number	206-632-6206

OTHER INFO

Report Format / Distribution		Excel	PDF	EDD
Email 1:	cait.good@teck.com	X	X	X
Email 2:	Carlie.Meyer@teck.com	X	X	X
Email 3:	teckcoal@equisonline.com	X	X	X
Email 4:	kbatchelar@minnow.ca	X	X	X
Email 5:				

PO number: VPO00690100

SAMPLE DETAILS

ANALYSIS REQUESTED

Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	Total Selenium (HNO3, P)	Dissolved Selenium (HNO3, F/P)	Selenium Speciation (F)
RG_LCut_WS_2020-07-13_N_NA	RG_LCut	WS	No	2020-07-13	13:50	G	2	X	X	
RG_LCut_WS_2020-07-13_N	RG_LCut	WS	No	2020-07-13	13:50	G	1			X
RG_LI24_WS_2020-07-14_N_NA	RG_LI24	WS	No	2020-07-14	09:00	G	2	X	X	
RG_LI24_WS_2020-07-14_N	RG_LI24	WS	No	2020-07-14	09:00	G	1			X
RG_SLINE_WS_2020-07-14_N_NA	RG_SLINE	WS	No	2020-07-14	12:09	G	2	X	X	
RG_SLINE_WS_2020-07-14_N	RG_SLINE	WS	No	2020-07-14	12:09	G	1			X
RG_LIDCOM_WS_2020-07-14_N_NA	RG_LIDCOM	WS	No	2020-07-14	14:30	G	2	X	X	
RG_LIDCOM_WS_2020-07-14_N	RG_LIDCOM	WS	No	2020-07-14	14:30	G	1			X
RG_LILC3_WS_2020-07-15_N	RG_LILC3	WS	No	2020-07-15	08:25	G	1			X
RG_LILC3_WS_2020-07-15_N_NA	RG_LILC3	WS	No	2020-07-15	08:25	G	2	X	X	

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

Line Creek LAEMP - VPO00690100.

Samples for total selenium have been preserved in the field. Dissolved selenium have been filtered and preserved. Speciation samples have been filtered and frozen.

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Rick Smit / Lotic Environmental	2020/07/16 / 15:30	BAL	7/28/20 7:00

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	2020 07 16 / 15:30

Teck

Page 2 of 2

COC ID: Regional Effects Program

TURNAROUND TIME: Regular

PROJECT/CLIENT INFO

Facility Name / Job#	Regional Effects Program
Project Manager	Cait Good
Email	cait.good@teck.com
Address	421 Pine Avenue
City	Sparwood
Province	BC
Postal Code	V0B 2G0
Country	Canada
Phone Number	250-425-8202

LABORATORY

Lab Name	Brooks Applied Labs
Lab Contact	Ben Wozniak
Email	ben@brooksapplied.com
Address	18804 North Creek Parkway
City	Bothell
Province	WA
Postal Code	98011
Country	USA
Phone Number	206-632-6206

OTHER INFO

Report Format / Distribution		Excel	PDF	EDD
Email 1:	cait.good@teck.com	X	X	X
Email 2:	Carlie.Meyer@teck.com	X	X	X
Email 3:	teckcoal@equisonline.com	X	X	X
Email 4:	kbatchelar@minnow.ca	X	X	X
Email 5:				

PO number: YPO00690100

SAMPLE DETAILS / ANALYSIS REQUESTED

Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	Total Selenium (HNO3, F)	Dissolved Selenium (HNO3, FIP)	Selenium Speciation (F)
RG_LISP24_WS_2020-07-15_N_NML	RG_LISP24	WS	NO	2020-07-15	10:45	G	2	X	X	
RG_LISP24_WS_2020-07-15_N	RG_LISP24	WS	NO	2020-07-15	10:45	G	1			X
RG_LI8_WS_2020-07-15_N_NML	RG_LI8	WS	NO	2020-07-15	13:20	G	2	X	X	
RG_LI8_WS_2020-07-15_N	RG_LI8	WS	NO	2020-07-15	13:20	G	1			X
RG_RIVER_WS_2020-07-15_N_NML	RG_RIVER	WS	NO	2020-07-15	14:00	G	2	X	X	
RG_RIVER_WS_2020-07-15_N	RG_RIVER	WS	NO	2020-07-15	14:00	G	1			X
RG_F023_WS_2020-07-16_N_NML	RG_F023	WS	NO	2020-07-16	11:33	G	2	X	X	
RG_F023_WS_2020-07-16_N	RG_F023	WS	NO	2020-07-16	11:35	G	1			X
RG_FRUL_WS_2020-07-16_N_NML	RG_FRUL	WS	NO	2020-07-16	08:30	G	2	X	X	
RG_FRUL_WS_2020-07-16_N_NML	RG_FRUL	WS	NO	2020-07-16	08:30	G	1			X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

Line Creek LAEMP - YPO00690100.

Samples for total selenium have been preserved in the field. Dissolved selenium have been filtered and preserved. Speciation samples have been filtered and frozen.

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Rick Smit / Lotic environmental	2020-07-16 15:30	[illegible] BAL	[illegible] 7:00

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	2020-07-16 / 15:30

STRAIGHT BILL OF LADING
NOT NEGOTIABLE

RW HOT SHOT SERVICE INC.

250-425-7447

24 Hour Hot Shot Service

No. 80124

Sparwood, BC
Kamloops, BC
Terrace, BC
Vancouver, BC
Prince George, BC
Tumbler Ridge, BC
Elkford, BC
Calgary, AB
Edmonton, AB
Ft. McMurray, AB
Hinton, AB
Red Deer, AB
Montreal, QC
Gillette, WY
Spokane, WA
Shelby, MT

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)
2	Styrofoam Cooler	201 LBS

PAPS# RWHV80124

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, oin 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

WHITE: Office YELLOW: Carrier PINK: Consignee GOLDENROAD: Shipper

GST # 864540398RT0001

NUMBER OF PIECES RECEIVED

AMIGOS PRINTING

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

DATE 7-23 2020

TIME 1:00

2

Cooler ID: Styrofoam Cooler #2 **Temperature:** 6.8 → 5.8 **IR:** 19 **Opened by:** DJR

Coolant Type: (Ice) Blue Ice Ambient Frozen **Date:** 7/23/20

Notes: N/A Melted? Sp.

Sampling Locations:	RG 1030045	LCO 1030044			
Sample Types:	(T/D) (SP)	(T/D) (SP)	T/D SP	T/D SP	T/D SP
Container Types:	120mL	120mL			

COC (Y/N) (Y) **Custody Seal (Y/N)** (Y) **CS Damaged (Y/N)** (N/A)

* 45 - 17 60mL

SELENIUM CHEMISTRY

BAL Final Report 2037037

(Finalized September 30, 2020)

BROOKS APPLIED LABS
18804 North Creek Parkway, Ste 100, Bothell, WA 98011 • USA • T: 206 632 6206 F: 206 632 6017 • info@brooksapplied.com

September 30, 2020

Teck Resources Limited - Vancouver
Cait Good
421 Pine Avenue
Sparwood, B.C. CANADA V0B2G0
Cait.Good@Teck.com

Re: REP

Ms. Good,

On September 10, 2020, Brooks Applied Labs (BAL) received eleven (11) aqueous samples.

The **Sample ID** listed on the chain-of-custody (COC) form did not match the corresponding **Sample ID** term listed on container label for the samples listed in the table below.

Laboratory ID	Sample ID *(From COC form)*	Sample ID *(From Container Label)*	Date Collected
2037037-01 2037037-02 2037037-03	RG_SLINE_WS_LAEMP_LCO_2020-08_NAL	RG_SLINE_WS_LAEMP_LCO_2020-09_NAL	08/31/2020

Per client instructions, the sample in the table above was logged in and reported according to the **Sample ID** value listed on the COC form.

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 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 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.

The internal standard recovery of continuing calibration blank (2001154-CCBC) was less than the lower control limit of 60%, at 58%. The internal standard recoveries of method blanks (B202524-BLK1, B202524-BLK2, B202524-BLK3, and B202524-BLK4) were less than the lower control limit of 60%, ranging from 48% to 53%. No significant bias was observed in the any CCBs, including

the CCB with the internal standard recovery outlier. Similarly, no significant bias was observed in method blanks associated with batch B202524. Since all CCB values and method blank values associated with the analytical batch demonstrate the absence of any significant bias inherent to the analytical platform, no corrective was deemed necessary.

The internal standard recoveries for the blank spike samples (B202524-BS1, B202524-BS2, and B202524-BS3) and reference material samples (B202524-SRM1, B202524-SRM2, and B202524-SRM3) were less than the lower control limit of 60%, ranging from 48% to 56%. Despite the lower internal standard recoveries, all blank spike and reference material sample recoveries in Batch B202524 met acceptance criteria, demonstrating that the internal standard appropriately corrected for the observed drift. Therefore, no corrective action or qualification of the data was deemed necessary.

The internal standard recovery for the dissolved fraction in the client sample *RG_FBLANK_WS_LAEMP_LCO_2020-08_NAL* was less than the control limit of 60%, at 59%. Since a low internal standard recovery would present as a positive bias in sample results, and selenium was not detected for sample *RG_FBLANK_WS_LAEMP_LCO_2020-08_NAL*, there should be no impact on data quality. No data were qualified, and no corrective actions were necessary.

The method detection limit (MDL) values for total recoverable and dissolved selenium have been calculated using the standard deviation of the method blanks prepared and analyzed concurrently with the submitted samples. The method reporting limit (MRL) is typically set by a low calibration standard in the calibration. Brooks Applied Labs requires that the MRL is at least two times the value of the corresponding MDL. Due to an elevated MDL in batch B202524, it was necessary to raise the selenium MRL to two times the value of the MDL.

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)*], selenomethionine [*SeMet*], selenosulfate [$SeSO_3$], and dimethylselenoxide [*DMSeO*]. An unknown selenium species eluting between MeSe(IV) and SeMet is also reported [*Se Unk A*]. Research at BAL has indicated that [*Se Unk A*] is a product of the oxidation of volatile selenium species present in some client samples. The total concentration of any remaining unidentified selenium-containing species detected in each sample has also been reported 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).

All data were reported without qualification (aside from concentration qualifiers). 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 27, 2020; Valid to: June 30, 2021
Certificate Number: E87982-35

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	Ag, As, 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-4200	Non-Potable Waters	Se(IV), Se(VI)
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), and DoD/DOE (3)

Issued by: ANAB

Issued on: January 10, 2020; Valid to: March 30, 2022

Method	Matrix	ISO and Non-Gov. TNI Accredited Analyte(s)	DoD/ OE Accredited Analytes
EPA 1638 Mod EPA 200.8 Mod EPA 6020 Mod BAL-5000	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	Ag, Al, As, Ba, Ca, Cd, Cr, Cu, Fe, Pb, Mg, Mn, Ni, Sb, Se, V, Zn
	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	Ag, As, Cd, Cr, Cu, Pb, Ni, Se, Zn
EPA 1640 Mod	Non-Potable Waters	Ag, As, Be, Cd, Cr, Co, Cu, Pb, Ni, Se, Tl, V, Zn	Not Accredited
EPA 1631E Mod BAL-3100 (waters) BAL-3101 (solids)	Non-Potable Waters, Solids/Chemicals & Biological/Food	Total Mercury	Total Mercury
EPA 1630 Mod BAL-3200	Non-Potable Waters, Solids/Chemicals Biological	Methyl Mercury	Methyl Mercury (excluding Solids/Chemicals)
EPA 1632A Mod BAL-3300	Non-Potable Waters Solids/Chemicals	Inorganic Arsenic, As(III)	Inorganic Arsenic. As(III) for waters only.
	Biological/Food	Inorganic Arsenic	Inorganic Arsenic (excluding Food)
AOAC 2015.01 Mod BAL-5000 by BAL-5040	Food	As, Cd, Hg, Pb	Not Accredited
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs	Not Accredited
	Biological by BA -4115	Inorganic Arsenic, DMAs, MMAs	Not Accredited
BAL-4101	Food by BAL-4116	Inorganic Arsenic, DMAs, MMAs	Not Accredited
BAL-4200	Non-Potable Waters	Se(IV), Se(VI), SeCN	Not Accredited
BAL-4201	Non-Potable Waters	Se(IV), Se(VI), SeCN, SeMet	Not Accredited
BAL-4300	Non-Potable Waters, Solid/Chemicals	Cr(VI)	Cr(VI)
SM 3500-Fe BAL-4500	Non-Potable Waters	Fe, Fe(II)	Not Accredited
SM2340B	Non-Potable Waters	Hardness	Hardness
SM 2540G EPA 160.3 BAL-0501	Solids/Chemicals & Biological	% Dry Weight	% Dry Weight

(1) ISO/IEC 17025:2017 – Certificate Number ADE-1447.2
(2) Non-Governmental NELAC Institute 2016 Standard – Certificate Number ADE-1447.1
(3) Department of Defense/Energy Consolidated Quality Systems Manual v. 5.3 – Certificate Numbers ADE-1447 for DoD, ADE-1447.3 for DOE.

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_SLINE_WS_LAEMP_LCO_2020-08_NAL	2037037-01	WS	Sample	08/31/2020	09/10/2020
RG_SLINE_WS_LAEMP_LCO_2020-08_NAL	2037037-02	WS	Sample	08/31/2020	09/10/2020
RG_SLINE_WS_LAEMP_LCO_2020-08_NAL	2037037-03	WS	Sample	08/31/2020	09/10/2020
RG_LCUT_WS_LAEMP_LCO_2020-08_NAL	2037037-04	WS	Sample	09/01/2020	09/10/2020
RG_LCUT_WS_LAEMP_LCO_2020-08_NAL	2037037-05	WS	Sample	09/01/2020	09/10/2020
RG_LCUT_WS_LAEMP_LCO_2020-08_NAL	2037037-06	WS	Sample	09/01/2020	09/10/2020
RG_LI24_WS_LAEMP_LCO_2020-08_NAL	2037037-07	WS	Sample	08/31/2020	09/10/2020
RG_LI24_WS_LAEMP_LCO_2020-08_NAL	2037037-08	WS	Sample	08/31/2020	09/10/2020
RG_LI24_WS_LAEMP_LCO_2020-08_NAL	2037037-09	WS	Sample	08/31/2020	09/10/2020
RG_LILC3_WS_LAEMP_LCO_2020-08_NAL	2037037-10	WS	Sample	08/27/2020	09/10/2020
RG_LILC3_WS_LAEMP_LCO_2020-08_NAL	2037037-11	WS	Sample	08/27/2020	09/10/2020
RG_LILC3_WS_LAEMP_LCO_2020-08_NAL	2037037-12	WS	Sample	08/27/2020	09/10/2020
RG_LISP24_WS_LAEMP_LCO_2020-08_NAL	2037037-13	WS	Sample	09/01/2020	09/10/2020
RG_LISP24_WS_LAEMP_LCO_2020-08_NAL	2037037-14	WS	Sample	09/01/2020	09/10/2020
RG_LISP24_WS_LAEMP_LCO_2020-08_NAL	2037037-15	WS	Sample	09/01/2020	09/10/2020
RG_LIDCOM_WS_LAEMP_LCO_2020-08_NAL	2037037-16	WS	Sample	08/30/2020	09/10/2020
RG_LIDCOM_WS_LAEMP_LCO_2020-08_NAL	2037037-17	WS	Sample	08/30/2020	09/10/2020
RG_LIDCOM_WS_LAEMP_LCO_2020-08_NAL	2037037-18	WS	Sample	08/30/2020	09/10/2020
RG_LI8_WS_LAEMP_LCO_2020-08_NAL	2037037-19	WS	Sample	08/30/2020	09/10/2020
RG_LI8_WS_LAEMP_LCO_2020-08_NAL	2037037-20	WS	Sample	08/30/2020	09/10/2020
RG_LI8_WS_LAEMP_LCO_2020-08_NAL	2037037-21	WS	Sample	08/30/2020	09/10/2020

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_FRUL_WS_LAEMP_LCO_2020-08_NAL	2037037-22	WS	Sample	08/29/2020	09/10/2020
RG_FRUL_WS_LAEMP_LCO_2020-08_NAL	2037037-23	WS	Sample	08/29/2020	09/10/2020
RG_FRUL_WS_LAEMP_LCO_2020-08_NAL	2037037-24	WS	Sample	08/29/2020	09/10/2020
RG_FO23_WS_LAEMP_LCO_2020-08_NAL	2037037-25	WS	Sample	08/30/2020	09/10/2020
RG_FO23_WS_LAEMP_LCO_2020-08_NAL	2037037-26	WS	Sample	08/30/2020	09/10/2020
RG_FO23_WS_LAEMP_LCO_2020-08_NAL	2037037-27	WS	Sample	08/30/2020	09/10/2020
RG_RIVER_WS_LAEMP_LCO_2020-08_NAL	2037037-28	WS	Sample	08/30/2020	09/10/2020
RG_RIVER_WS_LAEMP_LCO_2020-08_NAL	2037037-29	WS	Sample	08/30/2020	09/10/2020
RG_RIVER_WS_LAEMP_LCO_2020-08_NAL	2037037-30	WS	Sample	08/30/2020	09/10/2020
RG_FBLANK_WS_LAEMP_LCO_2020-08_NAL	2037037-31	WS	Sample	08/28/2020	09/10/2020
RG_FBLANK_WS_LAEMP_LCO_2020-08_NAL	2037037-32	WS	Sample	08/28/2020	09/10/2020
RG_FBLANK_WS_LAEMP_LCO_2020-08_NAL	2037037-33	WS	Sample	08/28/2020	09/10/2020

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
DMSeO	Water	SOP BAL-4201	09/10/2020	09/11/2020	B202473	2001127
MeSe(IV)	Water	SOP BAL-4201	09/10/2020	09/11/2020	B202473	2001127
Se	Water	EPA 1638 Mod	09/17/2020	09/19/2020	B202524	2001154
Se Unk A	Water	SOP BAL-4201	09/10/2020	09/11/2020	B202473	2001127
Se(IV)	Water	SOP BAL-4201	09/10/2020	09/11/2020	B202473	2001127
Se(VI)	Water	SOP BAL-4201	09/10/2020	09/11/2020	B202473	2001127
SeCN	Water	SOP BAL-4201	09/10/2020	09/11/2020	B202473	2001127
SeMet	Water	SOP BAL-4201	09/10/2020	09/11/2020	B202473	2001127
SeSO3	Water	SOP BAL-4201	09/10/2020	09/11/2020	B202473	2001127
Unk Se Sp	Water	SOP BAL-4201	09/10/2020	09/11/2020	B202473	2001127

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_SLINE_WS_LAEMP_LCO_2020-08_NAL										
2037037-01	Se	WS	TR	1.18		0.275	0.550	µg/L	B202524	2001154
RG_SLINE_WS_LAEMP_LCO_2020-08_NAL										
2037037-02	Se	WS	D	1.48		0.275	0.550	µg/L	B202524	2001154
RG_SLINE_WS_LAEMP_LCO_2020-08_NAL										
2037037-03	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-03	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-03	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-03	Se(IV)	WS	D	≤ 0.050	U	0.050	0.125	µg/L	B202473	2001127
2037037-03	Se(VI)	WS	D	0.892		0.060	0.125	µg/L	B202473	2001127
2037037-03	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202473	2001127
2037037-03	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-03	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202473	2001127
2037037-03	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202473	2001127
RG_LCUT_WS_LAEMP_LCO_2020-08_NAL										
2037037-04	Se	WS	TR	57.0		0.275	0.550	µg/L	B202524	2001154
RG_LCUT_WS_LAEMP_LCO_2020-08_NAL										
2037037-05	Se	WS	D	54.8		0.275	0.550	µg/L	B202524	2001154
RG_LCUT_WS_LAEMP_LCO_2020-08_NAL										
2037037-06	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-06	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-06	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-06	Se(IV)	WS	D	0.097	J	0.050	0.125	µg/L	B202473	2001127
2037037-06	Se(VI)	WS	D	55.5		0.060	0.125	µg/L	B202473	2001127
2037037-06	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202473	2001127
2037037-06	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-06	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202473	2001127
2037037-06	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202473	2001127
RG_LI24_WS_LAEMP_LCO_2020-08_NAL										
2037037-07	Se	WS	TR	2.73		0.275	0.550	µg/L	B202524	2001154
RG_LI24_WS_LAEMP_LCO_2020-08_NAL										
2037037-08	Se	WS	D	2.82		0.275	0.550	µg/L	B202524	2001154

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_LI24_WS_LAEMP_LCO_2020-08_NAL										
2037037-09	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-09	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-09	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-09	Se(IV)	WS	D	≤ 0.050	U	0.050	0.125	µg/L	B202473	2001127
2037037-09	Se(VI)	WS	D	2.16		0.060	0.125	µg/L	B202473	2001127
2037037-09	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202473	2001127
2037037-09	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-09	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202473	2001127
2037037-09	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202473	2001127
RG_LILC3_WS_LAEMP_LCO_2020-08_NAL										
2037037-10	Se	WS	TR	41.8		0.275	0.550	µg/L	B202524	2001154
RG_LILC3_WS_LAEMP_LCO_2020-08_NAL										
2037037-11	Se	WS	D	40.9		0.275	0.550	µg/L	B202524	2001154
RG_LILC3_WS_LAEMP_LCO_2020-08_NAL										
2037037-12	DMSeO	WS	D	0.011	J	0.010	0.025	µg/L	B202473	2001127
2037037-12	MeSe(IV)	WS	D	0.016	J	0.010	0.025	µg/L	B202473	2001127
2037037-12	Se Unk A	WS	D	0.025	J	0.010	0.025	µg/L	B202473	2001127
2037037-12	Se(IV)	WS	D	0.195		0.050	0.125	µg/L	B202473	2001127
2037037-12	Se(VI)	WS	D	25.2		0.060	0.125	µg/L	B202473	2001127
2037037-12	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202473	2001127
2037037-12	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-12	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202473	2001127
2037037-12	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202473	2001127
RG_LISP24_WS_LAEMP_LCO_2020-08_NAL										
2037037-13	Se	WS	TR	29.1		0.275	0.550	µg/L	B202524	2001154
RG_LISP24_WS_LAEMP_LCO_2020-08_NAL										
2037037-14	Se	WS	D	32.1		0.275	0.550	µg/L	B202524	2001154

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_LISP24_WS_LAEMP_LCO_2020-08_NAL										
2037037-15	DMSeO	WS	D	0.013	J	0.010	0.025	µg/L	B202473	2001127
2037037-15	MeSe(IV)	WS	D	0.013	J	0.010	0.025	µg/L	B202473	2001127
2037037-15	Se Unk A	WS	D	0.021	J	0.010	0.025	µg/L	B202473	2001127
2037037-15	Se(IV)	WS	D	0.206		0.050	0.125	µg/L	B202473	2001127
2037037-15	Se(VI)	WS	D	31.4		0.060	0.125	µg/L	B202473	2001127
2037037-15	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202473	2001127
2037037-15	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-15	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202473	2001127
2037037-15	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202473	2001127
RG_LIDCOM_WS_LAEMP_LCO_2020-08_NAL										
2037037-16	Se	WS	TR	29.3		0.275	0.550	µg/L	B202524	2001154
RG_LIDCOM_WS_LAEMP_LCO_2020-08_NAL										
2037037-17	Se	WS	D	28.8		0.275	0.550	µg/L	B202524	2001154
RG_LIDCOM_WS_LAEMP_LCO_2020-08_NAL										
2037037-18	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-18	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-18	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-18	Se(IV)	WS	D	0.144		0.050	0.125	µg/L	B202473	2001127
2037037-18	Se(VI)	WS	D	22.8		0.060	0.125	µg/L	B202473	2001127
2037037-18	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202473	2001127
2037037-18	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-18	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202473	2001127
2037037-18	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202473	2001127
RG_LI8_WS_LAEMP_LCO_2020-08_NAL										
2037037-19	Se	WS	TR	27.4		0.275	0.550	µg/L	B202524	2001154
RG_LI8_WS_LAEMP_LCO_2020-08_NAL										
2037037-20	Se	WS	D	27.2		0.275	0.550	µg/L	B202524	2001154

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_LI8_WS_LAEMP_LCO_2020-08_NAL										
2037037-21	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-21	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-21	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-21	Se(IV)	WS	D	0.080	J	0.050	0.125	µg/L	B202473	2001127
2037037-21	Se(VI)	WS	D	27.2		0.060	0.125	µg/L	B202473	2001127
2037037-21	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202473	2001127
2037037-21	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-21	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202473	2001127
2037037-21	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202473	2001127
RG_FRUL_WS_LAEMP_LCO_2020-08_NAL										
2037037-22	Se	WS	TR	43.3		0.275	0.550	µg/L	B202524	2001154
RG_FRUL_WS_LAEMP_LCO_2020-08_NAL										
2037037-23	Se	WS	D	44.3		0.275	0.550	µg/L	B202524	2001154
RG_FRUL_WS_LAEMP_LCO_2020-08_NAL										
2037037-24	DMSeO	WS	D	0.016	J	0.010	0.025	µg/L	B202473	2001127
2037037-24	MeSe(IV)	WS	D	0.023	J	0.010	0.025	µg/L	B202473	2001127
2037037-24	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-24	Se(IV)	WS	D	0.336		0.050	0.125	µg/L	B202473	2001127
2037037-24	Se(VI)	WS	D	44.7		0.060	0.125	µg/L	B202473	2001127
2037037-24	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202473	2001127
2037037-24	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-24	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202473	2001127
2037037-24	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202473	2001127
RG_FO23_WS_LAEMP_LCO_2020-08_NAL										
2037037-25	Se	WS	TR	39.8		0.275	0.550	µg/L	B202524	2001154
RG_FO23_WS_LAEMP_LCO_2020-08_NAL										
2037037-26	Se	WS	D	38.8		0.275	0.550	µg/L	B202524	2001154

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FO23_WS_LAEMP_LCO_2020-08_NAL										
2037037-27	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-27	MeSe(IV)	WS	D	0.014	J	0.010	0.025	µg/L	B202473	2001127
2037037-27	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-27	Se(IV)	WS	D	0.241		0.050	0.125	µg/L	B202473	2001127
2037037-27	Se(VI)	WS	D	33.1		0.060	0.125	µg/L	B202473	2001127
2037037-27	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202473	2001127
2037037-27	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-27	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202473	2001127
2037037-27	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202473	2001127
RG_RIVER_WS_LAEMP_LCO_2020-08_NAL										
2037037-28	Se	WS	TR	37.5		0.275	0.550	µg/L	B202524	2001154
RG_RIVER_WS_LAEMP_LCO_2020-08_NAL										
2037037-29	Se	WS	D	37.7		0.275	0.550	µg/L	B202524	2001154
RG_RIVER_WS_LAEMP_LCO_2020-08_NAL										
2037037-30	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-30	MeSe(IV)	WS	D	0.015	J	0.010	0.025	µg/L	B202473	2001127
2037037-30	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-30	Se(IV)	WS	D	0.240		0.050	0.125	µg/L	B202473	2001127
2037037-30	Se(VI)	WS	D	38.2		0.060	0.125	µg/L	B202473	2001127
2037037-30	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202473	2001127
2037037-30	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-30	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202473	2001127
2037037-30	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202473	2001127
RG_FBLANK_WS_LAEMP_LCO_2020-08_NAL										
2037037-31	Se	WS	TR	≤ 0.275	U	0.275	0.550	µg/L	B202524	2001154
RG_FBLANK_WS_LAEMP_LCO_2020-08_NAL										
2037037-32	Se	WS	D	≤ 0.275	U	0.275	0.550	µg/L	B202524	2001154

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FBLANK_WS_LAEMP_LCO_2020-08_NAL										
2037037-33	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-33	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-33	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-33	Se(IV)	WS	D	≤ 0.050	U	0.050	0.125	µg/L	B202473	2001127
2037037-33	Se(VI)	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202473	2001127
2037037-33	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202473	2001127
2037037-33	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202473	2001127
2037037-33	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202473	2001127
2037037-33	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202473	2001127

Accuracy & Precision Summary

Batch: B202473
Lab Matrix: Water
Method: SOP BAL-4201

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B202473-BS1	**Blank Spike, (1923027)**						
	MeSe(IV)		5.095	5.251	µg/L	103% 75-125	
	Se(IV)		5.000	5.062	µg/L	101% 75-125	
	Se(VI)		5.000	4.906	µg/L	98% 75-125	
	SeCN		5.015	4.671	µg/L	93% 75-125	
	SeMet		4.932	4.647	µg/L	94% 75-125	
B202473-DUP5	**Duplicate, (2037037-15)**						
	DMSeO	0.013		0.015	µg/L		13% 25
	MeSe(IV)	0.013		0.013	µg/L		4% 25
	Se Unk A	0.021		0.023	µg/L		10% 25
	Se(IV)	0.206		0.202	µg/L		2% 25
	Se(VI)	31.38		31.58	µg/L		0.6% 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
B202473-MS5	**Matrix Spike, (2037037-15)**						
	Se(IV)	0.206	4.900	5.300	µg/L	104% 75-125	
	Se(VI)	31.38	5.100	36.38	µg/L	NR 75-125	
	SeCN	ND	4.905	4.927	µg/L	100% 75-125	
	SeMet	ND	0.9885	0.965	µg/L	98% 75-125	
B202473-MSD5	**Matrix Spike Duplicate, (2037037-15)**						
	Se(IV)	0.206	4.900	5.292	µg/L	104% 75-125	0.1% 25
	Se(VI)	31.38	5.100	36.50	µg/L	NR 75-125	N/C 25
	SeCN	ND	4.905	4.961	µg/L	101% 75-125	0.7% 25
	SeMet	ND	0.9885	0.962	µg/L	97% 75-125	0.3% 25

Accuracy & Precision Summary

Batch: B202524
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B202524-BS1	**Blank Spike, (2035012)**						
	Se		200.0	199.6	µg/L	100% 75-125	
B202524-BS2	**Blank Spike, (2035012)**						
	Se		200.0	200.6	µg/L	100% 75-125	
B202524-BS3	**Blank Spike, (2035012)**						
	Se		200.0	201.4	µg/L	101% 75-125	
B202524-SRM1	**Reference Material (1913039, T221)**						
	Se		3.800	3.518	µg/L	93% 75-125	
B202524-SRM2	**Reference Material (1913039, T221)**						
	Se		3.800	3.419	µg/L	90% 75-125	
B202524-SRM3	**Reference Material (1913039, T221)**						
	Se		3.800	3.853	µg/L	101% 75-125	
B202524-DUP1	**Duplicate, (2037037-01)**						
	Se	1.182		1.383	µg/L		16% 20
B202524-MS1	**Matrix Spike, (2037037-01)**						
	Se	1.182	220.0	228.5	µg/L	103% 75-125	
B202524-MSD1	**Matrix Spike Duplicate, (2037037-01)**						
	Se	1.182	220.0	222.4	µg/L	101% 75-125	3% 20
B202524-DUP2	**Duplicate, (2037037-13)**						
	Se	29.09		30.91	µg/L		6% 20
B202524-MS2	**Matrix Spike, (2037037-13)**						
	Se	29.09	220.0	255.9	µg/L	103% 75-125	

Accuracy & Precision Summary

Batch: B202524
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B202524-MSD2	**Matrix Spike Duplicate, (2037037-13)**						
	Se	29.09	220.0	263.4	µg/L	107% 75-125	3% 20
B202524-DUP3	**Duplicate, (2037037-31)**						
	Se	ND		ND	µg/L		N/C 20
B202524-MS3	**Matrix Spike, (2037037-31)**						
	Se	ND	220.0	223.7	µg/L	102% 75-125	
B202524-MSD3	**Matrix Spike Duplicate, (2037037-31)**						
	Se	ND	220.0	233.2	µg/L	106% 75-125	4% 20

Method Blanks & Reporting Limits

Batch: B202473
Matrix: Water
Method: SOP BAL-4201
Analyte: DMSeO

Sample	Result	Units
B202473-BLK1	0.00	µg/L
B202473-BLK2	0.00	µg/L
B202473-BLK3	0.00	µg/L
B202473-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Analyte: MeSe(IV)

Sample	Result	Units
B202473-BLK1	0.00	µg/L
B202473-BLK2	0.00	µg/L
B202473-BLK3	0.00	µg/L
B202473-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Analyte: Se Unk A

Sample	Result	Units
B202473-BLK1	0.00	µg/L
B202473-BLK2	0.00	µg/L
B202473-BLK3	0.00	µg/L
B202473-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
B202473-BLK1	0.00	µg/L
B202473-BLK2	0.00	µg/L
B202473-BLK3	0.00	µg/L
B202473-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.010
MRL: 0.025

Analyte: Se(VI)

Sample	Result	Units
B202473-BLK1	0.00	µg/L
B202473-BLK2	0.00	µg/L
B202473-BLK3	0.00	µg/L
B202473-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.012
MRL: 0.025

Analyte: SeCN

Sample	Result	Units
B202473-BLK1	0.00	µg/L
B202473-BLK2	0.00	µg/L
B202473-BLK3	0.00	µg/L
B202473-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.008
MRL: 0.025

Analyte: SeMet

Sample	Result	Units
B202473-BLK1	0.00	µg/L
B202473-BLK2	0.00	µg/L
B202473-BLK3	0.00	µg/L
B202473-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
B202473-BLK1	0.00	µg/L
B202473-BLK2	0.00	µg/L
B202473-BLK3	0.00	µg/L
B202473-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.012
MRL: 0.025

Analyte: Unk Se Sp

Sample	Result	Units
B202473-BLK1	0.00	µg/L
B202473-BLK2	0.00	µg/L
B202473-BLK3	0.00	µg/L
B202473-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.012
MRL: 0.025

Method Blanks & Reporting Limits

Batch: B202524
Matrix: Water
Method: EPA 1638 Mod
Analyte: Se

Sample	Result	Units
B202524-BLK1	0.110	µg/L
B202524-BLK2	-0.014	µg/L
B202524-BLK3	0.101	µg/L
B202524-BLK4	0.094	µg/L

Average: 0.073
Limit: 0.500

MDL: 0.250
MRL: 0.500

Sample Containers

Lab ID: 2037037-01
Sample: RG_SLINE_WS_LAEMP_LCO_2020-08_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 08/31/2020
Received: 09/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler 5 - 2037037

Lab ID: 2037037-02
Sample: RG_SLINE_WS_LAEMP_LCO_2020-08_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 08/31/2020
Received: 09/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler 5 - 2037037

Lab ID: 2037037-03
Sample: RG_SLINE_WS_LAEMP_LCO_2020-08_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 08/31/2020
Received: 09/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2037037
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2037037
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler 5 - 2037037

Lab ID: 2037037-04
Sample: RG_LCUT_WS_LAEMP_LCO_2020-08_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/01/2020
Received: 09/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler 5 - 2037037

Sample Containers

Lab ID: 2037037-05
Sample: RG_LCUT_WS_LAEMP_LCO_2020-08_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/01/2020
Received: 09/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler 5 - 2037037

Lab ID: 2037037-06
Sample: RG_LCUT_WS_LAEMP_LCO_2020-08_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/01/2020
Received: 09/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2037037
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2037037
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler 5 - 2037037

Lab ID: 2037037-07
Sample: RG_LI24_WS_LAEMP_LCO_2020-08_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 08/31/2020
Received: 09/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler 5 - 2037037

Lab ID: 2037037-08
Sample: RG_LI24_WS_LAEMP_LCO_2020-08_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 08/31/2020
Received: 09/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler 5 - 2037037

Sample Containers

Lab ID: 2037037-09
Sample: RG_LI24_WS_LAEMP_LCO_2020-08_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 08/31/2020
Received: 09/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2037037
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2037037
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler 5 - 2037037

Lab ID: 2037037-10
Sample: RG_LILC3_WS_LAEMP_LCO_2020-08_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 08/27/2020
Received: 09/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler 3 - 2037037

Lab ID: 2037037-11
Sample: RG_LILC3_WS_LAEMP_LCO_2020-08_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 08/27/2020
Received: 09/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler 3 - 2037037

Lab ID: 2037037-12
Sample: RG_LILC3_WS_LAEMP_LCO_2020-08_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 08/27/2020
Received: 09/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2037037
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2037037
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler 5 - 2037037

Sample Containers

Lab ID: 2037037-13
Sample: RG_LISP24_WS_LAEMP_LCO_2020-08_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/01/2020
Received: 09/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler 3 - 2037037

Lab ID: 2037037-14
Sample: RG_LISP24_WS_LAEMP_LCO_2020-08_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/01/2020
Received: 09/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler 3 - 2037037

Lab ID: 2037037-15
Sample: RG_LISP24_WS_LAEMP_LCO_2020-08_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/01/2020
Received: 09/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2037037
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2037037
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler 5 - 2037037

Lab ID: 2037037-16
Sample: RG_LIDCOM_WS_LAEMP_LCO_2020-08_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 08/30/2020
Received: 09/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler 7 - 2037037

Sample Containers

Lab ID: 2037037-17
Sample: RG_LIDCOM_WS_LAEMP_LCO_2020-08_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 08/30/2020
Received: 09/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler 7 - 2037037

Lab ID: 2037037-18
Sample: RG_LIDCOM_WS_LAEMP_LCO_2020-08_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 08/30/2020
Received: 09/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2037037
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2037037
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler 5 - 2037037

Lab ID: 2037037-19
Sample: RG_LI8_WS_LAEMP_LCO_2020-08_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 08/30/2020
Received: 09/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler 3 - 2037037

Lab ID: 2037037-20
Sample: RG_LI8_WS_LAEMP_LCO_2020-08_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 08/30/2020
Received: 09/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler 3 - 2037037

Sample Containers

Lab ID: 2037037-21 **Report Matrix:** WS **Collected:** 08/30/2020
Sample: RG_LI8_WS_LAEMP_LCO_2020-08_NAL **Sample Type:** Sample + Sum **Received:** 09/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2037037
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2037037
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler 4 - 2037037

Lab ID: 2037037-22 **Report Matrix:** WS **Collected:** 08/29/2020
Sample: RG_FRUL_WS_LAEMP_LCO_2020-08_NAL **Sample Type:** Sample + Sum **Received:** 09/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler 1 - 2037037

Lab ID: 2037037-23 **Report Matrix:** WS **Collected:** 08/29/2020
Sample: RG_FRUL_WS_LAEMP_LCO_2020-08_NAL **Sample Type:** Sample + Sum **Received:** 09/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler 1 - 2037037

Lab ID: 2037037-24 **Report Matrix:** WS **Collected:** 08/29/2020
Sample: RG_FRUL_WS_LAEMP_LCO_2020-08_NAL **Sample Type:** Sample + Sum **Received:** 09/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2037037
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2037037
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler 4 - 2037037

Sample Containers

Lab ID: 2037037-25
Sample: RG_FO23_WS_LAEMP_LCO_2020-08_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 08/30/2020
Received: 09/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler 1 - 2037037

Lab ID: 2037037-26
Sample: RG_FO23_WS_LAEMP_LCO_2020-08_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 08/30/2020
Received: 09/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler 1 - 2037037

Lab ID: 2037037-27
Sample: RG_FO23_WS_LAEMP_LCO_2020-08_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 08/30/2020
Received: 09/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2037037
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2037037
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler 4 - 2037037

Lab ID: 2037037-28
Sample: RG_RIVER_WS_LAEMP_LCO_2020-08_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 08/30/2020
Received: 09/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler 1 - 2037037

Sample Containers

Lab ID: 2037037-29 **Report Matrix** WS **Collected:** 08/30/2020
Sample: **Sample Type:** Sample + Sum **Received:** 09/10/2020
RG_RIVER_WS_LAEMP_LCO_2020-08_NAL

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler 1 - 2037037

Lab ID: 2037037-30 **Report Matrix** WS **Collected:** 08/30/2020
Sample: **Sample Type:** Sample + Sum **Received:** 09/10/2020
RG_RIVER_WS_LAEMP_LCO_2020-08_NAL

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2037037
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2037037
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler 4 - 2037037

Lab ID: 2037037-31 **Report Matrix** WS **Collected:** 08/28/2020
Sample: **Sample Type:** Sample + Sum **Received:** 09/10/2020
RG_FBLANK_WS_LAEMP_LCO_2020-08_NAL

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler 1 - 2037037

Lab ID: 2037037-32 **Report Matrix** WS **Collected:** 08/28/2020
Sample: **Sample Type:** Sample + Sum **Received:** 09/10/2020
RG_FBLANK_WS_LAEMP_LCO_2020-08_NAL

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler 1 - 2037037

Sample Containers

Lab ID: 2037037-33
Sample:
RG_FBLANK_WS_LAEMP_LCO_2020-08_NAL

Report Matrix WS
Sample Type: Sample + Sum

Collected: 08/28/2020
Received: 09/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2037037
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2037037
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler 4 - 2037037

Shipping Containers

Styrofoam Cooler 1 - 2037037

Received: September 10, 2020 7:00
Tracking No: 76917 via Courier
Coolant Type: Blue Ice
Temperature: 3.9 °C

Description: Styrofoam Cooler 1
Damaged in transit? No
Returned to client? No
Comments: IR# 21

Custody seals present? No
Custody seals intact? No
COC present? No

Styrofoam Cooler 3 - 2037037

Received: September 10, 2020 7:00
Tracking No: 76917 via Courier
Coolant Type: Blue Ice
Temperature: 0.5 °C

Description: Styrofoam Cooler 3
Damaged in transit? No
Returned to client? No
Comments: IR# 21

Custody seals present? No
Custody seals intact? No
COC present? No

Styrofoam Cooler 4 - 2037037

Received: September 10, 2020 7:00
Tracking No: 76917 via Courier
Coolant Type: Blue Ice
Temperature: 0.5 °C

Description: Styrofoam Cooler 4
Damaged in transit? No
Returned to client? No
Comments: IR# 21

Custody seals present? No
Custody seals intact? No
COC present? No

Styrofoam Cooler 5 - 2037037

Received: September 10, 2020 7:00
Tracking No: 76917 via Courier
Coolant Type: Blue Ice
Temperature: 1.2 °C

Description: Styrofoam Cooler 5
Damaged in transit? No
Returned to client? No
Comments: IR# 21

Custody seals present? No
Custody seals intact? No
COC present? No

Styrofoam Cooler 7 - 2037037

Received: September 10, 2020 7:00
Tracking No: 76917 via Courier
Coolant Type: Blue Ice
Temperature: 3.7 °C

Description: Styrofoam Cooler 7
Damaged in transit? No
Returned to client? No
Comments: IR# 21

Custody seals present? No
Custody seals intact? No
COC present? No

Confidential

BAL Final Report 2037037

COC ID: LCO LAEMP Aug 2020 | **TURNAROUND TIME:**

PROJECT/CLIENT INFO				LABORATORY			
Facility Name	REP			Lab Name	Brooks Applied Labs		
Project Manager	Cait Good			Lab Contact	Ben Wozniak		
Email	cait.good@teck.com			Email	ben@brooksapplied.com		
Address	421 Pine Avenue			Address	18804 North Creek Parkway		
City	Sparwood	Province	BC	City	Bothell	Province	WA
Postal Code	V0B 2G0	Country	Canada	Postal Code	98011	Country	USA
Phone Number	250-425-8202			Phone Number	206-632-6206		

	Excel	PDF	EDD
cait.good@teck.com	x	x	x
teckcoal@equisonline.com			x
carlie.miner@teck.com	x	x	x
kbatchelar@minnow.ca	x	x	x

SAMPLE DETAILS | **ANALYSIS REQUESTED** (Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	Filt.	HNO3	HNO3										
								PRESERV.	P	F/P	F										
								ANALYSIS	Total Selenium	Dissolved Selenium	Selenium Speciation									
RG_SLINE_WS_LAEMP_LCO_2020-08_NAL	RG_SLINE	WS	No	31-Aug-20	09:00	G	3		X	X	X									
RG_LCUT_WS_LAEMP_LCO_2020-08_NAL	RG_LCUT	WS	No	01-Sept-20	12:08	G	3		X	X	X									
RG_LI24_WS_LAEMP_LCO_2020-08_NAL	RG_LI24	WS	No	31-Aug-20	09:42	G	3		X	X	X	Date: 31-Aug-20, Time: 09:42								
RG_LILC3_WS_LAEMP_LCO_2020-08_NAL	RG_LILC3	WS	No	27-Aug-20	08:30	G	3		X	X	X									
RG_LISP24_WS_LAEMP_LCO_2020-08_NAL	RG_LISP24	WS	No	01-Sept-20	17:09	G	3		X	X	X									
RG_LIDCOM_WS_LAEMP_LCO_2020-08_NAL	RG_LIDCOM	WS	No	30-Aug-20	15:15	G	3		X	X	X									
RG_LI8_WS_LAEMP_LCO_2020-08_NAL	RG_LI8	WS	No	30-Aug-20	11:15	G	3		X	X	X									
RG_FRUL_WS_LAEMP_LCO_2020-08_NAL	RG_FRUL	WS	No	29-Aug-20	15:40	G	3		X	X	X									
RG_FO23_WS_LAEMP_LCO_2020-08_NAL	RG_FO23	WS	No	30-Aug-20	18:13	G	3		X	X	X									
RG_RIVER_WS_LAEMP_LCO_2020-08_NAL	RG_RIVER	WS	No	30-Aug-20	18:13	G	3		X	X	X									
RG_FBLANK _WS_LAEMP_LCO_2020-08_NAL	RG_FBLANK	WS	No	28-Aug-20	07:48	G	3		X	X	X									

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION
Line Creek LAEMP - VPO00690100. **Samples for total selenium have been preserved in the field. Dissolved selenium have been filtered and preserved. Speciation samples have been filtered and frozen.**	**Katharina Batchelar/Minnow**	02-Sept-20 14:00	Spencer Shibuya (BAL) 9/10/20 7:00

NB OF BOTTLES RETURNED/DESCRIPTION

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	**Katharina Batchelar**	**Mobile #**	**778-679-4350**
Sampler's Signature	KBatchelar	**Date/Time**	02-Sept-20 14:00

STRAIGHT BILL OF LADING
NOT NEGOTIABLE
COPY

RW HOT SHOT SERVICE INC.

250-425-7447

24 Hour Hot Shot Service

No. 76917

Sparwood, BC
Kamloops, BC
Terrace, BC

Vancouver, BC
Prince George, BC
Tumbler Ridge, BC

Elkford, BC
Calgary, AB
Edmonton, AB

Ft. McMurray, AB
Hinton, AB
Red Deer, AB

Montreal, QC
Gillette, WY
Spokane, WA

Shelby, MT

INVOICE TO	DATE Sept 11 20
BILL OF LADING #	PURCHASE ORDER NUMBER
SHIPPER (FROM)	CONSIGNEE (TO) Baker Applied Labs
STREET	STREET 201 N Cedar Rd
CITY/PROVINCE	POSTAL CODE
CITY/PROVINCE Lyndonville NY	POSTAL CODE 14098

SPECIAL INSTRUCTIONS

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)
		500 LBS
	PAPS# RWHV76917	

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 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

WHITE: Office YELLOW: Carrier PINK: Consignee GOLDENROAD: Shipper GST # 864540398RT0001 NUMBER OF PIECES RECEIVED

MARCOS PRINTING

Cooler ID: S.C. 1 COC (Y/N) Temperature: 3.9 IR: 21

Coolant Type: Ice Blue Ice Ambient

Notes:

Sampling Locations:	2037037		2037036		2037035		2037039		2037040	
Sample Types:	T/D	SP	T/D	SP	T/D	SP	T/D	SP	T/D	SP
Container Types:	120		120		120			120		120

Opened By: DSL Date: 9/10/20

Effective 7/29/20

Revision 004

COPY
STRAIGHT BILL OF LADING
NOT NEGOTIABLE

RW HOT SHOT SERVICE INC.

250-425-7447

24 Hour Hot Shot Service

No. 76917

Sparwood, BC
Kamloops, BC
Terrace, BC

Vancouver, BC
Prince George, BC
Tumbler Ridge, BC

Elkford, BC
Calgary, AB
Edmonton, AB

Ft. McMurray, AB
Hinton, AB
Red Deer, AB

Montreal, QC
Gillette, WY
Spokane, WA

Shelby, MT

INVOICE TO	DATE Sept 9 / 20
BILL OF LADING #	PURCHASE ORDER NUMBER
SHIPPER (FROM)	CONSIGNEE (TO) Pacific Applied Labs
STREET	STREET 10241 N. Cook Unit 104
CITY/PROVINCE	POSTAL CODE CITY/PROVINCE Spokane WA POSTAL CODE 99218

SPECIAL INSTRUCTIONS

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)
1	Cooler	30 LBS

PAPS# RWHV76917

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	DATE
SHIPPER SIGN	CONSIGNEE SIGN	TIME

WHITE: Office YELLOW: Carrier PINK: Consignee GOLDENROAD: Shipper GST # 864540398RT0001 NUMBER OF PIECES RECEIVED

AMIGOS PRINTING

Cooler ID: S.C. 3 COC (Y/N) Temperature: Se sp. = 0.5°C IR: 21

Coolant Type: Ice Blue Ice Ambient T/D = 4.7°C

Notes:

Sampling Locations:

	LCO		RG		WL		E4F (Sept. 1)		E4F (Sept. 5, 6, 7)	
Sample Types:	T/D	SP	T/D	SP	T/D	SP	T/D	SP	T/D	SP
Container Types:		120mL HDPE	120mL HDPE		40mL glass	125mL HDPE		120mL/ 60mL HDPE	125mL amber glass	

Opened By: JMG Date: 9/10/20

Effective 7/29/20

Revision 004

STRAIGHT BILL OF LADING
NOT NEGOTIABLE
COPY

RW HOT SHOT SERVICE INC.

250-425-7447

24 Hour Hot Shot Service

No. 76917

Sparwood, BC
Kamloops, BC
Terrace, BC

Vancouver, BC
Prince George, BC
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Edmonton, AB

Ft. McMurray, AB
Hinton, AB
Red Deer, AB

Montreal, QC
Gillette, WY
Spokane, WA

Shelby, MT

INVOICE TO	DATE 9/11/20
BILL OF LADING #	PURCHASE ORDER NUMBER
SHIPPER (FROM)	CONSIGNEE (TO) Pacific Applied Labs
STREET	STREET 1281 N. Orchard St
CITY/PROVINCE	POSTAL CODE / CITY/PROVINCE Moscow ID WA / POSTAL CODE 83843

SPECIAL INSTRUCTIONS

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)
		500 LBS
	PAPS# RWHV76917	

FREIGHT CHARGES
SHIPPER TO CHECK
☐ PREPAID ☐ COLLECT
If not indicated, shipping will automatically move collect.

FEE
WAITING
XPU
CHARGES
FSC
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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

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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 to 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: S.C.4 COC (Y/N) Temperature: 0.5 IR: 21

Coolant Type: Ice (Blue Ice) Ambient

Notes:

Sampling Locations: RG

	T/D	SP	T/D	SP	T/D	SP	T/D	SP	T/D	SP
Sample Types:	(T/D)	(SP)								
Container Types:	125 mL glass	125 mL HDPE								
	60 mL HDPE									

Opened By: SKS Date: 9/10/20

Effective 7/29/20

Revision 004

STRAIGHT BILL OF LADING NOT NEGOTIABLE COPY

RW HOT SHOT SERVICE INC.

250-425-7447

24 Hour Hot Shot Service

No. 76917

Sparwood, BC · Kamloops, BC · Terrace, BC · Vancouver, BC · Prince George, BC · Tumbler Ridge, BC · Elkford, BC · Calgary, AB · Edmonton, AB · Ft. McMurray, AB · Hinton, AB · Red Deer, AB · Montreal, QC · Gillette, WY · Spokane, WA · Shelby, MT

INVOICE TO	DATE Sept 11 20
BILL OF LADING #	PURCHASE ORDER NUMBER
SHIPPER (FROM)	CONSIGNEE (TO) Pacific Applied Labs
STREET	STREET 18804 N Creek Parkway
CITY/PROVINCE	POSTAL CODE / CITY/PROVINCE Bothell WA POSTAL CODE 98011

SPECIAL INSTRUCTIONS

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)
1	Cooler	400 LBS

PAPS# RWHV76917

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

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, 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 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 9
SHIPPER SIGN	CONSIGNEE SIGN	TIME

WHITE: Office YELLOW: Carrier PINK: Consignee GOLDENROAD: Shipper GST # 864540398RT0001 NUMBER OF PIECES RECEIVED ▲

AMIGOS PRINTING

Cooler ID: S.C. 5 **COC (Y/N)** (N) **Temperature:** Sp. 1.2°C (frozen) IR: 21
T/D 5.5°C

Coolant Type: Ice (Blue Ice) Ambient

Notes:

	RG		FR		EV		E4F			
Sampling Locations:	T/D	SP	T/D	SP	T/D	SP	T/D	SP	T/D	SP
Sample Types:										
Container Types:		120mL HDPE		60mL AMBER HDPE		60mL 120mL HDPE	125mL AMBER GLASS			

Opened By: ADN **Date:** 9/10/20

Revision 004

Effective 7/29/20

WOs: 2037029 2037032 2037037 2037034

STRAIGHT BILL OF LADING
NOT NEGOTIABLE

COPY

RW HOT SHOT SERVICE INC.

250-425-7447

24 Hour Hot Shot Service

No. 76917

Sparwood, BC
Kamloops, BC
Terrace, BC
Vancouver, BC
Prince George, BC
Tumbler Ridge, BC
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Edmonton, AB
Ft. McMurray, AB
Hinton, AB
Red Deer, AB
Montreal, QC
Gillette, WY
Spokane, WA
Shelby, MT

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# RWHV76917	

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

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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: S.C 7 COC (Y/N) Temperature: 3.7 IR: 29

Coolant Type: Ice Blue Ice Ambient

Notes:

Sampling Locations: SNC 37

Sample Types:	T/D	SP	T/D	SP	T/D	SP	T/D	SP	T/D	SP
	NS		120							

Container Types:

Opened By: DSR Date: 9/10/20

Effective 7/29/20

Revision 004

SELENIUM CHEMISTRY

BAL Final Report 2012199

(Finalized December 28, 2020)

BROOKS APPLIED LABS
18804 North Creek Parkway, Ste 100, Bothell, WA 98011 • USA • T: 206 632 6206 F: 206 632 6017 • info@brooksapplied.com

December 28, 2020

Teck Resources Limited - Vancouver
Cait Good
421 Pine Avenue
Sparwood, B.C. CANADA V0B2G0
Cait.Good@teck.com

Re: Regional Effects Program

Dear Cait Good,

On December 10, 2020, Brooks Applied Labs (BAL) received ten (10) 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 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 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, Se 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

Se species may coelute. Alternate methods can be applied, upon client request, to increase the separation of DMSeO from potentially co-eluting Se species.

Recoveries for all spiked selenium species in the opening continuing calibration verification standard (S202014-CCV1) were less than the lower control limit of 75%, with each recovery near 70%. The spiked selenium species recoveries for the initial calibration verification standard (S202014-ICV1) were acceptable and recoveries for the remaining CCV standards in the batch were within acceptable ranges. The method blanks, blank spikes, and a suite of low-level calibration standards (SEQ-LCV1, SEQ-LCV2, SEQ-LCV3, and SEQ-LCV4) were the only items bracketed by the CCV outlier. Blank spike recoveries were satisfactory for all spiked selenium species and recoveries were acceptable for all four low-level calibration standards. Since all remaining CCV recoveries, blank spike recoveries, and LCV recoveries associated with this analytical batch demonstrate the absence of any significant selenium species bias or drift inherent in the analytical platform, the results for the method blanks bracketed by the CCV outlier are deemed representative of the batch performance. No corrective actions were necessary.

Continuing calibration verification standards (CCVs) bracketing client samples in sequence S202014 exhibited split peaks for Se(VI) in the chromatograms. The slightly split peaks were integrated yielding acceptable recoveries for selenate. Since all CCV recovery values associated with this analytical batch were within acceptable ranges, demonstrating the absence of adverse chromatographic impacts on selenate results, the results bracketed by the CCVs have been reported without qualification. Split peaks were not observed in the chromatograms for client samples reported from sequence S202014.

Samples in Batch B204032 were bracketed by a continuous calibration blank (S202014-CCBC) with a selenate value (0.048 µg/L) greater than the associated selenate reporting limit (Se(VI) MRL = 0.011 µg/L). Samples 2012199-03, 2012199-06, 2012199-09, and QC set 6 were bracketed by S202014-CCBC in the analytical run. The selenate value for 2012199-06 was less than 10 times the CCB outlier. 2012199-06 was analyzed in a separate sequence with clean bracketing CCBs. Results were confirmed for all Se species. Consequently, results for 2012199-06 are reported unqualified from the initial injection in batch B204032. Selenate results for the remaining client samples bracketed by S202014-CCBC were greater than 10x the elevated CCB result; the potential impact of the CCB outlier is insignificant. No data were qualified, and no corrective actions were necessary.

All samples in Batch B204032 were bracketed by a continuous calibration blank (S202014-CCBD) with a selenate value (0.177 µg/L) greater than the associated selenate reporting limit (Se(VI) MRL = 0.011 µg/L). Except for 2012199-06, selenate results for client samples bracketed by S202014-CCBD were greater than 10x the elevated CCB result; the potential impact of the CCB outlier is insignificant. No data were qualified, and no corrective actions were necessary.

Poor mass balance was observed in samples 2012199-18 and 2012199-24 when Se speciation results were compared to corresponding dissolved Se results. Re-analyses confirmed the results. Container labels were checked and there was no indication of samples miss-labeled. Consequently, no additional corrective actions are necessary. The reported results are deemed representative of the submitted containers.

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 method detection limits (MDLs), MRLs, and other details.

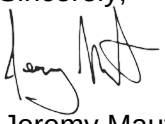
In instances when a matrix spike/matrix spike duplicate (MS/MSD) set was spiked at a level less than the native sample concentration, the recoveries, and the relative percent difference (RPD) are not considered valid indicators of data quality. In such instances, the recoveries of the laboratory fortified 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**).

All data were reported without qualification, aside from concentration qualifiers. Except for items noted above, 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 27, 2020; Valid to: June 30, 2021
Certificate Number: E87982-35

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	Ag, As, 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-4200	Non-Potable Waters	Se(IV), Se(VI)
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), and DoD/DOE (3)

Issued by: ANAB

Issued on: November 20, 2020; Valid to: March 20, 2022

Method	Matrix	ISO and Non-Gov. TNI Accredited Analyte(s)	DoD/DOE Accredited Analytes
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	Ag, Al, As, Ba, Ca, Cd, Cr, Cu, Fe, Pb, Mg, Mn, Ni, Sb, Se, 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)	Not Accredited
EPA 1640 Mod	Non-Potable Waters	Ag, As, Cd, Cu, Pb, Ni, Zn Cr, Co, Se, Tl, V (ISO Only)	Not Accredited
EPA 1631E Mod BAL-3100 (waters)	Non-Potable Waters, Solids/Chemicals & Biological/Food	Total Mercury	Total Mercury
EPA 1630 Mod BAL-3200	Non-Potable Waters, Solids/Chemicals Biological	Methyl Mercury	Methyl Mercury (excluding Solids/Chemicals)
EPA 1632A Mod BAL-3300	Non-Potable Waters	Inorganic Arsenic, As(III) (ISO Only)	Not Accredited
	Biological/Food Solids/Chemicals	Inorganic Arsenic (ISO Only)	Not Accredited
AOAC 2015.01 Mod BAL-5000 by BAL-5040	Food	As, Cd, Hg, Pb	Not Accredited
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs	Not Accredited
	Biological by BAL-4115	Inorganic Arsenic, DMAs, MMAs (ISO Only)	Not Accredited
BAL-4101	Food by BAL-4116	Inorganic Arsenic, DMAs, MMAs (ISO Only)	Not Accredited
BAL-4201	Non-Potable Waters	Se(IV), Se(VI), SeCN, SeMet	Not Accredited
BAL-4300	Non-Potable Waters, Solid/Chemicals	Cr(VI)	Cr(VI)
SM 3500-Fe BAL-4500	Non-Potable Waters	Fe, Fe(II) (ISO Only)	Not Accredited
SM2340B	Non-Potable Waters	Hardness	Hardness
SM 2540G EPA 160.3 BAL-0501	Solids/Chemicals & Biological	% Dry Weight	% Dry Weight

(1) ISO/IEC 17025:2017 – Certificate Number ADE-1447.2

(2) Non-Governmental NELAC Institute 2016 Standard – Certificate Number ADE-1447.1

(3) Department of Defense/Energy Consolidated Quality Systems Manual v. 5.3 – Certificate Numbers ADE-1447 for DoD, ADE-1447.3 for DOE.

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_LI24_WS_LAEMP_LCO_2020-12_NP_NAL	2012199-01	WS	Sample	11/30/2020	12/10/2020
RG_LI24_WS_LAEMP_LCO_2020-12_NP_NAL	2012199-02	WS	Sample	11/30/2020	12/10/2020
RG_LI24_WS_LAEMP_LCO_2020-12_NP	2012199-03	WS	Sample	11/30/2020	12/10/2020
RG_SLINE_WS_LAEMP_LCO_2020-12_NP_NAL	2012199-04	WS	Sample	11/30/2020	12/10/2020
RG_SLINE_WS_LAEMP_LCO_2020-12_NP_NAL	2012199-05	WS	Sample	11/30/2020	12/10/2020
RG_SLINE_WS_LAEMP_LCO_2020-12_NP	2012199-06	WS	Sample	11/30/2020	12/10/2020
RG_FRUL_WS_LAEMP_LCO_2020-12_NP_NAL	2012199-07	WS	Sample	11/30/2020	12/10/2020
RG_FRUL_WS_LAEMP_LCO_2020-12_NP_NAL	2012199-08	WS	Sample	11/30/2020	12/10/2020
RG_FRUL_WS_LAEMP_LCO_2020-12_NP	2012199-09	WS	Sample	11/30/2020	12/10/2020
RG_LILC3_WS_LAEMP_LCO_2020-12_NP_NAL	2012199-10	WS	Sample	12/01/2020	12/10/2020
RG_LILC3_WS_LAEMP_LCO_2020-12_NP_NAL	2012199-11	WS	Sample	12/01/2020	12/10/2020
RG_LILC3_WS_LAEMP_LCO_2020-12_NP	2012199-12	WS	Sample	12/01/2020	12/10/2020
RG_LCUT_WS_LAEMP_LCO_2020-12_NP_NAL	2012199-13	WS	Sample	12/01/2020	12/10/2020
RG_LCUT_WS_LAEMP_LCO_2020-12_NP_NAL	2012199-14	WS	Sample	12/01/2020	12/10/2020
RG_LCUT_WS_LAEMP_LCO_2020-12_NP	2012199-15	WS	Sample	12/01/2020	12/10/2020
RG_RIVER_WS_LAEMP_LCO_2020-12_NP_NAL	2012199-16	WS	Sample	12/01/2020	12/10/2020
RG_RIVER_WS_LAEMP_LCO_2020-12_NP_NAL	2012199-17	WS	Sample	12/01/2020	12/10/2020
RG_RIVER_WS_LAEMP_LCO_2020-12_NP	2012199-18	WS	Sample	12/01/2020	12/10/2020
RG_LIDCOM_WS_LAEMP_LCO_2020-12_NP_NAL	2012199-19	WS	Sample	12/01/2020	12/10/2020
RG_LIDCOM_WS_LAEMP_LCO_2020-12_NP_NAL	2012199-20	WS	Sample	12/01/2020	12/10/2020
RG_LIDCOM_WS_LAEMP_LCO_2020-12_NP	2012199-21	WS	Sample	12/01/2020	12/10/2020

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_FO23_WS_LAEMP_LCO_2020-12_NP_NAL	2012199-22	WS	Sample	12/02/2020	12/10/2020
RG_FO23_WS_LAEMP_LCO_2020-12_NP_NAL	2012199-23	WS	Sample	12/02/2020	12/10/2020
RG_FO23_WS_LAEMP_LCO_2020-12_NP	2012199-24	WS	Sample	12/02/2020	12/10/2020
RG_LI8_WS_LAEMP_LCO_2020-12_NP_NAL	2012199-25	WS	Sample	12/02/2020	12/10/2020
RG_LI8_WS_LAEMP_LCO_2020-12_NP_NAL	2012199-26	WS	Sample	12/02/2020	12/10/2020
RG_LI8_WS_LAEMP_LCO_2020-12_NP	2012199-27	WS	Sample	12/02/2020	12/10/2020
RG_LISP24_WS_LAEMP_LCO_2020-12_NP_NAL	2012199-28	WS	Sample	12/02/2020	12/10/2020
RG_LISP24_WS_LAEMP_LCO_2020-12_NP_NAL	2012199-29	WS	Sample	12/02/2020	12/10/2020
RG_LISP24_WS_LAEMP_LCO_2020-12_NP	2012199-30	WS	Sample	12/02/2020	12/10/2020

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
DMSeO	Water	SOP BAL-4201	12/09/2020	12/12/2020	B204032	S202014
MeSe(IV)	Water	SOP BAL-4201	12/09/2020	12/12/2020	B204032	S202014
MeSe(VI)	Water	SOP BAL-4201	12/09/2020	12/12/2020	B204032	S202014
Se	Water	EPA 1638 Mod	12/10/2020	12/15/2020	B204056	S202030
Se(IV)	Water	SOP BAL-4201	12/09/2020	12/12/2020	B204032	S202014
Se(VI)	Water	SOP BAL-4201	12/09/2020	12/12/2020	B204032	S202014
SeCN	Water	SOP BAL-4201	12/09/2020	12/12/2020	B204032	S202014
SeMet	Water	SOP BAL-4201	12/09/2020	12/12/2020	B204032	S202014
SeSO3	Water	SOP BAL-4201	12/09/2020	12/12/2020	B204032	S202014
Unk Se Sp	Water	SOP BAL-4201	12/09/2020	12/12/2020	B204032	S202014

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_LI24_WS_LAEMP_LCO_2020-12_NP_NAL										
2012199-01	Se	WS	TR	3.07		0.053	0.528	µg/L	B204056	S202030
RG_LI24_WS_LAEMP_LCO_2020-12_NP_NAL										
2012199-02	Se	WS	D	3.23		0.053	0.528	µg/L	B204056	S202030
RG_LI24_WS_LAEMP_LCO_2020-12_NP										
2012199-03	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-03	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-03	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-03	Se(IV)	WS	D	0.031	J	0.010	0.075	µg/L	B204032	S202014
2012199-03	Se(VI)	WS	D	2.68		0.010	0.055	µg/L	B204032	S202014
2012199-03	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B204032	S202014
2012199-03	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-03	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B204032	S202014
2012199-03	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204032	S202014
RG_SLINE_WS_LAEMP_LCO_2020-12_NP_NAL										
2012199-04	Se	WS	TR	1.62		0.053	0.528	µg/L	B204056	S202030
RG_SLINE_WS_LAEMP_LCO_2020-12_NP_NAL										
2012199-05	Se	WS	D	1.56		0.053	0.528	µg/L	B204056	S202030
RG_SLINE_WS_LAEMP_LCO_2020-12_NP										
2012199-06	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-06	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-06	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-06	Se(IV)	WS	D	0.025	J	0.010	0.075	µg/L	B204032	S202014
2012199-06	Se(VI)	WS	D	1.33		0.010	0.055	µg/L	B204032	S202014
2012199-06	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B204032	S202014
2012199-06	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-06	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B204032	S202014
2012199-06	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204032	S202014
RG_FRUL_WS_LAEMP_LCO_2020-12_NP_NAL										
2012199-07	Se	WS	TR	54.4		0.053	0.528	µg/L	B204056	S202030
RG_FRUL_WS_LAEMP_LCO_2020-12_NP_NAL										
2012199-08	Se	WS	D	55.8		0.053	0.528	µg/L	B204056	S202030

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FRUL_WS_LAEMP_LCO_2020-12_NP										
2012199-09	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-09	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-09	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-09	Se(IV)	WS	D	0.164		0.010	0.075	µg/L	B204032	S202014
2012199-09	Se(VI)	WS	D	47.3		0.010	0.055	µg/L	B204032	S202014
2012199-09	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B204032	S202014
2012199-09	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-09	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B204032	S202014
2012199-09	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204032	S202014
RG_LILC3_WS_LAEMP_LCO_2020-12_NP_NAL										
2012199-10	Se	WS	TR	49.2		0.053	0.528	µg/L	B204056	S202030
RG_LILC3_WS_LAEMP_LCO_2020-12_NP_NAL										
2012199-11	Se	WS	D	47.4		0.053	0.528	µg/L	B204056	S202030
RG_LILC3_WS_LAEMP_LCO_2020-12_NP										
2012199-12	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-12	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-12	MeSe(VI)	WS	D	0.103		0.010	0.025	µg/L	B204032	S202014
2012199-12	Se(IV)	WS	D	0.574		0.010	0.075	µg/L	B204032	S202014
2012199-12	Se(VI)	WS	D	42.0		0.010	0.055	µg/L	B204032	S202014
2012199-12	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B204032	S202014
2012199-12	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-12	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B204032	S202014
2012199-12	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204032	S202014
RG_LCUT_WS_LAEMP_LCO_2020-12_NP_NAL										
2012199-13	Se	WS	TR	65.1		0.053	0.528	µg/L	B204056	S202030
RG_LCUT_WS_LAEMP_LCO_2020-12_NP_NAL										
2012199-14	Se	WS	D	65.3		0.053	0.528	µg/L	B204056	S202030

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_LCUT_WS_LAEMP_LCO_2020-12_NP										
2012199-15	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-15	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-15	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-15	Se(IV)	WS	D	0.093		0.010	0.075	µg/L	B204032	S202014
2012199-15	Se(VI)	WS	D	55.2		0.010	0.055	µg/L	B204032	S202014
2012199-15	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B204032	S202014
2012199-15	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-15	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B204032	S202014
2012199-15	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204032	S202014
RG_RIVER_WS_LAEMP_LCO_2020-12_NP_NAL										
2012199-16	Se	WS	TR	65.4		0.053	0.528	µg/L	B204056	S202030
RG_RIVER_WS_LAEMP_LCO_2020-12_NP_NAL										
2012199-17	Se	WS	D	65.3		0.053	0.528	µg/L	B204056	S202030
RG_RIVER_WS_LAEMP_LCO_2020-12_NP										
2012199-18	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-18	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-18	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-18	Se(IV)	WS	D	0.077		0.010	0.075	µg/L	B204032	S202014
2012199-18	Se(VI)	WS	D	37.7		0.010	0.055	µg/L	B204032	S202014
2012199-18	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B204032	S202014
2012199-18	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-18	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B204032	S202014
2012199-18	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204032	S202014
RG_LIDCOM_WS_LAEMP_LCO_2020-12_NP_NAL										
2012199-19	Se	WS	TR	33.7		0.053	0.528	µg/L	B204056	S202030
RG_LIDCOM_WS_LAEMP_LCO_2020-12_NP_NAL										
2012199-20	Se	WS	D	32.7		0.053	0.528	µg/L	B204056	S202030

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_LIDCOM_WS_LAEMP_LCO_2020-12_NP										
2012199-21	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-21	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-21	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-21	Se(IV)	WS	D	0.212		0.010	0.075	µg/L	B204032	S202014
2012199-21	Se(VI)	WS	D	27.5		0.010	0.055	µg/L	B204032	S202014
2012199-21	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B204032	S202014
2012199-21	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-21	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B204032	S202014
2012199-21	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204032	S202014
RG_FO23_WS_LAEMP_LCO_2020-12_NP_NAL										
2012199-22	Se	WS	TR	46.4		0.053	0.528	µg/L	B204056	S202030
RG_FO23_WS_LAEMP_LCO_2020-12_NP_NAL										
2012199-23	Se	WS	D	44.1		0.053	0.528	µg/L	B204056	S202030
RG_FO23_WS_LAEMP_LCO_2020-12_NP										
2012199-24	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-24	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-24	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-24	Se(IV)	WS	D	0.147		0.010	0.075	µg/L	B204032	S202014
2012199-24	Se(VI)	WS	D	33.7		0.010	0.055	µg/L	B204032	S202014
2012199-24	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B204032	S202014
2012199-24	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-24	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B204032	S202014
2012199-24	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204032	S202014
RG_LI8_WS_LAEMP_LCO_2020-12_NP_NAL										
2012199-25	Se	WS	TR	30.1		0.053	0.528	µg/L	B204056	S202030
RG_LI8_WS_LAEMP_LCO_2020-12_NP_NAL										
2012199-26	Se	WS	D	29.8		0.053	0.528	µg/L	B204056	S202030

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_LI8_WS_LAEMP_LCO_2020-12_NP										
2012199-27	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-27	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-27	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-27	Se(IV)	WS	D	0.122		0.010	0.075	µg/L	B204032	S202014
2012199-27	Se(VI)	WS	D	24.5		0.010	0.055	µg/L	B204032	S202014
2012199-27	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B204032	S202014
2012199-27	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-27	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B204032	S202014
2012199-27	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204032	S202014
RG_LISP24_WS_LAEMP_LCO_2020-12_NP_NAL										
2012199-28	Se	WS	TR	39.7		0.053	0.528	µg/L	B204056	S202030
RG_LISP24_WS_LAEMP_LCO_2020-12_NP_NAL										
2012199-29	Se	WS	D	39.0		0.053	0.528	µg/L	B204056	S202030
RG_LISP24_WS_LAEMP_LCO_2020-12_NP										
2012199-30	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-30	MeSe(IV)	WS	D	0.013	J	0.010	0.025	µg/L	B204032	S202014
2012199-30	MeSe(VI)	WS	D	0.086		0.010	0.025	µg/L	B204032	S202014
2012199-30	Se(IV)	WS	D	0.475		0.010	0.075	µg/L	B204032	S202014
2012199-30	Se(VI)	WS	D	32.0		0.010	0.055	µg/L	B204032	S202014
2012199-30	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B204032	S202014
2012199-30	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204032	S202014
2012199-30	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B204032	S202014
2012199-30	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204032	S202014

Accuracy & Precision Summary

Batch: B204032
Lab Matrix: Water
Method: SOP BAL-4201

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B204032-BS1	**Blank Spike, (1923027)**						
	MeSe(IV)		5.095	5.087	µg/L	100% 75-125	
	Se(IV)		5.000	5.004	µg/L	100% 75-125	
	Se(VI)		5.000	4.943	µg/L	99% 75-125	
	SeCN		5.015	4.979	µg/L	99% 75-125	
	SeMet		4.932	4.605	µg/L	93% 75-125	
B204032-DUP6	**Duplicate, (2012199-09)**						
	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)	0.164		0.170	µg/L		4% 25
	Se(VI)	47.34		45.71	µg/L		4% 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
B204032-MS6	**Matrix Spike, (2012199-09)**						
	Se(IV)	0.164	4.900	4.887	µg/L	96% 75-125	
	Se(VI)	47.34	5.100	51.93	µg/L	NR 75-125	
	SeCN	ND	4.905	4.399	µg/L	90% 75-125	
	SeMet	ND	1.977	1.844	µg/L	93% 75-125	
B204032-MSD6	**Matrix Spike Duplicate, (2012199-09)**						
	Se(IV)	0.164	4.900	4.797	µg/L	95% 75-125	2% 25
	Se(VI)	47.34	5.100	49.40	µg/L	NR 75-125	N/C 25
	SeCN	ND	4.905	4.426	µg/L	90% 75-125	0.6% 25
	SeMet	ND	1.977	1.783	µg/L	90% 75-125	3% 25

Accuracy & Precision Summary

Batch: B204056
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B204056-BS1	**Blank Spike, (2035013)**						
	Se		200.0	198.4	µg/L	99% 75-125	
B204056-BS2	**Blank Spike, (2035013)**						
	Se		200.0	205.2	µg/L	103% 75-125	
B204056-BS3	**Blank Spike, (2035013)**						
	Se		200.0	204.2	µg/L	102% 75-125	
B204056-SRM1	**Reference Material (2041015, TMDA 51.5 Reference Standard - Bottle 2 - SRM)**						
	Se		14.30	14.42	µg/L	101% 75-125	
B204056-SRM2	**Reference Material (2041015, TMDA 51.5 Reference Standard - Bottle 2 - SRM)**						
	Se		14.30	14.82	µg/L	104% 75-125	
B204056-SRM3	**Reference Material (2041015, TMDA 51.5 Reference Standard - Bottle 2 - SRM)**						
	Se		14.30	14.74	µg/L	103% 75-125	
B204056-DUP2	**Duplicate, (2012199-01)**						
	Se	3.068		3.220	µg/L		5% 20
B204056-MS2	**Matrix Spike, (2012199-01)**						
	Se	3.068	220.0	224.7	µg/L	101% 75-125	
B204056-MSD2	**Matrix Spike Duplicate, (2012199-01)**						
	Se	3.068	220.0	228.2	µg/L	102% 75-125	2% 20

Method Blanks & Reporting Limits

Batch: B204032
Matrix: Water
Method: SOP BAL-4201
Analyte: DMSeO

Sample	Result	Units
B204032-BLK1	0.00	µg/L
B204032-BLK2	0.00	µg/L
B204032-BLK3	0.00	µg/L
B204032-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005

MDL: 0.002
MRL: 0.005

Analyte: MeSe(IV)

Sample	Result	Units
B204032-BLK1	0.00	µg/L
B204032-BLK2	0.00	µg/L
B204032-BLK3	0.00	µg/L
B204032-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005

MDL: 0.002
MRL: 0.005

Analyte: MeSe(VI)

Sample	Result	Units
B204032-BLK1	0.00	µg/L
B204032-BLK2	0.00	µg/L
B204032-BLK3	0.00	µg/L
B204032-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
B204032-BLK1	0.00	µg/L
B204032-BLK2	0.00	µg/L
B204032-BLK3	0.00	µg/L
B204032-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.015

MDL: 0.002
MRL: 0.015

Analyte: Se(VI)

Sample	Result	Units
B204032-BLK1	0.00	µg/L
B204032-BLK2	0.00	µg/L
B204032-BLK3	0.00	µg/L
B204032-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.011

MDL: 0.002
MRL: 0.011

Analyte: SeCN

Sample	Result	Units
B204032-BLK1	0.00	µg/L
B204032-BLK2	0.00	µg/L
B204032-BLK3	0.00	µg/L
B204032-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.010

MDL: 0.002
MRL: 0.010

Analyte: SeMet

Sample	Result	Units
B204032-BLK1	0.00	µg/L
B204032-BLK2	0.00	µg/L
B204032-BLK3	0.00	µg/L
B204032-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
B204032-BLK1	0.00	µg/L
B204032-BLK2	0.00	µg/L
B204032-BLK3	0.00	µg/L
B204032-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.011

MDL: 0.002
MRL: 0.011

Analyte: Unk Se Sp

Sample	Result	Units
B204032-BLK1	0.00	µg/L
B204032-BLK2	0.00	µg/L
B204032-BLK3	0.00	µg/L
B204032-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.015

MDL: 0.002
MRL: 0.015

Method Blanks & Reporting Limits

Batch: B204056
Matrix: Water
Method: EPA 1638 Mod
Analyte: Se

Sample	Result	Units
B204056-BLK1	0.011	µg/L
B204056-BLK2	-0.006	µg/L
B204056-BLK3	-0.007	µg/L
B204056-BLK4	0.013	µg/L

Average: 0.003
Limit: 0.480

MDL: 0.048
MRL: 0.480

Sample Containers

Lab ID: 2012199-01
Sample: RG_LI24_WS_LAEMP_LCO_2020-12_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 11/30/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler 1 - 2012199

Lab ID: 2012199-02
Sample: RG_LI24_WS_LAEMP_LCO_2020-12_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 11/30/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler 1 - 2012199

Lab ID: 2012199-03
Sample: RG_LI24_WS_LAEMP_LCO_2020-12_NP
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 11/30/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199

Lab ID: 2012199-04
Sample: RG_SLINE_WS_LAEMP_LCO_2020-12_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 11/30/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler 1 - 2012199

Sample Containers

Lab ID: 2012199-05
Sample: RG_SLINE_WS_LAEMP_LCO_2020-12_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 11/30/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler 1 - 2012199

Lab ID: 2012199-06
Sample: RG_SLINE_WS_LAEMP_LCO_2020-12_NP
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 11/30/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199

Lab ID: 2012199-07
Sample: RG_FRUL_WS_LAEMP_LCO_2020-12_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 11/30/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler 1 - 2012199

Lab ID: 2012199-08
Sample: RG_FRUL_WS_LAEMP_LCO_2020-12_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 11/30/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler 1 - 2012199

Sample Containers

Lab ID: 2012199-09
Sample: RG_FRUL_WS_LAEMP_LCO_2020-12_NP
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 11/30/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199

Lab ID: 2012199-10
Sample: RG_LILC3_WS_LAEMP_LCO_2020-12_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/01/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler 1 - 2012199

Lab ID: 2012199-11
Sample: RG_LILC3_WS_LAEMP_LCO_2020-12_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/01/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler 1 - 2012199

Lab ID: 2012199-12
Sample: RG_LILC3_WS_LAEMP_LCO_2020-12_NP
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/01/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199

Sample Containers

Lab ID: 2012199-13
Sample: RG_LCUT_WS_LAEMP_LCO_2020-12_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/01/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler 1 - 2012199

Lab ID: 2012199-14
Sample: RG_LCUT_WS_LAEMP_LCO_2020-12_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/01/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler 1 - 2012199

Lab ID: 2012199-15
Sample: RG_LCUT_WS_LAEMP_LCO_2020-12_NP
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/01/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199

Lab ID: 2012199-16
Sample: RG_RIVER_WS_LAEMP_LCO_2020-12_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/01/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler 1 - 2012199

Sample Containers

Lab ID: 2012199-17
Sample: RG_RIVER_WS_LAEMP_LCO_2020-12_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/01/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler 1 - 2012199

Lab ID: 2012199-18
Sample: RG_RIVER_WS_LAEMP_LCO_2020-12_NP
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/01/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199

Lab ID: 2012199-19
Sample: RG_LIDCOM_WS_LAEMP_LCO_2020-12_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/01/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler 1 - 2012199

Lab ID: 2012199-20
Sample: RG_LIDCOM_WS_LAEMP_LCO_2020-12_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/01/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler 1 - 2012199

Sample Containers

Lab ID: 2012199-21
Sample: RG_LIDCOM_WS_LAEMP_LCO_2020-12_NP
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/01/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199

Lab ID: 2012199-22
Sample: RG_FO23_WS_LAEMP_LCO_2020-12_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/02/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler 1 - 2012199

Lab ID: 2012199-23
Sample: RG_FO23_WS_LAEMP_LCO_2020-12_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/02/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler 1 - 2012199

Lab ID: 2012199-24
Sample: RG_FO23_WS_LAEMP_LCO_2020-12_NP
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/02/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199

Sample Containers

Lab ID: 2012199-25
Sample: RG_LI8_WS_LAEMP_LCO_2020-12_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/02/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler 1 - 2012199

Lab ID: 2012199-26
Sample: RG_LI8_WS_LAEMP_LCO_2020-12_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/02/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler 1 - 2012199

Lab ID: 2012199-27
Sample: RG_LI8_WS_LAEMP_LCO_2020-12_NP
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/02/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199

Lab ID: 2012199-28
Sample: RG_LISP24_WS_LAEMP_LCO_2020-12_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/02/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler 1 - 2012199

Sample Containers

Lab ID: 2012199-29
Sample: RG_LISP24_WS_LAEMP_LCO_2020-12_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/02/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2002005	<2	Styrofoam Cooler 1 - 2012199

Lab ID: 2012199-30
Sample: RG_LISP24_WS_LAEMP_LCO_2020-12_NP
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/02/2020
Received: 12/10/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler 1 - 2012199

Shipping Containers

Styrofoam Cooler 1 - 2012199

Received: December 10, 2020 7:00
Tracking No: 82417 via Courier
Coolant Type: Blue Ice
Temperature: 0.6 °C

Description: Styrofoam Cooler 1
Damaged in transit? No
Returned to client? No
Comments: IR #21

Custody seals present? No
Custody seals intact? No
COC present? Yes

COC ID: Regional Effects Program | **TURNAROUND TIME:** Regular

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program			Lab Name	ALS Calgary			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cait Good			Lab Contact	Lyuda Shvets			Email 1:	cait.good@teck.com	X	X	X
Email	cait.good@teck.com			Email	Lyudmyla.Shvets@ALSGlobal.com			Email 2:	carlie.meyer@teck.com	X	X	X
Address	421 Pine Avenue			Address	2559 29 Street NE			Email 3:	teckcoal@equisonline.com			X
								Email 4:	kbatchelar@minnow.ca	X	X	X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:	Carla.FroymanParker@teck.com	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada					
Phone Number	250-425-8202			Phone Number	403-407-1800			PO number	VPO00689999			

SAMPLE DETAILS								ANALYSIS REQUESTED (Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)										
								FIL	N	Y	N	Y	Y	N	N			
								PRESERV.	NONE	H2SO4	H2SO4	HCl	HNO3	HNO3	NONE			
Sample ID	Sample Location (sys loc code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	ANALYSIS	Total Selenium	Dissolved Selenium	Selenium Speciation							
LG_LI24_WS_LAEMP_LCO_2020-12_NP_NAL	RG_LI24	WS	NO	Nov30/20	10:45	G	2		x	x								
RG_LI24_WS_LAEMP_LCO_2020-12_NP	RG_LI24	WS	NO	Nov30/20	10:45	G	1				x							
LG_SLINE_WS_LAEMP_LCO_2020-12_NP_NAL	RG_SLINE	WS	NO	Nov30/20	13:30	G	2		x	x								
LG_SLINE_WS_LAEMP_LCO_2020-12_NP	RG_SLINE	WS	NO	Nov30/20	13:30	G	1				x							
G_FRUL_WS_LAEMP_LCO_2020-12_NP_NAL	RG_FRUL	WS	NO	Nov30/20	16:15	G	2		x	x								
RG_FRUL_WS_LAEMP_LCO_2020-12_NP	RG_FRUL	WS	NO	Nov30/20	16:15	G	1				x							
LG_LILC3_WS_LAEMP_LCO_2020-12_NP_NAL	RG_LILC3	WS	NO	Dec 1/20	10:30	G	2		x	x								
RG_LILC3_WS_LAEMP_LCO_2020-12_NP	RG_LILC3	WS	NO	Dec 1/20	10:30	G	1				x							
RG_LCUT_WS_LAEMP_LCO_2020-12_NP	RG_LCUT	WS	NO	Dec 1/20	13:00	G	1				x							
LG_LCUT_WS_LAEMP_LCO_2020-12_NP_NAL	RG_LCUT	WS	NO	Dec 1/20	13:00	G	2		x	x								

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Line Creek LAMEP - VPO00690100. **Samples for total selenium have been preserved in the field. Dissolved selenium have been filtered and preserved. Speciation samples have been filtered and frozen.**	Rick Smit / Lotic environmental		[illegible]	Nov30 7:00

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				
Emergency (1 Business Day) - 100% surcharge	**Sampler's Signature**	[signature]	**Date/Time**	
For Emergency <1 Day, ASAP or Weekend - Contact ALS				

Teck

Confidential

BAL Final Report 2012199

COC ID: Regional Effects Program | **TURNAROUND TIME:** Regular

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Regional Effects Program			Lab Name	ALS Calgary			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cait Good			Lab Contact	Lyuda Shvets			Email 1:	cait.good@teck.com	X	X	X
Email	cait.good@teck.com			Email	Lyudmyla.Shvets@ALSGlobal.com			Email 2:	carlie.meyer@teck.com	X	X	X
Address	421 Pine Avenue			Address	2559 29 Street NE			Email 3:	teckcoal@equisonline.com			X
								Email 4:	kbatchelar@minnow.ca	X	X	X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:	Carla.FroymanParker@teck.com	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada					
Phone Number	250-425-8202			Phone Number	403-407-1800			PO number	VPO00689999			

SAMPLE DETAILS								ANALYSIS REQUESTED (Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)											
								FIL	N	Y	N	Y	Y	N	N				
								PRESERV.	NONE	H2SO4	H2SO4	HCl	HNO3	HNO3	NONE				
Sample ID	Sample Location (sys loc code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	ANALYSIS	Total Selenium	Dissolved Selenium	Selenium Speciation								
RG_RIVER_WS_LAEMP_LCO_2020-12_NP_NAL	RG_RIVER	WS	NO	Dec1/20	12:45	G	2		x	x									
RG_RIVER_WS_LAEMP_LCO_2020-12_NP	RG_RIVER	WS	NO	Dec1/20	12:45	G	1				x								
RG_LIDCOM_WS_LAEMP_LCO_2020-12_NP_NAL	RG_LIDCOM	WS	NO	Dec1/20	14:45	G	2		x	x									
RG_LIDCOM_WS_LAEMP_LCO_2020-12_NP	RG_LIDCOM	WS	NO	Dec1/20	14:45	G	1				x								
RG_F023_WS_LAEMP_LCO_2020-12_NP_NAL	RG_F023	WS	NO	Dec2/20	09:15	G	2		x	x									
RG_F023_WS_LAEMP_LCO_2020-12_NP	RG_F023	WS	NO	Dec2/20	09:15	G	1				x								
RG_LIB_WS_LAEMP_LCO_2020-12_NP_NAL	RG_LIB	WS	NO	Dec2/20	11:15	G	2		x	x									
RG_LIB_WS_LAEMP_LCO_2020-12_NP	RG_LIB	WS	NO	Dec2/20	11:15	G	1				x								
RG_LISP24_WS_LAEMP_LCO_2020-12_NP	RG_LISP24	WS	NO	Dec2/20	13:00	G	1				x								
RG_LISP24_WS_LAEMP_LCO_2020-12_NP_NAL	RG_LISP24	WS	NO	Dec2/20	13:00	G	2		x	x									

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Line Creek LAMEP - VPO00690100. Samples for total selenium have been preserved in the field. Dissolved selenium have been filtered and preserved. Speciation samples have been filtered and frozen.	Rick Smith Hatfield Environmental Rudy Brown	2020-12-02 14:00 12/09	Rudy B Jamie Rieg BAL	Nicholas Rice

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 Smith	Mobile #	403-586-3241
Sampler's Signature		Date/Time	Dec 2/20 14:00

Confidential **STRAIGHT BILL OF LADING**
NOT NEGOTIABLE

NW HOT SHOT SERVICE INC.
250-425-7447
24 Hour Hot Shot Service

No. 82417

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

DATE Dec 9/2020

INVOICE TO

BILL OF LADING #

PURCHASE ORDER NUMBER

SHIPPER (FROM) Teck Coal

CONSIGNEE (TO) Brooks Applied labs

STREET Westline Creek

STREET 19504 North creek Parkway

CITY/PROVINCE Sparwood B.C

POSTAL CODE

CITY/PROVINCE Bothell WA

POSTAL CODE

SPECIAL INSTRUCTIONS

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)
2	Coolers - water samples	50 lbs
	The unit at lodge	
	PAPS # NWHS 82417	

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 # 154

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 | PICK UP TIME

DRIVER'S SIGNATURE - DELIVERY BY | FINISH TIME

NOTICE OF CLAIM: (a) No carrier is liable for ... goods under the B... respect of such loss, damage or delay ... (b)The final statement of the claim ... RECEIVED at the point of origin on the date specified ... declined as indicated below, which the carrier agrees to carry and to deliver ... It is mutually agreed, as to each carrier of all or any of the ... all the conditions standard Bill of Lading, in power at the ... the date of issuing, which are hereby agreed to by the consignor and accepted ... The Contract for the carriage of the goods listed in the Bill of Lading is governed by regulation in force ... notice, therefor ... sixty (60) days after ... date of shipment ... described, in ... signed at the ... and as to each ... and accepted ... of and his ... action at the ... of the origin, destroyed ... date of shipment of the goods and the estimated amount claimed in ... goods, on the case of ... ...mails delivery within nine (9) months from the date of shipment. ... a copy of the said ... Bill. ... about as noted (contents and condition of contents of packages unknown) marked, consigned and ... subject to the rates and classification in effect on the date of shipment ... interested in all or any ... that every service to be performed hereunder shall be subject to ... assigns. Period of ... conditions set aside by the standard Bill of Lading in power at ... present and is subject to the conditions set out in such conditions

SHIPPER PRINT

CONSIGNEE PRINT

SHIPPER SIGN

CONSIGNEE SIGN

DATE

TIME

WHITE: Office YELLOW: Carrier PINK: Consignee GOLDENROAD: Shipper

GST # 864540398RT0001

NUMBER OF PIECES RECEIVED

ALSCOS PRINTING

Cooler ID: Styro Cooler 1 **COC** (Y/N) **Temperature:** 0.6 **IR:** 21

Coolant Type: (Ice) Blue Ice Ambient

Notes: 20122012012202

Sampling Locations:	G4 FRO		126		WL						
Sample Types:	T/D	SP	T/D	SP	T/D	SP	T/D	SP	T/D	SP	
Container Types:	125	120	120	120	40	125					

Opened By: **Date:**

Effective 7/29/20

Revision 004

BENTHIC COMMUNITY STRUCTURE

Cordillera Methods and QC Report 20-15

(March 30, 2021)

Methods and QC Report 2020

Project ID: Teck Line (20-15)

Client: Minnow Environmental

Prepared by:
Cordillera Consulting Inc.
Summerland, BC

Unit 1, 13216 Henry Ave B1202
Summerland, BC, V0H 1Z0
www.cordilleraconsulting.ca

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F: 250.494.7562

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Sample Reception

On September 11, 2020, 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

Project	Sample	CC#	Date	Size	# of Jars
Teck Line Creek LAEMP (20-15)	RG_LILC3_BIC-1_2020-08-27	CC210639	8/27/2020	400µM	2
Teck Line Creek LAEMP (20-15)	RG_LILC3_BIC-2_2020-08-27	CC210640	8/27/2020	400µM	1
Teck Line Creek LAEMP (20-15)	RG_LILC3_BIC-3_2020-08-27	CC210641	8/27/2020	400µM	1
Teck Line Creek LAEMP (20-15)	RG_LILC3_BIC-4_2020-08-27	CC210642	8/27/2020	400µM	2
Teck Line Creek LAEMP (20-15)	RG_LILC3_BIC-5_2020-08-27	CC210643	8/27/2020	400µM	1
Teck Line Creek LAEMP (20-15)	RG_FO23_BIC-1_2020-08-28	CC210644	8/28/2020	400µM	1
Teck Line Creek LAEMP (20-15)	RG_FO23_BIC-2_2020-08-28	CC210645	8/28/2020	400µM	1
Teck Line Creek LAEMP (20-15)	RG_FO23_BIC-3_2020-08-28	CC210646	8/28/2020	400µM	1
Teck Line Creek LAEMP (20-15)	RG_FO23_BIC-4_2020-08-28	CC210647	8/28/2020	400µM	1
Teck Line Creek LAEMP (20-15)	RG_FO23_BIC-5_2020-08-28	CC210648	8/28/2020	400µM	1
Teck Line Creek LAEMP (20-15)	RG_LCUT_BIC_2020-09-01	CC210649	9/1/2020	400µM	1
Teck Line Creek LAEMP (20-15)	RG_LISP24_BIC_2020-09-01	CC210650	9/1/2020	400µM	1
Teck Line Creek LAEMP (20-15)	RG_SLINE_BIC-1_2020-08-31	CC210651	8/31/2020	400µM	1
Teck Line Creek LAEMP (20-15)	RG_SLINE_BIC-2_2020-08-31	CC210652	8/31/2020	400µM	1
Teck Line Creek LAEMP (20-15)	RG_SLINE_BIC-3_2020-08-31	CC210653	8/31/2020	400µM	1
Teck Line Creek LAEMP (20-15)	RG_LI24_BIC-1_2020-08-31	CC210654	8/31/2020	400µM	1
Teck Line Creek LAEMP (20-15)	RG_LI24_BIC-2_2020-08-31	CC210655	8/31/2020	400µM	1
Teck Line Creek LAEMP (20-15)	RG_LI24_BIC-3_2020-08-31	CC210656	8/31/2020	400µM	1
Teck Line Creek LAEMP (20-15)	RG_LI24_BIC-4_2020-08-31	CC210657	8/31/2020	400µM	1
Teck Line Creek LAEMP (20-15)	RG_LI24_BIC-5_2020-09-01	CC210658	9/1/2020	400µM	1
Teck Line Creek LAEMP (20-15)	RG_LIDCOM_BIC_2020-08-30	CC210659	8/30/2020	400µM	2
Teck Line Creek LAEMP (20-15)	RG_FRUL_BIC_2020-08-29	CC210660	8/29/2020	400µM	1
Teck Line Creek LAEMP (20-15)	RG_LIDSL_BIC-1_2020-08-25	CC210661	8/25/2020	400µM	1
Teck Line Creek LAEMP (20-15)	RG_LIDSL_BIC-2_2020-08-25	CC210662	8/25/2020	400µM	1
Teck Line Creek LAEMP (20-15)	RG_LIDSL_BIC-3_2020-08-26	CC210663	8/26/2020	400µM	1
Teck Line Creek LAEMP (20-15)	RG_LIDSL_BIC-4_2020-08-26	CC210664	8/26/2020	400µM	1

Teck Line Creek LAEMP (20-15)	RG_LIDSL_BIC-5_2020-08-26	CC210665	8/26/2020	400µM	1
Teck Line Creek LAEMP (20-15)	RG_LI8_BIC-1_2020-08-30	CC210666	8/30/2020	400µM	1
Teck Line Creek LAEMP (20-15)	RG_LI8_BIC-2_2020-08-30	CC210667	8/30/2020	400µM	1
Teck Line Creek LAEMP (20-15)	RG_LI8_BIC-3_2020-08-30	CC210668	8/30/2020	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

Project	**Sample**	**Date**	**CC#**	**400 micron fraction**	
				% Sampled	**# Invertebrates**
Teck Line Creek LAEMP (20-15)	RG_LILC3_BIC-1_2020-08-27	27-Aug-20	CC210639	5%	1380

Teck Line Creek LAEMP (20-15)	RG_LILC3_BIC-2_2020-08-27	27-Aug-20	CC210640	5%	754
Teck Line Creek LAEMP (20-15)	RG_LILC3_BIC-3_2020-08-27	27-Aug-20	CC210641	5%	1040
Teck Line Creek LAEMP (20-15)	RG_LILC3_BIC-4_2020-08-27	27-Aug-20	CC210642	5%	1193
Teck Line Creek LAEMP (20-15)	RG_LILC3_BIC-5_2020-08-27	27-Aug-20	CC210643	5%	1066
Teck Line Creek LAEMP (20-15)	RG_FO23_BIC-1_2020-08-28	28-Aug-20	CC210644	5%	654
Teck Line Creek LAEMP (20-15)	RG_FO23_BIC-2_2020-08-28	28-Aug-20	CC210645	5%	529
Teck Line Creek LAEMP (20-15)	RG_FO23_BIC-3_2020-08-28	28-Aug-20	CC210646	5%	437
Teck Line Creek LAEMP (20-15)	RG_FO23_BIC-4_2020-08-28	28-Aug-20	CC210647	9%	369
Teck Line Creek LAEMP (20-15)	RG_FO23_BIC-5_2020-08-28	28-Aug-20	CC210648	5%	366
Teck Line Creek LAEMP (20-15)	RG_LCUT_BIC_2020-09-01	01-Sep-20	CC210649	5%	923
Teck Line Creek LAEMP (20-15)	RG_LISP24_BIC_2020-09-01	01-Sep-20	CC210650	5%	532
Teck Line Creek LAEMP (20-15)	RG_SLINE_BIC-1_2020-08-31	31-Aug-20	CC210651	10%	317
Teck Line Creek LAEMP (20-15)	RG_SLINE_BIC-2_2020-08-31	31-Aug-20	CC210652	5%	369
Teck Line Creek LAEMP (20-15)	RG_SLINE_BIC-3_2020-08-31	31-Aug-20	CC210653	5%	401
Teck Line Creek LAEMP (20-15)	RG_LI24_BIC-1_2020-08-31	31-Aug-20	CC210654	6%	336
Teck Line Creek LAEMP (20-15)	RG_LI24_BIC-2_2020-08-31	31-Aug-20	CC210655	10%	436
Teck Line Creek LAEMP (20-15)	RG_LI24_BIC-3_2020-08-31	31-Aug-20	CC210656	7%	359
Teck Line Creek LAEMP (20-15)	RG_LI24_BIC-4_2020-08-31	31-Aug-20	CC210657	5%	334
Teck Line Creek LAEMP (20-15)	RG_LI24_BIC-5_2020-09-01	01-Sep-20	CC210658	10%	306
Teck Line Creek LAEMP (20-15)	RG_LIDCOM_BIC_2020-08-30	30-Aug-20	CC210659	5%	1348
Teck Line Creek LAEMP (20-15)	RG_FRUL_BIC_2020-08-29	29-Aug-20	CC210660	5%	376
Teck Line Creek LAEMP (20-15)	RG_LIDSL_BIC-1_2020-08-25	25-Aug-20	CC210661	5%	666
Teck Line Creek LAEMP (20-15)	RG_LIDSL_BIC-2_2020-08-25	25-Aug-20	CC210662	5%	583
Teck Line Creek LAEMP (20-15)	RG_LIDSL_BIC-3_2020-08-26	26-Aug-20	CC210663	5%	445
Teck Line Creek LAEMP (20-15)	RG_LIDSL_BIC-4_2020-08-26	26-Aug-20	CC210664	5%	469
Teck Line Creek LAEMP (20-15)	RG_LIDSL_BIC-5_2020-08-26	26-Aug-20	CC210665	5%	537
Teck Line Creek LAEMP (20-15)	RG_LI8_BIC-1_2020-08-30	30-Aug-20	CC210666	5%	852
Teck Line Creek LAEMP (20-15)	RG_LI8_BIC-2_2020-08-30	30-Aug-20	CC210667	5%	835

Teck Line Creek LAEMP (20-15)	RG_LI8_BIC-3_2020-08-30	30-Aug-20	CC210668	5%	818

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 - QC1, CC# - CC210644, Percent sampled = 5%, Sieve size = 400			
Diptera	1		
Chironomidae	2		
Ephemeroptera	2		
Plecoptera	1		
Trombidiformes	1		
Total:	**7**	**654**	**99%**
Site - QC, Sample - QC2, CC# - CC210654, Percent sampled = 6%, Sieve size = 400			
No Invertebrates Found	0		
Total:	**0**	**336**	**100%**

Site - QC, Sample - QC3, CC# - CC210660, Percent sampled = 5%, Sieve size = 400				
Diptera		2		
Plecoptera		2		
	Total:	**4**	**376**	**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										By	Time		Percent Range		Min	Max
210658	RG_LI24_BIC-5_2020-09-01	308	273	320	296	290	302	278	316	314	297										CM	400	2994	0.34	14.69	0.80	8.82
210651	RG_SLINE_BIC-1_2020-08-1	322	312	311	326	323	322	271	295	295	335										AR	360	3112	0.00	19.10	0.06	12.92
210655	RG_LI24_BIC-2_2020-08-31	412	410	407	451	413	417	416	437	444	402										JH	525	4209	0.24	10.86	0.93	7.15

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 - 2020, Sample - RG_LILC3_BIC-1_2020-08-27, CC# - CC210639, Percent sampled = 5%, Sieve size = 400	1379	0.07	0.03624502	0.28985507	0.00253715
Site - 2020, Sample - RG_SLINE_BIC-2_2020-08-31, CC# - CC210652, Percent sampled = 5%, Sieve size = 400	369	0.00	0	0.54200542	0.00542005
Site - 2020, Sample - RG_LIDSL_BIC-1_2020-08-25, CC# - CC210661, Percent sampled = 5%, Sieve size = 400	663	0.00	0.22573363	0.6006006	0.00376223

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 - 2020, Sample - RG_LILC3_BIC-1_2020-08-27, CC# - CC210639, Percent sampled = 5%, Sieve size = 400	Laboratory Count	QC Audit Count	Agreement	Misidentification	Questionable Taxonomic Resolution	Enumeration	Insufficient Taxonomic Resolution	Comments
Acentrella	1	1						
Ameletus	1	1						

Aturidae	1	1						
Baetidae	1	2	No			X		
Baetis	6	5	No			X		
Brachycentrus americanus	1	1						
Capniidae	3	3						
Chironomidae	102	102						
Chloroperlidae	1	1						
Clinocera	1	1						
Diamesa	19	18	No			X		
Drunella doddsii	1	1						
Ephemerellidae	2	2						
Eukiefferiella	99	99						
Feltria	25	25						
Heptageniidae	14	14						
Hydrobaenus	14	14						
Lebertia	7	7						
Micropsectra	9	9						
Neaviperla	1	1						
Orthocladius complex	499	497	No			X		
Pagastia	103	104	No	1		X		
Parapsyche elsis	36	36						
Perlodidae	1	1						
Prosimulium/Helodon	1	1						
Rheocricotopus	121	121						
Rhyacophila hyalinata group	1	1						
Simulium	2	2						
Sperchon	17	17						
Taeniopterygidae	1	1						
Trichoptera	2	2						
Trombidiformes	1	1						
Tvetenia	257	258	No			X		
Zapada	15	15						
Zapada columbiana	5	5						
Zapada oregonensis group	9	9						
Total:	**1380**	**1379**						
					0	**6**	**0**	
% Total Misidentification Rate =	misidentifications / total number	x100 =	0.07	**Pass**				

Site - 2020, Sample - RG_SLINE_BIC-2_2020-08-31, CC# - CC210652, Percent sampled = 5%, Sieve size = 400	Laboratory Count	QC Audit Count	Agreement	Misidentification	Questionable Taxonomic Resolution	Enumeration	Insufficient Taxonomic Resolution	Comments
Ameletus	8	8						
Baetidae	4	4						
Baetis	29	28	No			X		
Baetis rhodani group	41	42	No			X		
Capniidae	1	1						
Chironomidae	5	5						
Chloroperlidae	2	2						
Cinygmula	2	2						
Drunella	3	3						
Drunella doddsii	3	3						
Empididae	1	1						
Enchytraeidae	2	2						
Epeorus	3	3						
Ephemerellidae	45	45						
Eukiefferiella	14	15	No			X		
Glossosomatidae	2	2						
Glutops	1	1						
Haploperla	1	1						
Heptageniidae	41	41						
Hydrobaenus	1	1						
Hydrozetidae	1	1						
Lebertia	4	4						
Leuctridae	3	3						
Megarcys	6	6						
Nemouridae	2	2						
Neothremma	3	3						
Oribatida	2	2						
Pagastia	1	1						
Parametriocnemus	2	2						
Peltoperlidae	1	1						
Pericoma/Telmatoscopus	4	4						
Perlodidae	14	14						
Plecoptera	3	3						
Rheocricotopus	11	11						
Rhyacophila	9	8	No			X		
Rhyacophila brunnea/vemna group	1	1						

Rhyacophila hyalinata group	4	4						
Rhyacophila vofixa group	1	1						
Rhynchelmis	1	1						
Sperchon	4	4						
Sweltsa	3	3						
Taeniopterygidae	2	2						
Tvetenia	26	26						
Yoraperla	2	2						
Zapada columbiana	50	50						
Total:	**369**	**369**						
					0	**4**	**0**	
% Total Misidentification Rate =	misidentifications / total number	x100 =	0.00	**Pass**				

Site - 2020, Sample - RG_LIDSL_BIC-1_2020-08-25, CC# - CC210661, Percent sampled = 5%, Sieve size = 400	Laboratory Count	QC Audit Count	Agreement	Misidentification	Questionable Taxonomic Resolution	Enumeration	Insufficient Taxonomic Resolution	Comments
Ameletus	2	2						
Baetidae	8	8						
Baetis	47	46	No			X		
Baetis rhodani group	22	22						
Chironomidae	23	23						
Chloroperlidae	2	2						
Cinygmula	1	1						
Clinocera	1	1						
Corynoneura	1	1						
Diamesa	3	3						
Drunella coloradensis	3	3						
Drunella doddsii	18	18						
Epeorus	5	5						
Ephemerellidae	24	22	No			X		
Eukiefferiella	34	34						
Feltria	2	2						
Heptageniidae	124	124						
Hydrobaenus	58	58						
Hydropsychidae	1	1						
Kogotus	1	1						

Lebertia	3	3						
Limnephilidae	2	2						
Malenka	1	1						
Megarcys	1	1						
Micropsectra	3	3						
Neaviperla	2	2						
Nemouridae	2	2						
Orthocladius complex	52	52						
Pagastia	24	24						
Parapsyche elsis	8	8						
Parorthocladius	1	1						
Peltoperlidae	1	1						
Pericoma/Telmatoscopus	5	5						
Plecoptera	3	2	No			X		
Rheocricotopus	42	42						
Rhyacophila	4	4						
Rhyacophila betteni group	1	1						
Rhyacophila brunnea/vemna group	2	2						
Rhyacophila narvae	1	1						
Simulium	1	1						
Sperchon	3	3						
Stempellinella	4	4						
Suwallia	1	1						
Taeniopterygidae	1	1						
Trombidiformes	5	5						
Tvetenia	91	92	No			X		
Zapada	13	13						
Zapada columbiana	5	5						
Zapada oregonensis group	4	4						
Total:	**666**	**663**						
					0	**4**	**0**	
% Total Misidentification Rate =	misidentifications / total number	x100 =	0.00	**Pass**				

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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 STRUCTURE

Cordillera Kick and Sweep Report 20-15 raw data

(March 30, 2021)

Project: Teck Line Creek LAEMP (20-15)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_LILC3_BIC-1_2020-08-27	RG_LILC3_BIC-2_2020-08-27	RG_LILC3_BIC-3_2020-08-27	RG_LILC3_BIC-4_2020-08-27	RG_LILC3_BIC-5_2020-08-27	RG_FO23_BIC-1_2020-08-28	RG_FO23_BIC-2_2020-08-28	RG_FO23_BIC-3_2020-08-28	RG_FO23_BIC-4_2020-08-28	RG_FO23_BIC-5_2020-08-28
Sample Collection Date:	27-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20
CC#:	CC210639	CC210640	CC210641	CC210642	CC210643	CC210644	CC210645	CC210646	CC210647	CC210648
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0	0	0
Ameletus	20	0	0	0	0	40	0	0	22	20
| Family: Baetidae	20	0	0	20	0	20	120	200	0	0
Acentrella	20	0	0	0	0	0	0	20	11	0
Baetis	120	140	260	200	220	820	920	880	567	600
Baetis rhodani group	0	0	20	0	0	580	840	180	222	680
| Family: Ephemerellidae	40	20	20	0	100	140	20	40	44	20
Drunella	0	0	0	0	0	60	0	0	0	0
Drunella coloradensis	0	0	0	0	0	0	0	0	0	0
Drunella doddsii	20	60	40	20	20	60	300	300	67	80
Drunella spinifera	0	0	0	0	0	0	0	0	11	0
Ephemerella excrucians complex	0	0	0	0	0	0	20	0	11	0
| Family: Heptageniidae	280	80	160	160	180	1080	1500	1480	533	860
Cinygmula	0	0	0	0	0	0	0	0	0	0
Epeorus	0	0	0	0	20	0	0	20	0	20
Rhithrogena	0	0	0	0	0	60	0	0	0	0
| Order: Plecoptera	0	0	20	0	0	0	0	0	0	0
| Family: Capniidae	60	0	0	20	0	180	620	320	100	360
Bolshecapnia	0	0	0	20	0	0	0	0	0	0
| Family: Chloroperlidae	20	0	20	20	100	60	220	180	22	0
Haploperla	0	0	0	0	0	0	40	0	0	0
Kathroperla	0	0	0	0	0	0	0	0	0	0
Neaviperla	20	0	20	0	0	0	0	0	0	0
Suwallia	0	0	0	0	0	0	0	0	0	0
Sweltsa	0	0	60	20	40	40	300	240	11	0
| Family: Leuctridae	0	0	0	0	0	0	0	20	11	20
Paraleuctra	0	0	0	0	0	0	0	0	0	0
Perlomyia	0	0	0	0	0	0	0	0	0	0
| Family: Nemouridae	0	0	0	0	40	60	100	0	33	0
Malenka	0	20	20	180	100	0	0	0	0	0
Visoka cataractae	0	0	0	0	0	20	20	0	0	0
Zapada	300	60	60	360	140	260	400	480	333	340
Zapada oregonensis group	180	140	200	280	220	0	0	0	0	0
Zapada cinctipes	0	0	0	0	0	1260	200	80	67	560
Zapada columbiana	100	40	20	40	0	0	40	40	0	0
| Family: Peltoperlidae	0	0	0	0	0	0	0	0	0	0
Yoraperla	0	0	0	0	0	0	0	0	0	0
| Family: Perlidae	0	0	0	20	0	80	80	40	22	60
Claassenia sabulosa	0	0	0	0	0	0	20	0	0	0
Hesperoperla	0	0	0	0	0	260	460	140	33	80
| Family: Perlodidae	20	0	40	40	60	120	0	0	44	0
Kogotus	0	20	60	80	0	120	20	0	44	0
Megarcys	0	0	0	20	0	20	20	40	0	0
| Family: Taeniopterygidae	20	0	0	0	0	240	920	1700	144	820
Taenionema	0	0	0	0	0	0	0	0	0	0
| Order: Trichoptera	40	0	40	0	60	60	40	0	0	20
| Family: Apataniidae	0	0	0	0	0	0	0	0	0	0

Note: ND designation of a taxa represents a non-distinct taxa. This adjusts where the associated taxa fall in the metrics for this sample because the individuals are likely represented by Genus or Species level identifications.

Project: Teck Line Creek LAEMP (20-15)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_LILC3_BIC-1_2020-08-27	RG_LILC3_BIC-2_2020-08-27	RG_LILC3_BIC-3_2020-08-27	RG_LILC3_BIC-4_2020-08-27	RG_LILC3_BIC-5_2020-08-27	RG_FO23_BIC-1_2020-08-28	RG_FO23_BIC-2_2020-08-28	RG_FO23_BIC-3_2020-08-28	RG_FO23_BIC-4_2020-08-28	RG_FO23_BIC-5_2020-08-28
Sample Collection Date:	27-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20
CC#:	CC210639	CC210640	CC210641	CC210642	CC210643	CC210644	CC210645	CC210646	CC210647	CC210648
Apatania	0	0	0	0	0	0	0	0	0	0
| Family: Brachycentridae	0	0	0	0	0	80	120	20	56	0
Brachycentrus americanus	20	0	0	0	0	40	40	0	0	20
| Family: Glossosomatidae	0	0	0	0	0	60	0	0	11	20
Glossosoma	0	0	0	0	0	0	0	0	0	0
| Family: Hydropsychidae	0	0	60	0	60	80	0	20	11	20
Parapsyche	0	0	20	0	0	0	0	0	0	0
Parapsyche elsis	720	260	220	300	100	0	0	0	0	0
| Family: Lepidostomatidae	0	0	0	0	0	0	0	0	0	0
Lepidostoma	0	0	0	0	0	0	0	0	0	0
| Family: Limnephilidae	0	0	0	0	0	0	0	0	0	0
| Family: Rhyacophilidae	0	0	0	0	0	0	0	0	0	0
Rhyacophila	0	0	20	0	40	40	0	20	0	60
Rhyacophila betteni group	0	0	0	0	20	0	0	0	0	0
Rhyacophila brunnea/vemna group	0	0	0	0	0	20	80	40	11	40
Rhyacophila hyalinata group	20	20	40	0	20	0	0	0	11	0
Rhyacophila vofixa group	0	0	0	0	0	0	0	0	0	0
Rhyacophila atrata complex	0	0	0	0	0	0	0	40	33	0
Rhyacophila narvae	0	0	0	0	0	0	0	0	0	0
| Family: Uenoidae	0	0	0	0	0	0	0	0	0	0
Neothremma	0	0	0	0	0	0	0	0	0	0
| Order: Coleoptera	0	0	0	0	0	0	0	0	0	0
| Family: Elmidae	0	20	0	0	0	20	0	20	0	0
Heterlimnius	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0	0	0
| Family: Athericidae	0	0	0	0	0	0	0	0	0	0
Atherix	0	0	0	0	0	0	0	20	22	20
| Family: Ceratopogonidae	0	0	0	0	0	0	0	0	0	0
Mallochohelea	0	0	0	0	0	40	0	0	22	20
| Family: Chironomidae	2040	1120	1520	1460	1400	200	200	300	122	920
| Subfamily: Chironominae	0	0	0	0	0	0	0	0	0	0
| Tribe: Tanytarsini	0	40	0	80	0	0	0	0	0	0
Constempellina sp. C	0	0	0	0	0	0	20	0	0	0
Micropsectra	180	40	140	120	140	240	360	160	0	20
Stempellinella	0	20	0	0	0	40	120	0	22	40
| Subfamily: Diamesinae	0	0	0	0	0	0	0	0	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0	0	0	0
Diamesa	380	140	340	180	160	0	0	0	0	0
Pagastia	2060	700	760	1220	1240	60	40	20	11	0
Pseudodiamesa	0	0	0	40	0	0	0	0	0	0
| Subfamily: Orthocladiinae	0	0	0	0	0	0	0	0	0	0
Corynoneura	0	0	60	40	100	0	0	0	11	20
Diplocladius cultriger	0	0	0	40	40	0	0	0	0	0
Eukiefferiella	1980	780	1320	1340	1700	440	220	40	111	120
Heleniella	0	0	0	0	0	0	0	0	0	0
Hydrobaenus	280	940	940	860	860	80	0	0	0	0
Orthocladius complex	9980	6920	8480	8020	7920	3560	120	60	200	120
Parametriocnemus	0	0	0	0	0	0	0	0	0	0
Parorthocladius	0	20	0	20	0	0	0	0	0	20
Psectrocladius	0	0	0	0	0	0	0	0	0	0
Rheocricotopus	2420	980	1860	2620	1100	40	240	40	22	40

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Project: Teck Line Creek LAEMP (20-15)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_LILC3_BIC-1_2020-08-27	RG_LILC3_BIC-2_2020-08-27	RG_LILC3_BIC-3_2020-08-27	RG_LILC3_BIC-4_2020-08-27	RG_LILC3_BIC-5_2020-08-27	RG_FO23_BIC-1_2020-08-28	RG_FO23_BIC-2_2020-08-28	RG_FO23_BIC-3_2020-08-28	RG_FO23_BIC-4_2020-08-28	RG_FO23_BIC-5_2020-08-28
Sample Collection Date:	27-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20
CC#:	CC210639	CC210640	CC210641	CC210642	CC210643	CC210644	CC210645	CC210646	CC210647	CC210648
Thienemanniella	0	0	0	0	20	40	0	0	0	0
Tvetenia	5140	1460	2660	5120	4020	120	440	100	78	180
| Family: Empididae	0	0	0	0	20	60	60	0	11	0
Clinocera	20	60	80	40	40	200	0	0	0	20
Neoplasta	0	0	0	0	0	20	60	20	22	20
Oreogeton	0	0	0	0	0	0	0	0	0	0
| Family: Muscidae	0	0	0	0	0	0	0	0	0	0
Limnophora	0	20	20	0	0	0	0	0	0	0
| Family: Pelecorhynchidae	0	0	0	0	0	0	0	0	0	0
Glutops	0	0	0	20	0	0	0	0	0	0
| Family: Psychodidae	0	0	0	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	0	0	0	60	40	720	920	700	567	540
| Family: Simuliidae	0	0	0	0	40	0	80	80	0	140
Prosimulium/Helodon	20	0	0	0	0	0	0	0	0	0
Simulium	40	20	20	20	0	0	80	600	56	140
| Family: Tipulidae	0	0	0	0	0	0	0	0	0	0
Dicranota	0	0	0	0	0	40	20	0	11	20
Hexatoma	0	0	0	0	0	40	20	20	22	0
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0	0	0
| Order: Trombidiformes	20	20	200	80	0	0	0	0	0	0
| Family: Aturidae	20	0	0	0	0	0	0	0	0	0
Aturus	0	0	40	0	0	0	20	0	0	0
| Family: Feltriidae	0	0	0	0	0	0	0	0	0	0
Feltria	500	220	280	160	300	0	0	0	0	0
| Family: Hydryphantidae	0	0	0	0	0	0	0	0	0	0
Protzia	0	0	0	0	0	0	0	0	0	0
| Family: Hygrobatidae	0	0	0	0	0	0	0	0	0	0
Atractides	0	0	0	0	0	0	0	0	0	0
Hygrobates	0	0	0	0	0	0	0	0	11	0
| Family: Lebertiidae	0	0	0	0	0	0	0	0	0	0
Lebertia	140	260	280	200	240	540	80	0	200	60
| Family: Sperchontidae	0	0	0	0	0	0	0	0	0	0
Sperchon	340	420	340	300	380	40	0	0	0	0
| Family: Torrenticolidae	0	0	0	0	0	0	0	0	0	0
Testudacarus	0	0	0	0	0	320	20	20	11	80
| Order: Sarcoptiformes	0	0	0	0	0	0	0	0	0	0
| Order: Oribatida	0	0	0	0	0	0	0	0	0	0
| Family: Hydrozetidae	0	0	0	0	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0
| Order: Lumbriculida	0	0	0	0	0	0	0	0	0	0
| Family: Lumbriculidae	0	0	20	0	0	0	0	0	11	0
Rhynchelmis	0	0	20	0	0	40	0	0	33	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0	0	0	0	0	20
Enchytraeus	0	20	0	20	20	0	0	0	22	0
| Family: Naididae	0	0	0	0	0	0	0	0	0	0
Nais	0	0	0	0	0	220	0	0	11	60
Totals:	**27600**	**15080**	**20800**	**23860**	**21320**	**13080**	**10580**	**8740**	**4094**	**7320**

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Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_LILC3_BIC-1_2020-08-27	RG_LILC3_BIC-2_2020-08-27	RG_LILC3_BIC-3_2020-08-27	RG_LILC3_BIC-4_2020-08-27	RG_LILC3_BIC-5_2020-08-27	RG_FO23_BIC-1_2020-08-28	RG_FO23_BIC-2_2020-08-28	RG_FO23_BIC-3_2020-08-28	RG_FO23_BIC-4_2020-08-28	RG_FO23_BIC-5_2020-08-28
Sample Collection Date:	27-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20
CC#:	CC210639	CC210640	CC210641	CC210642	CC210643	CC210644	CC210645	CC210646	CC210647	CC210648
Taxa present but not included:										
Terrestrials	0	0	0	0	0	0	0	0	0	0
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0	0
| Class: Ostracoda	20	20	20	20	20	20	20	20	11	0
| Class: Branchiopoda	0	0	0	0	0	0	0	0	0	0
| Order: Cladocera	0	0	0	0	0	0	0	0	0	0
| Class: Maxillipoda	0	0	0	0	0	0	0	0	0	0
| Class: Copepoda	0	0	0	20	0	0	0	0	0	0
Phylum: Nemata	20	0	20	20	0	20	20	0	0	20
Phylum: Platyhelminthes	0	0	0	0	0	0	0	0	0	0
| Class: Turbellaria	20	20	20	20	20	0	0	0	0	0
Totals:	60	40	60	80	40	40	40	20	11	20

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250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_LCUT_BIC_2020-09-01	RG_LISP24_BIC_2020-09-01	RG_SLINE_BIC-1_2020-08-31	RG_SLINE_BIC-2_2020-08-31	RG_SLINE_BIC-3_2020-08-31	RG_LI24_BIC-1_2020-08-31	RG_LI24_BIC-2_2020-08-31	RG_LI24_BIC-3_2020-08-31	RG_LI24_BIC-4_2020-08-31	RG_LI24_BIC-5_2020-09-01
Sample Collection Date:	01-Sep-20	01-Sep-20	31-Aug-20	31-Aug-20	31-Aug-20	31-Aug-20	31-Aug-20	31-Aug-20	31-Aug-20	01-Sep-20
CC#:	CC210649	CC210650	CC210651	CC210652	CC210653	CC210654	CC210655	CC210656	CC210657	CC210658
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0	0	0
Ameletus	20	20	60	160	160	67	130	43	0	40
| Family: Baetidae	0	20	0	80	160	0	10	0	0	10
Acentrella	0	0	0	0	0	0	0	0	0	0
Baetis	200	140	250	580	520	50	40	43	0	20
Baetis rhodani group	180	840	210	820	800	150	20	71	160	20
| Family: Ephemerellidae	520	480	510	900	280	217	150	229	160	30
Drunella	0	60	60	60	200	0	0	29	160	0
Drunella coloradensis	0	60	0	0	0	0	0	0	0	0
Drunella doddsii	60	380	40	60	100	17	40	71	180	100
Drunella spinifera	0	0	0	0	0	0	0	0	0	0
Ephemerella excrucians complex	0	0	0	0	0	0	0	0	0	0
| Family: Heptageniidae	660	1660	820	820	1280	2767	2070	2300	2540	1010
Cinygmula	20	0	30	40	20	183	390	257	260	210
Epeorus	0	140	60	60	160	17	0	43	40	0
Rhithrogena	0	0	0	0	120	50	130	29	320	10
| Order: Plecoptera	0	0	0	60	60	50	20	29	0	30
| Family: Capniidae	40	60	0	20	40	117	110	43	60	70
Bolshecapnia	20	0	0	0	0	0	0	0	0	0
| Family: Chloroperlidae	40	0	90	40	220	83	10	43	20	0
Haploperla	0	0	0	20	0	0	0	0	0	0
Kathroperla	0	0	0	0	0	0	0	0	0	0
Neaviperla	0	0	0	0	0	0	0	0	0	0
Suwallia	0	0	0	0	40	0	80	29	20	0
Sweltsa	0	0	30	60	80	17	180	43	80	10
| Family: Leuctridae	0	0	60	60	0	17	10	43	20	0
Paraleuctra	0	0	0	0	0	0	0	0	0	0
Perlomyia	0	0	0	0	0	0	0	29	20	0
| Family: Nemouridae	100	40	50	40	100	83	0	86	0	10
Malenka	0	0	0	0	0	0	0	0	0	0
Visoka cataractae	0	0	10	0	0	0	20	0	20	0
Zapada	120	120	0	0	60	50	0	43	0	0
Zapada oregonensis group	120	40	0	0	60	0	0	14	0	0
Zapada cinctipes	0	100	0	0	1360	0	0	0	0	0
Zapada columbiana	80	0	200	1000	0	300	160	614	740	360
| Family: Peltoperlidae	0	0	10	20	0	0	0	0	0	0
Yoraperla	0	0	0	40	60	17	0	0	0	0
| Family: Perlidae	0	0	0	0	0	0	0	0	0	0
Claassenia sabulosa	0	0	0	0	0	0	0	0	0	0
Hesperoperla	0	0	0	0	0	0	0	0	0	0
| Family: Perlodidae	40	40	40	280	400	33	40	43	40	60
Kogotus	0	0	0	0	0	0	0	0	0	0
Megarcys	0	120	20	120	120	67	20	114	540	70
| Family: Taeniopterygidae	0	20	10	40	20	667	110	257	180	150
Taenionema	0	0	0	0	0	0	0	0	0	60
| Order: Trichoptera	0	0	0	0	0	0	0	0	0	0
| Family: Apataniidae	0	0	0	0	0	0	0	0	0	0

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Minnow Environmental (BC)
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scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_LCUT_BIC_2020-09-01	RG_LISP24_BIC_2020-09-01	RG_SLINE_BIC-1_2020-08-31	RG_SLINE_BIC-2_2020-08-31	RG_SLINE_BIC-3_2020-08-31	RG_LI24_BIC-1_2020-08-31	RG_LI24_BIC-2_2020-08-31	RG_LI24_BIC-3_2020-08-31	RG_LI24_BIC-4_2020-08-31	RG_LI24_BIC-5_2020-09-01
Sample Collection Date:	01-Sep-20	01-Sep-20	31-Aug-20	31-Aug-20	31-Aug-20	31-Aug-20	31-Aug-20	31-Aug-20	31-Aug-20	01-Sep-20
CC#:	CC210649	CC210650	CC210651	CC210652	CC210653	CC210654	CC210655	CC210656	CC210657	CC210658
Apatania	0	0	0	0	0	0	0	0	0	0
| Family: Brachycentridae	0	0	0	0	0	0	0	0	0	0
Brachycentrus americanus	0	0	0	0	0	0	0	0	0	0
| Family: Glossosomatidae	0	0	20	40	20	0	0	0	0	0
Glossosoma	0	0	20	0	0	0	0	0	0	0
| Family: Hydropsychidae	20	20	0	0	0	0	0	0	0	0
Parapsyche	40	0	0	0	20	0	0	0	0	0
Parapsyche elsis	60	80	0	0	0	0	10	0	0	0
| Family: Lepidostomatidae	0	0	0	0	0	0	0	0	0	0
Lepidostoma	0	0	0	0	0	0	0	0	0	0
| Family: Limnephilidae	80	20	30	0	0	0	0	0	20	0
| Family: Rhyacophilidae	0	0	0	0	0	0	0	0	0	0
Rhyacophila	40	60	70	180	220	0	0	43	20	10
Rhyacophila betteni group	0	0	0	0	0	0	0	0	0	0
Rhyacophila brunnea/vemna group	0	0	0	20	60	0	10	57	80	10
Rhyacophila hyalinata group	40	120	0	80	60	0	0	0	0	0
Rhyacophila vofixa group	0	60	30	20	20	0	0	0	0	0
Rhyacophila atrata complex	0	0	0	0	0	0	0	0	0	0
Rhyacophila narvae	0	0	0	0	0	0	0	0	0	0
| Family: Uenoidae	0	0	0	0	0	0	0	0	0	0
Neothremma	0	0	30	60	60	0	20	43	20	10
| Order: Coleoptera	0	0	0	0	0	0	0	0	0	0
| Family: Elmidae	0	0	0	0	0	0	0	0	0	0
Heterlimnius	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	17	0	0	0	0
| Family: Athericidae	0	0	0	0	0	0	0	0	0	0
Atherix	0	0	0	0	0	0	0	0	0	0
| Family: Ceratopogonidae	0	0	0	0	0	0	0	0	0	0
Mallochohelea	0	0	0	0	0	0	0	0	0	0
| Family: Chironomidae	1780	820	0	100	120	67	110	71	120	40
| Subfamily: Chironominae	0	0	0	0	0	0	0	0	0	0
| Tribe: Tanytarsini	0	0	0	0	0	0	0	0	0	0
Constempellina sp. C	0	0	0	0	0	0	0	0	0	0
Micropsectra	20	0	0	0	0	0	0	0	0	0
Stempellinella	0	20	0	0	0	0	0	0	0	0
| Subfamily: Diamesinae	0	0	0	0	0	0	0	0	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0	0	0	0
Diamesa	540	540	0	0	0	0	0	0	40	40
Pagastia	1900	820	20	20	0	0	10	0	0	10
Pseudodiamesa	0	0	0	0	0	0	0	0	0	0
| Subfamily: Orthocladiinae	0	0	0	0	0	0	0	0	0	0
Corynoneura	0	0	0	0	0	0	0	0	0	0
Diplocladius cultriger	40	0	0	0	0	0	0	0	0	0
Eukiefferiella	1640	940	20	280	60	33	0	29	280	180
Heleniella	0	0	0	0	0	0	0	0	0	0
Hydrobaenus	240	60	10	20	40	0	20	0	0	0
Orthocladius complex	4900	1480	40	0	0	0	40	14	240	280
Parametriocnemus	0	0	0	40	0	0	0	0	0	0
Parorthocladius	100	40	10	0	40	17	0	0	0	30
Psectrocladius	0	0	0	0	0	0	0	0	0	0
Rheocricotopus	1380	480	90	220	120	200	180	114	20	60

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Taxonomist: Scott Finlayson
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250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_LCUT_BIC_2020-09-01	RG_LISP24_BIC_2020-09-01	RG_SLINE_BIC-1_2020-08-31	RG_SLINE_BIC-2_2020-08-31	RG_SLINE_BIC-3_2020-08-31	RG_LI24_BIC-1_2020-08-31	RG_LI24_BIC-2_2020-08-31	RG_LI24_BIC-3_2020-08-31	RG_LI24_BIC-4_2020-08-31	RG_LI24_BIC-5_2020-09-01
Sample Collection Date:	01-Sep-20	01-Sep-20	31-Aug-20	31-Aug-20	31-Aug-20	31-Aug-20	31-Aug-20	31-Aug-20	31-Aug-20	01-Sep-20
CC#:	CC210649	CC210650	CC210651	CC210652	CC210653	CC210654	CC210655	CC210656	CC210657	CC210658
Thienemanniella	0	0	0	0	0	17	10	0	0	0
Tvetenia	2200	420	110	520	560	167	130	86	140	20
| Family: Empididae	0	0	30	20	0	0	0	0	0	0
Clinocera	20	0	0	0	0	0	0	14	0	0
Neoplasta	0	0	0	0	0	0	0	0	0	0
Oreogeton	0	0	20	0	40	0	0	0	0	0
| Family: Muscidae	0	0	0	0	0	0	0	0	0	0
Limnophora	0	0	0	0	0	0	0	0	0	0
| Family: Pelecorhynchidae	0	0	0	0	0	0	0	0	0	0
Glutops	0	0	0	20	0	0	0	0	0	0
| Family: Psychodidae	0	0	0	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	0	0	0	80	20	0	20	0	20	10
| Family: Simuliidae	0	0	0	0	0	0	0	0	0	0
Prosimulium/Helodon	0	0	0	0	0	0	0	0	0	0
Simulium	20	0	0	0	0	0	0	0	0	0
| Family: Tipulidae	0	0	0	0	0	0	0	0	0	0
Dicranota	0	0	0	0	0	17	0	0	0	0
Hexatoma	20	20	0	0	0	0	0	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0	0	0
| Order: Trombidiformes	60	100	10	0	0	0	0	0	0	0
| Family: Aturidae	0	0	0	0	0	0	0	0	0	0
Aturus	0	0	0	0	0	0	0	0	0	0
| Family: Feltriidae	0	0	0	0	0	0	0	0	0	0
Feltria	220	0	0	0	0	0	0	0	0	0
| Family: Hydryphantidae	0	0	0	0	0	0	0	0	0	0
Protzia	0	0	10	0	0	0	0	0	0	0
| Family: Hygrobatidae	0	0	0	0	0	0	0	0	0	0
Atractides	0	0	0	0	0	0	0	29	0	0
Hygrobates	0	0	0	0	0	0	0	0	0	0
| Family: Lebertiidae	0	0	0	0	0	0	0	0	0	0
Lebertia	520	60	10	80	40	33	60	43	40	30
| Family: Sperchontidae	0	0	0	0	0	0	0	0	0	0
Sperchon	320	140	20	80	80	17	0	29	60	60
| Family: Torrenticolidae	0	0	0	0	0	0	0	0	0	0
Testudacarus	0	0	0	0	0	0	0	0	0	0
| Order: Sarcoptiformes	0	0	0	0	0	0	0	0	0	0
| Order: Oribatida	40	0	0	40	0	0	0	0	20	0
| Family: Hydrozetidae	0	0	0	20	0	0	0	14	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0
| Order: Lumbriculida	0	0	0	0	0	0	0	0	0	0
| Family: Lumbriculidae	0	0	0	0	0	0	0	0	0	0
Rhynchelmis	0	0	10	20	20	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	40	0	0	0	0	0	0
Enchytraeus	0	0	0	0	0	0	0	0	0	0
| Family: Naididae	0	0	0	0	0	0	0	0	0	0
Nais	0	0	0	0	0	0	0	0	0	0
Totals:	**18460**	**10640**	**3170**	**7380**	**8020**	**5604**	**4360**	**5131**	**6680**	**3060**

Note: ND designation of a taxa represents a non-distinct taxa. This adjusts where the associated taxa fall in the metrics for this sample because the individuals are likely represented by Genus or Species level identifications.

Project: Teck Line Creek LAEMP (20-15)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_LCUT_BIC_2020-09-01	RG_LISP24_BIC_2020-09-01	RG_SLINE_BIC-1_2020-08-31	RG_SLINE_BIC-2_2020-08-31	RG_SLINE_BIC-3_2020-08-31	RG_LI24_BIC-1_2020-08-31	RG_LI24_BIC-2_2020-08-31	RG_LI24_BIC-3_2020-08-31	RG_LI24_BIC-4_2020-08-31	RG_LI24_BIC-5_2020-09-01
Sample Collection Date:	01-Sep-20	01-Sep-20	31-Aug-20	31-Aug-20	31-Aug-20	31-Aug-20	31-Aug-20	31-Aug-20	31-Aug-20	01-Sep-20
CC#:	CC210649	CC210650	CC210651	CC210652	CC210653	CC210654	CC210655	CC210656	CC210657	CC210658
Taxa present but not included:										
Terrestrials	0	0	0	0	0	0	0	0	0	0
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0	0
| Class: Ostracoda	20	20	10	0	20	0	10	0	20	10
| Class: Branchiopoda	0	0	0	0	0	0	0	0	0	0
| Order: Cladocera	0	20	0	0	0	0	0	0	0	0
| Class: Maxillipoda	0	0	0	0	0	0	0	0	0	0
| Class: Copepoda	0	0	0	0	0	0	0	0	0	0
Phylum: Nemata	20	20	0	0	20	17	10	14	20	0
Phylum: Platyhelminthes	0	0	0	0	0	0	0	0	0	0
| Class: Turbellaria	20	20	10	20	20	0	0	0	0	0
Totals:	60	80	20	20	60	17	20	14	40	10

Note: ND designation of a taxa represents a non-distinct taxa. This adjusts where the associated taxa fall in the metrics for this sample because the individuals are likely represented by Genus or Species level identifications.

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Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_LIDCOM_BIC_2020-08-30	RG_FRUL_BIC_2020-08-29	RG_LIDSL_BIC-1_2020-08-25	RG_LIDSL_BIC-2_2020-08-25	RG_LIDSL_BIC-3_2020-08-26	RG_LIDSL_BIC-4_2020-08-26	RG_LIDSL_BIC-5_2020-08-26	RG_LI8_BIC-1_2020-08-30	RG_LI8_BIC-2_2020-08-30	RG_LI8_BIC-3_2020-08-30
Sample Collection Date:	30-Aug-20	29-Aug-20	25-Aug-20	25-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20
CC#:	CC210659	CC210660	CC210661	CC210662	CC210663	CC210664	CC210665	CC210666	CC210667	CC210668
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0	0	0
Ameletus	140	0	40	40	40	20	0	40	60	60
| Family: Baetidae	160	600	160	200	180	220	120	260	260	140
Acentrella	0	0	0	0	0	0	0	0	0	0
Baetis	1420	860	940	420	840	680	780	2580	1060	620
Baetis rhodani group	3720	140	440	440	440	680	660	2080	1660	1740
| Family: Ephemerellidae	380	0	480	380	440	240	380	260	180	40
Drunella	0	20	0	0	0	0	0	0	40	20
Drunella coloradensis	20	0	60	60	100	100	60	0	0	0
Drunella doddsii	540	160	360	260	380	280	220	480	620	300
Drunella spinifera	0	0	0	0	0	0	0	0	0	0
Ephemerella excrucians complex	0	0	0	0	0	0	0	0	0	0
| Family: Heptageniidae	4300	1040	2480	2200	2000	2020	1760	3820	2940	3460
Cinygmula	0	0	20	0	20	20	0	0	20	0
Epeorus	160	0	100	0	100	40	100	140	60	60
Rhithrogena	20	0	0	0	0	0	0	0	0	0
| Order: Plecoptera	0	40	60	0	0	40	100	20	100	0
| Family: Capniidae	0	640	0	60	100	20	40	60	240	140
Bolshecapnia	0	0	0	0	0	0	0	0	0	0
| Family: Chloroperlidae	0	100	40	60	40	40	0	0	0	0
Haploperla	0	0	0	0	0	0	0	0	0	0
Kathroperla	0	0	0	0	20	0	0	0	0	0
Neaviperla	0	0	40	0	0	0	0	0	0	0
Suwallia	40	0	20	20	0	0	0	0	0	0
Sweltsa	40	60	0	60	100	80	80	20	0	0
| Family: Leuctridae	0	0	0	0	0	0	0	0	0	20
Paraleuctra	0	20	0	0	0	0	0	0	0	20
Perlomyia	20	0	0	0	0	0	0	0	0	0
| Family: Nemouridae	0	160	40	0	0	0	0	0	100	0
Malenka	0	0	20	0	0	0	0	0	0	0
Visoka cataractae	0	0	0	0	0	0	0	0	0	20
Zapada	980	620	260	300	140	160	140	1200	2260	1380
Zapada oregonensis group	200	20	80	140	280	180	460	40	200	240
Zapada cinctipes	0	0	0	0	0	0	0	0	180	320
Zapada columbiana	80	20	100	20	160	240	260	140	140	80
| Family: Peltoperlidae	0	0	20	0	0	0	0	0	0	0
Yoraperla	0	0	0	0	0	0	0	0	0	0
| Family: Perlidae	0	220	0	0	0	0	0	20	0	0
Claassenia sabulosa	0	0	0	0	0	0	0	0	0	0
Hesperoperla	0	120	0	0	0	0	0	0	0	0
| Family: Perlodidae	0	40	0	0	0	0	20	0	20	0
Kogotus	40	0	20	60	20	20	20	40	60	20
Megarcys	0	0	20	20	40	0	40	100	20	100
| Family: Taeniopterygidae	700	520	20	60	0	60	80	1340	1700	1520
Taenionema	0	0	0	0	0	0	0	0	20	0
| Order: Trichoptera	60	20	0	0	0	0	0	0	60	40
| Family: Apataniidae	0	0	0	0	0	0	0	0	0	0

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Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_LIDCOM_BIC_2020-08-30	RG_FRUL_BIC_2020-08-29	RG_LIDSL_BIC-1_2020-08-25	RG_LIDSL_BIC-2_2020-08-25	RG_LIDSL_BIC-3_2020-08-26	RG_LIDSL_BIC-4_2020-08-26	RG_LIDSL_BIC-5_2020-08-26	RG_LI8_BIC-1_2020-08-30	RG_LI8_BIC-2_2020-08-30	RG_LI8_BIC-3_2020-08-30
Sample Collection Date:	30-Aug-20	29-Aug-20	25-Aug-20	25-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20
CC#:	CC210659	CC210660	CC210661	CC210662	CC210663	CC210664	CC210665	CC210666	CC210667	CC210668
Apatania	100	0	0	0	0	0	0	0	0	0
| Family: Brachycentridae	0	0	0	0	0	0	0	0	0	0
Brachycentrus americanus	0	0	0	0	0	0	0	0	0	0
| Family: Glossosomatidae	0	0	0	0	0	0	0	0	0	0
Glossosoma	0	0	0	0	0	0	0	0	0	0
| Family: Hydropsychidae	300	0	20	100	60	40	100	160	260	80
Parapsyche	0	0	0	0	0	0	0	0	0	0
Parapsyche elsis	80	0	160	40	180	60	340	20	80	120
| Family: Lepidostomatidae	0	0	0	0	0	0	0	0	0	0
Lepidostoma	0	0	0	0	20	0	0	0	0	0
| Family: Limnephilidae	0	0	40	0	0	0	0	0	0	0
| Family: Rhyacophilidae	0	0	0	0	0	0	0	0	0	0
Rhyacophila	200	20	80	60	20	40	60	320	100	200
Rhyacophila betteni group	0	0	20	20	0	0	0	20	0	0
Rhyacophila brunnea/vemna group	80	20	40	20	0	40	120	140	100	180
Rhyacophila hyalinata group	60	0	0	0	100	120	400	140	20	60
Rhyacophila vofixa group	0	0	0	20	0	20	0	0	0	0
Rhyacophila atrata complex	0	20	0	0	0	0	20	0	0	0
Rhyacophila narvae	0	0	20	20	0	0	0	0	0	0
| Family: Uenoidae	0	0	0	0	0	0	0	0	0	0
Neothremma	0	0	0	0	0	0	0	0	0	0
| Order: Coleoptera	0	0	0	0	0	0	0	0	0	0
| Family: Elmidae	0	0	0	0	0	20	0	0	0	0
Heterlimnius	0	40	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0	0	0
| Family: Athericidae	0	0	0	0	0	0	0	0	0	0
Atherix	0	60	0	0	0	0	0	0	0	0
| Family: Ceratopogonidae	0	0	0	0	0	0	0	0	0	0
Mallochohelea	0	0	0	0	0	0	0	0	0	0
| Family: Chironomidae	1780	120	460	440	460	300	220	640	400	1060
| Subfamily: Chironominae	0	0	0	0	0	0	0	0	0	0
| Tribe: Tanytarsini	0	0	0	0	0	0	0	0	0	0
Constempellina sp. C	0	20	0	0	0	0	0	0	0	0
Micropsectra	0	140	60	60	20	20	40	20	100	160
Stempellinella	0	0	80	60	20	0	20	0	40	0
| Subfamily: Diamesinae	0	0	0	0	0	0	0	0	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0	0	0	0
Diamesa	1940	0	60	20	140	60	180	0	20	40
Pagastia	620	40	480	720	220	220	420	40	80	20
Pseudodiamesa	0	0	0	0	0	0	0	0	20	0
| Subfamily: Orthocladiinae	0	0	0	0	0	0	0	0	0	0
Corynoneura	20	0	20	0	0	0	0	60	20	0
Diplocladius cultriger	0	0	0	0	0	0	0	20	0	0
Eukiefferiella	2160	80	680	460	440	620	880	280	280	80
Heleniella	0	0	0	0	0	0	20	0	0	0
Hydrobaenus	440	0	1160	640	20	40	80	580	1320	1920
Orthocladius complex	3920	100	1040	1720	520	1320	1080	200	440	40
Parametriocnemus	0	0	0	0	0	0	0	0	0	0
Parorthocladius	0	0	20	0	0	20	0	20	0	0
Psectrocladius	20	0	0	0	0	0	0	0	0	0
Rheocricotopus	900	100	840	920	560	260	280	800	400	820

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Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_LIDCOM_BIC_2020-08-30	RG_FRUL_BIC_2020-08-29	RG_LIDSL_BIC-1_2020-08-25	RG_LIDSL_BIC-2_2020-08-25	RG_LIDSL_BIC-3_2020-08-26	RG_LIDSL_BIC-4_2020-08-26	RG_LIDSL_BIC-5_2020-08-26	RG_LI8_BIC-1_2020-08-30	RG_LI8_BIC-2_2020-08-30	RG_LI8_BIC-3_2020-08-30
Sample Collection Date:	30-Aug-20	29-Aug-20	25-Aug-20	25-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20
CC#:	CC210659	CC210660	CC210661	CC210662	CC210663	CC210664	CC210665	CC210666	CC210667	CC210668
Thienemanniella	0	0	0	0	0	0	0	0	0	0
Tvetenia	640	120	1820	1040	300	620	840	300	320	260
| Family: Empididae	20	40	0	20	0	0	0	20	0	0
Clinocera	60	0	20	40	40	0	20	0	20	20
Neoplasta	0	0	0	0	0	20	0	40	20	0
Oreogeton	0	0	0	0	20	0	0	0	0	0
| Family: Muscidae	0	0	0	0	0	0	0	0	0	0
Limnophora	0	0	0	0	0	0	0	0	0	0
| Family: Pelecorhynchidae	0	0	0	0	0	0	0	0	0	0
Glutops	0	0	0	0	0	0	0	0	0	0
| Family: Psychodidae	0	0	0	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	80	680	100	220	20	80	60	380	460	560
| Family: Simuliidae	0	80	0	0	20	0	0	20	100	20
Prosimulium/Helodon	0	0	0	0	0	0	0	0	0	0
Simulium	280	200	20	0	0	0	20	40	40	0
| Family: Tipulidae	0	20	0	0	0	20	0	0	0	0
Dicranota	0	0	0	0	0	0	0	0	0	0
Hexatoma	0	0	0	0	0	0	0	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0	0	0
| Order: Trombidiformes	40	0	100	20	40	100	60	0	0	0
| Family: Aturidae	0	0	0	0	0	0	0	0	0	0
Aturus	0	0	0	0	0	0	0	0	0	0
| Family: Feltriidae	0	0	0	0	0	0	0	0	0	0
Feltria	80	0	40	0	0	0	0	60	20	0
| Family: Hydryphantidae	0	0	0	0	0	0	0	0	0	0
Protzia	0	0	0	0	0	0	0	0	0	0
| Family: Hygrobatidae	0	0	0	0	0	0	0	0	0	0
Atractides	0	0	0	0	0	0	0	0	0	0
Hygrobates	0	0	0	0	0	0	0	0	0	0
| Family: Lebertiidae	0	0	0	0	0	0	0	0	0	0
Lebertia	0	120	60	60	100	60	40	0	20	20
| Family: Sperchontidae	0	0	0	0	0	0	0	0	0	0
Sperchon	100	20	60	140	40	140	100	40	20	0
| Family: Torrenticolidae	0	0	0	0	0	0	0	0	0	0
Testudacarus	0	60	0	0	0	0	0	0	0	0
| Order: Sarcoptiformes	0	0	0	0	0	0	0	0	0	0
| Order: Oribatida	0	0	0	0	0	0	0	0	0	0
| Family: Hydrozetidae	0	0	0	0	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0
| Order: Lumbriculida	0	0	0	0	0	0	0	0	0	0
| Family: Lumbriculidae	0	0	0	0	40	0	0	20	0	200
Rhynchelmis	20	0	0	0	60	0	0	20	0	160
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0	0	20	0	0	0
Enchytraeus	0	0	0	0	0	0	0	0	0	0
| Family: Naididae	0	0	0	0	0	0	0	0	0	0
Nais	0	0	0	0	0	0	0	0	0	0
Totals:	**26960**	**7520**	**13320**	**11660**	**8900**	**9380**	**10740**	**17040**	**16700**	**16360**

Note: ND designation of a taxa represents a non-distinct taxa. This adjusts where the associated taxa fall in the metrics for this sample because the individuals are likely represented by Genus or Species level identifications.

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Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_LIDCOM_BIC_2020-08-30	RG_FRUL_BIC_2020-08-29	RG_LIDSL_BIC-1_2020-08-25	RG_LIDSL_BIC-2_2020-08-25	RG_LIDSL_BIC-3_2020-08-26	RG_LIDSL_BIC-4_2020-08-26	RG_LIDSL_BIC-5_2020-08-26	RG_LI8_BIC-1_2020-08-30	RG_LI8_BIC-2_2020-08-30	RG_LI8_BIC-3_2020-08-30
Sample Collection Date:	30-Aug-20	29-Aug-20	25-Aug-20	25-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20
CC#:	CC210659	CC210660	CC210661	CC210662	CC210663	CC210664	CC210665	CC210666	CC210667	CC210668
Taxa present but not included:										
Terrestrials	0	0	0	0	0	0	20	0	0	0
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0	0
| Class: Ostracoda	0	20	20	20	20	20	20	20	20	20
| Class: Branchiopoda	0	0	0	0	0	0	0	0	0	0
| Order: Cladocera	0	0	0	0	0	0	0	0	0	0
| Class: Maxillipoda	0	0	0	0	0	0	0	0	0	0
| Class: Copepoda	0	0	0	0	0	0	0	0	20	0
Phylum: Nemata	20	20	0	20	0	0	20	20	20	20
Phylum: Platyhelminthes	0	0	0	0	0	0	0	0	0	0
| Class: Turbellaria	20	0	20	0	0	20	20	20	20	20
Totals:	40	40	40	40	20	40	80	60	80	60

Note: ND designation of a taxa represents a non-distinct taxa. This adjusts where the associated taxa fall in the metrics for this sample because the individuals are likely represented by Genus or Species level identifications.

BENTHIC COMMUNITY DENSITY

Zeas 20-15 QAQC Report

(March 30, 2021)

TABLE 1: CALCULATION OF SUBSAMPLING ERROR FOR BENTHIC MACROINVERTEBRATE SAMPLES FROM ELK VALLEY (2020).

Station	Whole Organisms	Number of Organisms in Fraction 1	Number of Organisms in Fraction 2	Number of Organisms in Fraction 3	Number of Organisms in Fraction 4	Actual Density*	Precision % range		Accuracy min	Accuracy max
LIDSL-6	-	413	419			832	1.4	-	0.7	-

* whole large organisms excluded in calculations.
min = minimum absolute % error
max = maximum absolute % error

TABLE 2: PERCENT RECOVERY OF BENTHIC MACROINVERTEBRATES FROM SAMPLES COLLECTED FROM ELK VALLEY (2020).

Station	Number of Organisms Recovered (initial sort)	Number of Organisms in Re-sort	Percent Recovery
LI24-3	212	213	99.5%
LILC3-1	792	795	99.6%
Sline-4	309	312	99.0%
		Average % Recovery	99.0%

TABLE 3: SAMPLE FRACTIONS SORTED FROM ELK VALLEY (2020).

Station	Fraction Sorted	Station	Fraction Sorted	Station	Fraction Sorted
LI24-1	Whole	LIDSL-6	Whole[a]	LILC3-6	1/8
LI24-2	Whole	LIDSL-7	1/2	LILC3-7	1/8
LI24-3	Whole	LIDSL-8	Whole	LILC3-8	1/4
LI24-4	Whole	LIDSL-9	1/2	LILC3-9	1/8
LI24-5	Whole	LIDSL-10	Whole	LILC3-10	1/8
LIDSL-1	Whole	LILC3-1	1/4	SLine-1	1/2
LIDSL-2	Whole	LILC3-2	1/4	SLine-2	Whole
LIDSL-3	1/2	LILC3-3	1/4	SLine-3	Whole
LIDSL-4	1/2	LILC3-4	1/8	SLine-4	Whole
LIDSL-5	Whole	LILC3-5	1/8	SLine-5	Whole

[a] two halves sorted for subsampling error calculations.

QA/QC Notes

Pupae were not counted toward total number of taxa unless they were the sole representative of their taxa group. Immatures were not counted toward total number of taxa unless they were the sole representative of their taxa group. The exceptions to this rule are immature tubificidae with and without hairs. Immature oligocheates are counted as taxa as the probability of the immature being a unique taxa is high.

Indeterminates are unique taxa that could not be identified further for whatever reason, e.g., (small, damaged).

Zaranko, D.T. and J. Keene. 2005. Are the costs to meet environmental effects monitoring (EEM) benthic sample precision and accuracy criteria justified? In Dixon, D.G., S. Munro and A.J. Niimi (eds). Proceedings of the 32nd Annual Aquatic Toxicity Workshop: October 3 to 5, 2005, Waterloo, Ontario. Can. Tech. Rep. Fish. Aquat. Sci: 2617. 120p.

Densities expressed per sampled area

BENTHIC COMMUNITY DENSITY

Zeas 20-15 raw data

(March 12, 2021)

quantity	life_stage_code	observ_sample_code	ITIS_TAXON_NAME_Y-N	ITIS_TSN	BENCH_TAXON_NAME	PERCENT_SAMPLED	RAW_BIOMASS
3	none	RG_LI24_HESS-1_2020-08-31	N		Nematoda	100	0.0016
1		RG_LI24_HESS-1_2020-08-31	Y	114093	Elmidae	100	0.0001
3	Nymph	RG_LI24_HESS-1_2020-08-31	Y	568544	Ameletidae	100	0.0012
3	Nymph	RG_LI24_HESS-1_2020-08-31	Y	100755	Baetidae	100	0.0035
1	Nymph	RG_LI24_HESS-1_2020-08-31	Y	101232	Ephemerellidae	100	0.0001
57	Nymph	RG_LI24_HESS-1_2020-08-31	Y	100504	Heptageniidae	100	0.0876
1	Nymph	RG_LI24_HESS-1_2020-08-31	Y	102643	Capniidae	100	0.0004
1	Nymph	RG_LI24_HESS-1_2020-08-31	Y	103202	Chloroperlidae	100	0.0026
2	Nymph	RG_LI24_HESS-1_2020-08-31	Y	102840	Leuctridae	100	0.0009
3	Nymph	RG_LI24_HESS-1_2020-08-31	Y	102517	Nemouridae	100	0.0023
1	Nymph	RG_LI24_HESS-1_2020-08-31	Y	102994	Perlodidae	100	0.0088
2	Nymph	RG_LI24_HESS-1_2020-08-31	Y	102788	Taeniopterygidae	100	0.0001
1		RG_LI24_HESS-1_2020-08-31	Y	115096	Rhyacophilidae	100	0.0093
1		RG_LI24_HESS-1_2020-08-31	Y	568757	Uenoidae	100	0.0003
1		RG_LI24_HESS-1_2020-08-31	Y	127076	Ceratopogonidae	100	0.0001
28		RG_LI24_HESS-1_2020-08-31	Y	127917	Chironomidae	100	0.0169
1	none	RG_LI24_HESS-2_2020-08-31	N		Nematoda	100	0.0001
3	Adult	RG_LI24_HESS-2_2020-08-31	Y	83033	Lebertiidae	100	0.0008
1	Adult	RG_LI24_HESS-2_2020-08-31	Y	895710	Sperchonidae	100	0.0002
3	none	RG_LI24_HESS-2_2020-08-31	Y	84195	Ostracoda	100	0.0011
7	Nymph	RG_LI24_HESS-2_2020-08-31	Y	568544	Ameletidae	100	0.0101
6	Nymph	RG_LI24_HESS-2_2020-08-31	Y	101232	Ephemerellidae	100	0.0475
108	Nymph	RG_LI24_HESS-2_2020-08-31	Y	100504	Heptageniidae	100	0.3950
5	Nymph	RG_LI24_HESS-2_2020-08-31	Y	102643	Capniidae	100	0.0035
28	Nymph	RG_LI24_HESS-2_2020-08-31	Y	103202	Chloroperlidae	100	0.0848
1	Nymph	RG_LI24_HESS-2_2020-08-31	Y	102840	Leuctridae	100	0.0013
10	Nymph	RG_LI24_HESS-2_2020-08-31	Y	102517	Nemouridae	100	0.0097
9	Nymph	RG_LI24_HESS-2_2020-08-31	Y	102994	Perlodidae	100	0.1117
1		RG_LI24_HESS-2_2020-08-31	Y	115096	Rhyacophilidae	100	0.0445
1		RG_LI24_HESS-2_2020-08-31	Y	568757	Uenoidae	100	0.0007
1		RG_LI24_HESS-2_2020-08-31	Y	127076	Ceratopogonidae	100	0.0009
10		RG_LI24_HESS-2_2020-08-31	Y	127917	Chironomidae	100	0.0037
2		RG_LI24_HESS-2_2020-08-31	Y	135830	Empididae	100	0.0026
1	none	RG_LI24_HESS-3_2020-08-31	N		Nematoda	100	0.0013
5	Adult	RG_LI24_HESS-3_2020-08-31	Y	83033	Lebertiidae	100	0.0023
3	Adult	RG_LI24_HESS-3_2020-08-31	Y	895710	Sperchonidae	100	0.0016
31	none	RG_LI24_HESS-3_2020-08-31	Y	84195	Ostracoda	100	0.0066
11	Nymph	RG_LI24_HESS-3_2020-08-31	Y	568544	Ameletidae	100	0.0379
4	Nymph	RG_LI24_HESS-3_2020-08-31	Y	100755	Baetidae	100	0.0241
3	Nymph	RG_LI24_HESS-3_2020-08-31	Y	101232	Ephemerellidae	100	0.0119
81	Nymph	RG_LI24_HESS-3_2020-08-31	Y	100504	Heptageniidae	100	0.4936
1	Nymph	RG_LI24_HESS-3_2020-08-31	Y	102643	Capniidae	100	0.0001
3	Nymph	RG_LI24_HESS-3_2020-08-31	Y	103202	Chloroperlidae	100	0.0112
1	Nymph	RG_LI24_HESS-3_2020-08-31	Y	102840	Leuctridae	100	0.0017
44	Nymph	RG_LI24_HESS-3_2020-08-31	Y	102517	Nemouridae	100	0.0633
7	Nymph	RG_LI24_HESS-3_2020-08-31	Y	102994	Perlodidae	100	0.0479
2		RG_LI24_HESS-3_2020-08-31	Y	115933	Limnephilidae	100	0.0013
1		RG_LI24_HESS-3_2020-08-31	Y	115096	Rhyacophilidae	100	0.0013
2		RG_LI24_HESS-3_2020-08-31	Y	568757	Uenoidae	100	0.0009
12		RG_LI24_HESS-3_2020-08-31	Y	127917	Chironomidae	100	0.0068
1	none	RG_LI24_HESS-4_2020-08-31	N		Nematoda	100	0.0009
3	Adult	RG_LI24_HESS-4_2020-08-31	Y	83033	Lebertiidae	100	0.0012
1	Adult	RG_LI24_HESS-4_2020-08-31	Y	895710	Sperchonidae	100	0.0002
15	none	RG_LI24_HESS-4_2020-08-31	Y	84195	Ostracoda	100	0.0033
8	Nymph	RG_LI24_HESS-4_2020-08-31	Y	568544	Ameletidae	100	0.0086
8	Nymph	RG_LI24_HESS-4_2020-08-31	Y	100755	Baetidae	100	0.0269
7	Nymph	RG_LI24_HESS-4_2020-08-31	Y	101232	Ephemerellidae	100	0.0281
25	Nymph	RG_LI24_HESS-4_2020-08-31	Y	100504	Heptageniidae	100	0.1255
2	Nymph	RG_LI24_HESS-4_2020-08-31	Y	103202	Chloroperlidae	100	0.0043
16	Nymph	RG_LI24_HESS-4_2020-08-31	Y	102517	Nemouridae	100	0.0236
9	Nymph	RG_LI24_HESS-4_2020-08-31	Y	102994	Perlodidae	100	0.1556
2	Nymph	RG_LI24_HESS-4_2020-08-31	Y	102788	Taeniopterygidae	100	0.0010
1		RG_LI24_HESS-4_2020-08-31	Y	115096	Rhyacophilidae	100	0.0016
8		RG_LI24_HESS-4_2020-08-31	Y	127917	Chironomidae	100	0.0047
1	Adult	RG_LI24_HESS-5_2019-09-01	Y	83033	Lebertiidae	100	0.0006
3	Adult	RG_LI24_HESS-5_2019-09-01	Y	895710	Sperchonidae	100	0.0020
5	none	RG_LI24_HESS-5_2019-09-01	Y	84195	Ostracoda	100	0.0015
5	Nymph	RG_LI24_HESS-5_2019-09-01	Y	568544	Ameletidae	100	0.0105
1	Nymph	RG_LI24_HESS-5_2019-09-01	Y	100755	Baetidae	100	0.0058
7	Nymph	RG_LI24_HESS-5_2019-09-01	Y	101232	Ephemerellidae	100	0.0246
87	Nymph	RG_LI24_HESS-5_2019-09-01	Y	100504	Heptageniidae	100	0.3113
2	Nymph	RG_LI24_HESS-5_2019-09-01	Y	102643	Capniidae	100	0.0021
6	Nymph	RG_LI24_HESS-5_2019-09-01	Y	103202	Chloroperlidae	100	0.0206
3	Nymph	RG_LI24_HESS-5_2019-09-01	Y	102517	Nemouridae	100	0.0029
1	Nymph	RG_LI24_HESS-5_2019-09-01	Y	102994	Perlodidae	100	0.0043
3		RG_LI24_HESS-5_2019-09-01	Y	115933	Limnephilidae	100	0.0003
3		RG_LI24_HESS-5_2019-09-01	Y	568757	Uenoidae	100	0.0007
29		RG_LI24_HESS-5_2019-09-01	Y	127917	Chironomidae	100	0.0099
2		RG_LI24_HESS-5_2019-09-01	Y	135830	Empididae	100	0.0024
1	larvae	RG_LI24_HESS-5_2019-09-01	Y	126640	Simuliidae	100	0.0043
5	none	RG_LIDSL_HESS-1_2020-08-25	N		Nematoda	100	0.0013
1	none	RG_LIDSL_HESS-1_2020-08-25	Y	54502	Planariidae	100	0.0012
1	none	RG_LIDSL_HESS-1_2020-08-25	Y	68510	Enchytraeidae	100	0.0001
33	none	RG_LIDSL_HESS-1_2020-08-25	Y	68440	Lumbriculidae	100	0.1129
1	Adult	RG_LIDSL_HESS-1_2020-08-25	Y	83033	Lebertiidae	100	0.0010
1	Adult	RG_LIDSL_HESS-1_2020-08-25	Y	83212	Hydryphantidae	100	0.0008
2	Adult	RG_LIDSL_HESS-1_2020-08-25	Y	895710	Sperchonidae	100	0.0008
5	none	RG_LIDSL_HESS-1_2020-08-25	Y	84195	Ostracoda	100	0.0018
20	Nymph	RG_LIDSL_HESS-1_2020-08-25	Y	100755	Baetidae	100	0.0271
17	Nymph	RG_LIDSL_HESS-1_2020-08-25	Y	101232	Ephemerellidae	100	0.0067
69	Nymph	RG_LIDSL_HESS-1_2020-08-25	Y	100504	Heptageniidae	100	0.0852
2	Nymph	RG_LIDSL_HESS-1_2020-08-25	Y	102643	Capniidae	100	0.0012
10	Nymph	RG_LIDSL_HESS-1_2020-08-25	Y	103202	Chloroperlidae	100	0.0435
3	Nymph	RG_LIDSL_HESS-1_2020-08-25	Y	102840	Leuctridae	100	0.0030
10	Nymph	RG_LIDSL_HESS-1_2020-08-25	Y	102517	Nemouridae	100	0.0189
4	Nymph	RG_LIDSL_HESS-1_2020-08-25	Y	102994	Perlodidae	100	0.0056
1		RG_LIDSL_HESS-1_2020-08-25	Y	116905	Brachycentridae	100	0.0004
4		RG_LIDSL_HESS-1_2020-08-25	Y	115398	Hydropsychidae	100	0.4888
4		RG_LIDSL_HESS-1_2020-08-25	Y	115096	Rhyacophilidae	100	0.0855
7		RG_LIDSL_HESS-1_2020-08-25	Y	127076	Ceratopogonidae	100	0.0042
307		RG_LIDSL_HESS-1_2020-08-25	Y	127917	Chironomidae	100	0.2720
6		RG_LIDSL_HESS-1_2020-08-25	Y	135830	Empididae	100	0.0159
11	larvae	RG_LIDSL_HESS-1_2020-08-25	Y	125351	Psychodidae	100	0.0024
2	larvae	RG_LIDSL_HESS-1_2020-08-25	Y	126640	Simuliidae	100	0.0056
2	none	RG_LIDSL_HESS-2_2020-08-25	N		Nematoda	100	0.0002
19	none	RG_LIDSL_HESS-2_2020-08-25	Y	68440	Lumbriculidae	100	0.0226
3	Adult	RG_LIDSL_HESS-2_2020-08-25	Y	83033	Lebertiidae	100	0.0007
2	Nymph	RG_LIDSL_HESS-2_2020-08-25	Y	568544	Ameletidae	100	0.0106

quantity	life_stage_code	observ_sample_code	ITIS_TAXON_NAME_Y-N	ITIS_TSN	BENCH_TAXON_NAME	PERCENT_SAMPLED	RAW_BIOMASS
21	Nymph	RG_LIDSL_HESS-2_2020-08-25	Y	100755	Baetidae	100	0.0362
18	Nymph	RG_LIDSL_HESS-2_2020-08-25	Y	101232	Ephemerellidae	100	0.1288
69	Nymph	RG_LIDSL_HESS-2_2020-08-25	Y	100504	Heptageniidae	100	0.2302
2	Nymph	RG_LIDSL_HESS-2_2020-08-25	Y	102643	Capniidae	100	0.0004
5	Nymph	RG_LIDSL_HESS-2_2020-08-25	Y	103202	Chloroperlidae	100	0.0062
3	Nymph	RG_LIDSL_HESS-2_2020-08-25	Y	102840	Leuctridae	100	0.0028
18	Nymph	RG_LIDSL_HESS-2_2020-08-25	Y	102517	Nemouridae	100	0.0569
1	Nymph	RG_LIDSL_HESS-2_2020-08-25	Y	102488	Peltoperlidae	100	0.0079
1	Nymph	RG_LIDSL_HESS-2_2020-08-25	Y	102994	Perlodidae	100	0.0075
2		RG_LIDSL_HESS-2_2020-08-25	Y	117120	Glossosomatidae	100	0.0031
4		RG_LIDSL_HESS-2_2020-08-25	Y	115398	Hydropsychidae	100	0.4156
12		RG_LIDSL_HESS-2_2020-08-25	Y	115096	Rhyacophilidae	100	0.1564
2		RG_LIDSL_HESS-2_2020-08-25	Y	568757	Uenoidae	100	0.0004
116		RG_LIDSL_HESS-2_2020-08-25	Y	127917	Chironomidae	100	0.2693
8		RG_LIDSL_HESS-2_2020-08-25	Y	135830	Empididae	100	0.0150
1	larvae	RG_LIDSL_HESS-2_2020-08-25	Y	130914	Pelecorhyncidae	100	0.0026
6	larvae	RG_LIDSL_HESS-2_2020-08-25	Y	125351	Psychodidae	100	0.0006
1	larvae	RG_LIDSL_HESS-2_2020-08-25	Y	118840	Tipulidae	100	0.0003
1	none	RG_LIDSL_HESS-3_2020-08-25	N		Nematoda	50	0.0002
1	none	RG_LIDSL_HESS-3_2020-08-25	Y	54502	Planariidae	50	0.0021
1	none	RG_LIDSL_HESS-3_2020-08-25	Y	68440	Lumbriculidae	50	0.0025
1	Adult	RG_LIDSL_HESS-3_2020-08-25	Y	83033	Lebertiidae	50	0.0005
2	Adult	RG_LIDSL_HESS-3_2020-08-25	Y	895710	Sperchonidae	50	0.0006
10	none	RG_LIDSL_HESS-3_2020-08-25	Y	84195	Ostracoda	50	0.0023
2	Nymph	RG_LIDSL_HESS-3_2020-08-25	Y	568544	Ameletidae	50	0.0002
2	Nymph	RG_LIDSL_HESS-3_2020-08-25	Y	100755	Baetidae	50	0.0022
11	Nymph	RG_LIDSL_HESS-3_2020-08-25	Y	101232	Ephemerellidae	50	0.1580
34	Nymph	RG_LIDSL_HESS-3_2020-08-25	Y	100504	Heptageniidae	50	0.0215
1	Nymph	RG_LIDSL_HESS-3_2020-08-25	Y	102643	Capniidae	50	0.0004
34	Nymph	RG_LIDSL_HESS-3_2020-08-25	Y	103202	Chloroperlidae	50	0.0582
10	Nymph	RG_LIDSL_HESS-3_2020-08-25	Y	102840	Leuctridae	50	0.0103
9	Nymph	RG_LIDSL_HESS-3_2020-08-25	Y	102517	Nemouridae	50	0.0199
1	Nymph	RG_LIDSL_HESS-3_2020-08-25	Y	102994	Perlodidae	50	0.0154
8		RG_LIDSL_HESS-3_2020-08-25	Y	115398	Hydropsychidae	100	1.3342
3		RG_LIDSL_HESS-3_2020-08-25	Y	115398	Hydropsychidae	50	0.2063
9		RG_LIDSL_HESS-3_2020-08-25	Y	115096	Rhyacophilidae	50	0.1559
257		RG_LIDSL_HESS-3_2020-08-25	Y	127917	Chironomidae	50	0.2262
3		RG_LIDSL_HESS-3_2020-08-25	Y	135830	Empididae	50	0.0073
2	larvae	RG_LIDSL_HESS-3_2020-08-25	Y	130914	Pelecorhyncidae	50	0.0051
7	larvae	RG_LIDSL_HESS-3_2020-08-25	Y	125351	Psychodidae	50	0.0007
1	larvae	RG_LIDSL_HESS-3_2020-08-25	Y	118840	Tipulidae	100	0.0966
3	larvae	RG_LIDSL_HESS-3_2020-08-25	Y	118840	Tipulidae	50	0.0204
1	none	RG_LIDSL_HESS-4_2020-08-25	N		Nematoda	50	0.0001
2	none	RG_LIDSL_HESS-4_2020-08-25	Y	54502	Planariidae	50	0.0023
1	none	RG_LIDSL_HESS-4_2020-08-25	Y	69165	Lumbricidae	100	0.0471
2	none	RG_LIDSL_HESS-4_2020-08-25	Y	68440	Lumbriculidae	50	0.0305
2	Adult	RG_LIDSL_HESS-4_2020-08-25	Y	83033	Lebertiidae	50	0.0008
4	Adult	RG_LIDSL_HESS-4_2020-08-25	Y	895710	Sperchonidae	50	0.0013
2	Nymph	RG_LIDSL_HESS-4_2020-08-25	Y	568544	Ameletidae	50	0.0003
11	Nymph	RG_LIDSL_HESS-4_2020-08-25	Y	100755	Baetidae	50	0.0179
6	Nymph	RG_LIDSL_HESS-4_2020-08-25	Y	101232	Ephemerellidae	50	0.0790
53	Nymph	RG_LIDSL_HESS-4_2020-08-25	Y	100504	Heptageniidae	50	0.0429
5	Nymph	RG_LIDSL_HESS-4_2020-08-25	Y	102643	Capniidae	50	0.0030
22	Nymph	RG_LIDSL_HESS-4_2020-08-25	Y	103202	Chloroperlidae	50	0.0430
9	Nymph	RG_LIDSL_HESS-4_2020-08-25	Y	102517	Nemouridae	50	0.0270
2	Nymph	RG_LIDSL_HESS-4_2020-08-25	Y	102994	Perlodidae	50	0.0028
1		RG_LIDSL_HESS-4_2020-08-25	Y	598182	Apataniidae	50	0.0002
2		RG_LIDSL_HESS-4_2020-08-25	Y	117120	Glossosomatidae	50	0.0023
7		RG_LIDSL_HESS-4_2020-08-25	Y	115398	Hydropsychidae	100	1.0560
5		RG_LIDSL_HESS-4_2020-08-25	Y	115096	Rhyacophilidae	100	0.3252
14		RG_LIDSL_HESS-4_2020-08-25	Y	115096	Rhyacophilidae	50	0.1248
3		RG_LIDSL_HESS-4_2020-08-25	Y	127076	Ceratopogonidae	50	0.0018
260		RG_LIDSL_HESS-4_2020-08-25	Y	127917	Chironomidae	50	0.3995
2		RG_LIDSL_HESS-4_2020-08-25	Y	135830	Empididae	50	0.0022
2	larvae	RG_LIDSL_HESS-4_2020-08-25	Y	130914	Pelecorhyncidae	50	0.0164
9	larvae	RG_LIDSL_HESS-4_2020-08-25	Y	125351	Psychodidae	50	0.0011
1	larvae	RG_LIDSL_HESS-4_2020-08-25	Y	118840	Tipulidae	100	0.1217
8	none	RG_LIDSL_HESS-5_2020-08-26	Y	54502	Planariidae	100	0.0163
34	none	RG_LIDSL_HESS-5_2020-08-26	Y	68440	Lumbriculidae	100	0.0803
1	Nymph	RG_LIDSL_HESS-5_2020-08-26	Y	568544	Ameletidae	100	0.0115
18	Nymph	RG_LIDSL_HESS-5_2020-08-26	Y	100755	Baetidae	100	0.0363
35	Nymph	RG_LIDSL_HESS-5_2020-08-26	Y	101232	Ephemerellidae	100	0.2310
194	Nymph	RG_LIDSL_HESS-5_2020-08-26	Y	100504	Heptageniidae	100	0.1580
9	Nymph	RG_LIDSL_HESS-5_2020-08-26	Y	102643	Capniidae	100	0.0029
94	Nymph	RG_LIDSL_HESS-5_2020-08-26	Y	103202	Chloroperlidae	100	0.1634
2	Nymph	RG_LIDSL_HESS-5_2020-08-26	Y	102840	Leuctridae	100	0.0013
18	Nymph	RG_LIDSL_HESS-5_2020-08-26	Y	102517	Nemouridae	100	0.0426
1	Nymph	RG_LIDSL_HESS-5_2020-08-26	Y	102488	Peltoperlidae	100	0.0128
1	Nymph	RG_LIDSL_HESS-5_2020-08-26	Y	102994	Perlodidae	100	0.0125
10	Nymph	RG_LIDSL_HESS-5_2020-08-26	Y	102788	Taeniopterygidae	100	0.0016
1		RG_LIDSL_HESS-5_2020-08-26	Y	117120	Glossosomatidae	100	0.0005
10		RG_LIDSL_HESS-5_2020-08-26	Y	115398	Hydropsychidae	100	1.2251
1		RG_LIDSL_HESS-5_2020-08-26	Y	115933	Limnephilidae	100	0.0001
6		RG_LIDSL_HESS-5_2020-08-26	Y	115096	Rhyacophilidae	100	0.0144
1		RG_LIDSL_HESS-5_2020-08-26	Y	127076	Ceratopogonidae	100	0.0001
245		RG_LIDSL_HESS-5_2020-08-26	Y	127917	Chironomidae	100	0.4300
4		RG_LIDSL_HESS-5_2020-08-26	Y	135830	Empididae	100	0.0120
3	larvae	RG_LIDSL_HESS-5_2020-08-26	Y	125351	Psychodidae	100	0.0003
3	larvae	RG_LIDSL_HESS-5_2020-08-26	Y	118840	Tipulidae	100	0.0538
3	none	RG_LIDSL_HESS-6_2020-08-26	N		Nematoda	100	0.0028
6	none	RG_LIDSL_HESS-6_2020-08-26	Y	54502	Planariidae	100	0.0119
47	none	RG_LIDSL_HESS-6_2020-08-26	Y	68440	Lumbriculidae	100	0.1046
9	Adult	RG_LIDSL_HESS-6_2020-08-26	Y	83033	Lebertiidae	100	0.0035
15	Adult	RG_LIDSL_HESS-6_2020-08-26	Y	895710	Sperchonidae	100	0.0062
14	none	RG_LIDSL_HESS-6_2020-08-26	Y	84195	Ostracoda	100	0.0042
6	Nymph	RG_LIDSL_HESS-6_2020-08-26	Y	568544	Ameletidae	100	0.0319
11	Nymph	RG_LIDSL_HESS-6_2020-08-26	Y	100755	Baetidae	100	0.0773
54	Nymph	RG_LIDSL_HESS-6_2020-08-26	Y	101232	Ephemerellidae	100	0.6925
167	Nymph	RG_LIDSL_HESS-6_2020-08-26	Y	100504	Heptageniidae	100	0.2759
2	Nymph	RG_LIDSL_HESS-6_2020-08-26	Y	102643	Capniidae	100	0.0005
86	Nymph	RG_LIDSL_HESS-6_2020-08-26	Y	103202	Chloroperlidae	100	0.1983
16	Nymph	RG_LIDSL_HESS-6_2020-08-26	Y	102840	Leuctridae	100	0.0058
25	Nymph	RG_LIDSL_HESS-6_2020-08-26	Y	102517	Nemouridae	100	0.0856
1	Nymph	RG_LIDSL_HESS-6_2020-08-26	Y	102994	Perlodidae	100	0.0075
4		RG_LIDSL_HESS-6_2020-08-26	Y	598182	Apataniidae	100	0.0071
4		RG_LIDSL_HESS-6_2020-08-26	Y	117120	Glossosomatidae	100	0.0229
4		RG_LIDSL_HESS-6_2020-08-26	Y	115398	Hydropsychidae	100	0.3302
25		RG_LIDSL_HESS-6_2020-08-26	Y	115096	Rhyacophilidae	100	0.4777
1		RG_LIDSL_HESS-6_2020-08-26	Y	568757	Uenoidae	100	0.0018

quantity	life_stage_code	observ_sample_code	ITIS_TAXON_NAME_Y-N	ITIS_TSN	BENCH_TAXON_NAME	PERCENT_SAMPLED	RAW_BIOMASS
1		RG_LIDSL_HESS-6_2020-08-26	Y	127076	Ceratopogonidae	100	0.0005
318		RG_LIDSL_HESS-6_2020-08-26	Y	127917	Chironomidae	100	0.7481
3		RG_LIDSL_HESS-6_2020-08-26	Y	135830	Empididae	100	0.0064
2	larvae	RG_LIDSL_HESS-6_2020-08-26	Y	125351	Psychodidae	100	0.0007
1	larvae	RG_LIDSL_HESS-6_2020-08-26	Y	126640	Simuliidae	100	0.0038
7	larvae	RG_LIDSL_HESS-6_2020-08-26	Y	118840	Tipulidae	100	0.1596
9	none	RG_LIDSL_HESS-7_2020-08-26	N		Nematoda	50	0.0028
11	none	RG_LIDSL_HESS-7_2020-08-26	Y	54502	Planariidae	50	0.0333
3	none	RG_LIDSL_HESS-7_2020-08-26	Y	68510	Enchytraeidae	50	0.0007
2	none	RG_LIDSL_HESS-7_2020-08-26	Y	68440	Lumbriculidae	50	0.0060
2	Adult	RG_LIDSL_HESS-7_2020-08-26	Y	83033	Lebertiidae	50	0.0009
19	Adult	RG_LIDSL_HESS-7_2020-08-26	Y	895710	Sperchonidae	50	0.0068
6	none	RG_LIDSL_HESS-7_2020-08-26	Y	84195	Ostracoda	50	0.0016
2		RG_LIDSL_HESS-7_2020-08-26	Y	114093	Elmidae	50	0.0026
32	Nymph	RG_LIDSL_HESS-7_2020-08-26	Y	100755	Baetidae	50	0.0693
9	Nymph	RG_LIDSL_HESS-7_2020-08-26	Y	101232	Ephemerellidae	50	0.0026
22	Nymph	RG_LIDSL_HESS-7_2020-08-26	Y	100504	Heptageniidae	50	0.0486
5	Nymph	RG_LIDSL_HESS-7_2020-08-26	Y	103202	Chloroperlidae	50	0.0099
2	Nymph	RG_LIDSL_HESS-7_2020-08-26	Y	102840	Leuctridae	50	0.0008
27	Nymph	RG_LIDSL_HESS-7_2020-08-26	Y	102517	Nemouridae	50	0.0726
2	Nymph	RG_LIDSL_HESS-7_2020-08-26	Y	102994	Perlodidae	50	0.0009
2	Nymph	RG_LIDSL_HESS-7_2020-08-26	Y	102788	Taeniopterygidae	50	0.0003
1		RG_LIDSL_HESS-7_2020-08-26	Y	598182	Apataniidae	50	0.0001
3		RG_LIDSL_HESS-7_2020-08-26	Y	116905	Brachycentridae	50	0.0013
5		RG_LIDSL_HESS-7_2020-08-26	Y	115398	Hydropsychidae	100	0.7000
7		RG_LIDSL_HESS-7_2020-08-26	Y	115398	Hydropsychidae	50	0.0031
1		RG_LIDSL_HESS-7_2020-08-26	Y	115629	Hydroptilidae	50	0.0002
24		RG_LIDSL_HESS-7_2020-08-26	Y	115096	Rhyacophilidae	50	0.2117
1		RG_LIDSL_HESS-7_2020-08-26	Y	568757	Uenoidae	50	0.0006
260		RG_LIDSL_HESS-7_2020-08-26	Y	127917	Chironomidae	50	0.1426
16		RG_LIDSL_HESS-7_2020-08-26	Y	135830	Empididae	50	0.0141
3	larvae	RG_LIDSL_HESS-7_2020-08-26	Y	130914	Pelecorhyncidae	50	0.0600
8	larvae	RG_LIDSL_HESS-7_2020-08-26	Y	125351	Psychodidae	50	0.0016
2	none	RG_LIDSL_HESS-8_2020-08-26	N		Nematoda	100	0.0004
23	none	RG_LIDSL_HESS-8_2020-08-26	Y	68440	Lumbriculidae	100	0.1102
1	Adult	RG_LIDSL_HESS-8_2020-08-26	Y	83033	Lebertiidae	100	0.0004
8	Adult	RG_LIDSL_HESS-8_2020-08-26	Y	895710	Sperchonidae	100	0.0024
4	none	RG_LIDSL_HESS-8_2020-08-26	Y	84195	Ostracoda	100	0.0012
1	Nymph	RG_LIDSL_HESS-8_2020-08-26	Y	568544	Ameletidae	100	0.0094
19	Nymph	RG_LIDSL_HESS-8_2020-08-26	Y	100755	Baetidae	100	0.0300
55	Nymph	RG_LIDSL_HESS-8_2020-08-26	Y	101232	Ephemerellidae	100	0.2991
107	Nymph	RG_LIDSL_HESS-8_2020-08-26	Y	100504	Heptageniidae	100	0.1791
2	Nymph	RG_LIDSL_HESS-8_2020-08-26	Y	102643	Capniidae	100	0.0011
22	Nymph	RG_LIDSL_HESS-8_2020-08-26	Y	103202	Chloroperlidae	100	0.0376
8	Nymph	RG_LIDSL_HESS-8_2020-08-26	Y	102840	Leuctridae	100	0.0051
43	Nymph	RG_LIDSL_HESS-8_2020-08-26	Y	102517	Nemouridae	100	0.1259
1	Nymph	RG_LIDSL_HESS-8_2020-08-26	Y	102488	Peltoperlidae	100	0.0005
3	Nymph	RG_LIDSL_HESS-8_2020-08-26	Y	102994	Perlodidae	100	0.0465
1		RG_LIDSL_HESS-8_2020-08-26	Y	598182	Apataniidae	100	0.0003
1		RG_LIDSL_HESS-8_2020-08-26	Y	117120	Glossosomatidae	100	0.0049
9		RG_LIDSL_HESS-8_2020-08-26	Y	115398	Hydropsychidae	100	1.1753
19		RG_LIDSL_HESS-8_2020-08-26	Y	115096	Rhyacophilidae	100	0.3187
1		RG_LIDSL_HESS-8_2020-08-26	Y	568757	Uenoidae	100	0.0005
290		RG_LIDSL_HESS-8_2020-08-26	Y	127917	Chironomidae	100	0.5259
9		RG_LIDSL_HESS-8_2020-08-26	Y	135830	Empididae	100	0.0199
3	larvae	RG_LIDSL_HESS-8_2020-08-26	Y	130914	Pelecorhyncidae	100	0.0123
2	larvae	RG_LIDSL_HESS-8_2020-08-26	Y	125351	Psychodidae	100	0.0003
1	larvae	RG_LIDSL_HESS-8_2020-08-26	Y	126640	Simuliidae	100	0.0018
2	none	RG_LIDSL_HESS-9_2020-08-26	N		Nematoda	50	0.0008
8	none	RG_LIDSL_HESS-9_2020-08-26	Y	54502	Planariidae	50	0.0094
12	none	RG_LIDSL_HESS-9_2020-08-26	Y	68440	Lumbriculidae	50	0.0408
14	Adult	RG_LIDSL_HESS-9_2020-08-26	Y	83033	Lebertiidae	50	0.0048
1	Adult	RG_LIDSL_HESS-9_2020-08-26	Y	83212	Hydryphantidae	50	0.0103
18	Adult	RG_LIDSL_HESS-9_2020-08-26	Y	895710	Sperchonidae	50	0.0084
14	none	RG_LIDSL_HESS-9_2020-08-26	Y	84195	Ostracoda	50	0.0038
10	Nymph	RG_LIDSL_HESS-9_2020-08-26	Y	568544	Ameletidae	50	0.0141
5	Nymph	RG_LIDSL_HESS-9_2020-08-26	Y	100755	Baetidae	50	0.0105
24	Nymph	RG_LIDSL_HESS-9_2020-08-26	Y	101232	Ephemerellidae	50	0.2742
58	Nymph	RG_LIDSL_HESS-9_2020-08-26	Y	100504	Heptageniidae	50	0.0233
1	Nymph	RG_LIDSL_HESS-9_2020-08-26	Y	102643	Capniidae	50	0.0012
20	Nymph	RG_LIDSL_HESS-9_2020-08-26	Y	103202	Chloroperlidae	50	0.0343
4	Nymph	RG_LIDSL_HESS-9_2020-08-26	Y	102840	Leuctridae	50	0.0031
14	Nymph	RG_LIDSL_HESS-9_2020-08-26	Y	102517	Nemouridae	50	0.0348
2	Nymph	RG_LIDSL_HESS-9_2020-08-26	Y	102788	Taeniopterygidae	50	0.0008
1		RG_LIDSL_HESS-9_2020-08-26	Y	115398	Hydropsychidae	50	0.1478
5		RG_LIDSL_HESS-9_2020-08-26	Y	115933	Limnephilidae	50	0.0013
11		RG_LIDSL_HESS-9_2020-08-26	Y	115096	Rhyacophilidae	50	0.1670
263		RG_LIDSL_HESS-9_2020-08-26	Y	127917	Chironomidae	50	0.4198
4		RG_LIDSL_HESS-9_2020-08-26	Y	135830	Empididae	50	0.0084
3	larvae	RG_LIDSL_HESS-9_2020-08-26	Y	130914	Pelecorhyncidae	50	0.0040
6	larvae	RG_LIDSL_HESS-9_2020-08-26	Y	125351	Psychodidae	50	0.0015
1	none	RG_LIDSL_HESS-10_2020-08-26	N		Nematoda	100	0.0001
2	none	RG_LIDSL_HESS-10_2020-08-26	Y	54502	Planariidae	100	0.0020
21	none	RG_LIDSL_HESS-10_2020-08-26	Y	68440	Lumbriculidae	100	0.0491
1	Adult	RG_LIDSL_HESS-10_2020-08-26	Y	83212	Hydryphantidae	100	0.0001
1	Adult	RG_LIDSL_HESS-10_2020-08-26	Y	895710	Sperchonidae	100	0.0001
3	none	RG_LIDSL_HESS-10_2020-08-26	Y	84195	Ostracoda	100	0.0014
37	Nymph	RG_LIDSL_HESS-10_2020-08-26	Y	100755	Baetidae	100	0.0667
25	Nymph	RG_LIDSL_HESS-10_2020-08-26	Y	101232	Ephemerellidae	100	0.0664
55	Nymph	RG_LIDSL_HESS-10_2020-08-26	Y	100504	Heptageniidae	100	0.1403
5	Nymph	RG_LIDSL_HESS-10_2020-08-26	Y	102643	Capniidae	100	0.0022
25	Nymph	RG_LIDSL_HESS-10_2020-08-26	Y	103202	Chloroperlidae	100	0.0523
2	Nymph	RG_LIDSL_HESS-10_2020-08-26	Y	102840	Leuctridae	100	0.0005
10	Nymph	RG_LIDSL_HESS-10_2020-08-26	Y	102517	Nemouridae	100	0.0271
2	Nymph	RG_LIDSL_HESS-10_2020-08-26	Y	102994	Perlodidae	100	0.0101
8	Nymph	RG_LIDSL_HESS-10_2020-08-26	Y	102788	Taeniopterygidae	100	0.0013
2		RG_LIDSL_HESS-10_2020-08-26	Y	115398	Hydropsychidae	100	0.1964
15		RG_LIDSL_HESS-10_2020-08-26	Y	115096	Rhyacophilidae	100	0.1998
111		RG_LIDSL_HESS-10_2020-08-26	Y	127917	Chironomidae	100	0.1124
3		RG_LIDSL_HESS-10_2020-08-26	Y	135830	Empididae	100	0.0047
1	larvae	RG_LIDSL_HESS-10_2020-08-26	Y	130914	Pelecorhyncidae	100	0.0024
2	larvae	RG_LIDSL_HESS-10_2020-08-26	Y	126640	Simuliidae	100	0.0025
2	larvae	RG_LIDSL_HESS-10_2020-08-26	Y	118840	Tipulidae	100	0.0062
33	none	RG_LILC3_HESS-1_2020-08-27	N		Nematoda	25	0.0049
1	none	RG_LILC3_HESS-1_2020-08-27	Y	68510	Enchytraeidae	25	0.0002
1	none	RG_LILC3_HESS-1_2020-08-27	Y	68440	Lumbriculidae	25	0.0063
1	Adult/indeterminate	RG_LILC3_HESS-1_2020-08-27	Y	82769	Trombidiformes	25	0.0001
1	Adult	RG_LILC3_HESS-1_2020-08-27	Y	83033	Lebertiidae	25	0.0001

quantity	life_stage_code	observ_sample_code	ITIS_TAXON_NAME_Y-N	ITIS_TSN	BENCH_TAXON_NAME	PERCENT_SAMPLED	RAW_BIOMASS
2	Adult	RG_LILC3_HESS-1_2020-08-27	Y	895710	Sperchonidae	25	0.0012
19	none	RG_LILC3_HESS-1_2020-08-27	Y	84195	Ostracoda	25	0.0060
1	Nymph	RG_LILC3_HESS-1_2020-08-27	Y	100755	Baetidae	25	0.0004
2	Nymph	RG_LILC3_HESS-1_2020-08-27	Y	100504	Heptageniidae	25	0.0005
2	Nymph	RG_LILC3_HESS-1_2020-08-27	Y	103202	Chloroperlidae	25	0.0086
1	Nymph	RG_LILC3_HESS-1_2020-08-27	Y	102517	Nemouridae	100	0.0080
7	Nymph	RG_LILC3_HESS-1_2020-08-27	Y	102517	Nemouridae	25	0.0395
20		RG_LILC3_HESS-1_2020-08-27	Y	115398	Hydropsychidae	100	2.9346
4		RG_LILC3_HESS-1_2020-08-27	Y	115096	Rhyacophilidae	100	0.2869
4		RG_LILC3_HESS-1_2020-08-27	Y	115096	Rhyacophilidae	25	0.0792
687		RG_LILC3_HESS-1_2020-08-27	Y	127917	Chironomidae	25	0.8917
4		RG_LILC3_HESS-1_2020-08-27	Y	135830	Empididae	25	0.0056
2	larvae	RG_LILC3_HESS-1_2020-08-27	Y	126640	Simuliidae	25	0.0068
16	none	RG_LILC3_HESS-2_2020-08-27	N		Nematoda	25	0.0032
3	none	RG_LILC3_HESS-2_2020-08-27	Y	54502	Planariidae	25	0.0091
2	none	RG_LILC3_HESS-2_2020-08-27	Y	68440	Lumbriculidae	25	0.0009
6	Adult	RG_LILC3_HESS-2_2020-08-27	Y	83033	Lebertiidae	25	0.0021
6	Adult	RG_LILC3_HESS-2_2020-08-27	Y	895710	Sperchonidae	25	0.0034
9	none	RG_LILC3_HESS-2_2020-08-27	Y	84195	Ostracoda	25	0.0022
1	Nymph	RG_LILC3_HESS-2_2020-08-27	Y	101232	Ephemerellidae	25	0.0005
1	Nymph	RG_LILC3_HESS-2_2020-08-27	Y	100504	Heptageniidae	25	0.0002
5	Nymph	RG_LILC3_HESS-2_2020-08-27	Y	103202	Chloroperlidae	25	0.0050
1	Nymph	RG_LILC3_HESS-2_2020-08-27	Y	102517	Nemouridae	25	0.0074
2	Nymph	RG_LILC3_HESS-2_2020-08-27	Y	102994	Perlodidae	25	0.0147
1		RG_LILC3_HESS-2_2020-08-27	Y	115398	Hydropsychidae	100	0.1255
14		RG_LILC3_HESS-2_2020-08-27	Y	115096	Rhyacophilidae	25	0.9484
468		RG_LILC3_HESS-2_2020-08-27	Y	127917	Chironomidae	25	0.5393
5		RG_LILC3_HESS-2_2020-08-27	Y	135830	Empididae	25	0.0122
31	none	RG_LILC3_HESS-3_2020-08-27	N		Nematoda	25	0.0050
11	none	RG_LILC3_HESS-3_2020-08-27	Y	54502	Planariidae	25	0.0679
2	none	RG_LILC3_HESS-3_2020-08-27	Y	68440	Lumbriculidae	25	0.0038
1	Adult/indeterminate	RG_LILC3_HESS-3_2020-08-27	Y	82769	Trombidiformes	25	0.0005
13	Adult	RG_LILC3_HESS-3_2020-08-27	Y	83033	Lebertiidae	25	0.0069
31	Adult	RG_LILC3_HESS-3_2020-08-27	Y	895710	Sperchonidae	25	0.0197
216	none	RG_LILC3_HESS-3_2020-08-27	Y	84195	Ostracoda	25	0.0572
4	Nymph	RG_LILC3_HESS-3_2020-08-27	Y	101232	Ephemerellidae	25	0.0027
15	Nymph	RG_LILC3_HESS-3_2020-08-27	Y	100504	Heptageniidae	25	0.0051
1	Nymph	RG_LILC3_HESS-3_2020-08-27	Y	102643	Capniidae	25	0.0043
6	Nymph	RG_LILC3_HESS-3_2020-08-27	Y	103202	Chloroperlidae	25	0.0248
9	Nymph	RG_LILC3_HESS-3_2020-08-27	Y	102517	Nemouridae	25	0.0585
3	Nymph	RG_LILC3_HESS-3_2020-08-27	Y	102914	Perlidae	25	0.0090
3		RG_LILC3_HESS-3_2020-08-27	Y	115398	Hydropsychidae	25	0.3619
2		RG_LILC3_HESS-3_2020-08-27	Y	115933	Limnephilidae	25	0.0013
6		RG_LILC3_HESS-3_2020-08-27	Y	115096	Rhyacophilidae	25	0.2218
1269		RG_LILC3_HESS-3_2020-08-27	Y	127917	Chironomidae	25	1.0514
6		RG_LILC3_HESS-3_2020-08-27	Y	135830	Empididae	25	0.0118
1	larvae	RG_LILC3_HESS-3_2020-08-27	Y	125351	Psychodidae	25	0.0003
7	none	RG_LILC3_HESS-4_2020-08-27	N		Nematoda	12.5	0.0009
7	none	RG_LILC3_HESS-4_2020-08-27	Y	54502	Planariidae	12.5	0.0092
1	none	RG_LILC3_HESS-4_2020-08-27	Y	68510	Enchytraeidae	12.5	0.0011
6	Adult	RG_LILC3_HESS-4_2020-08-27	Y	83033	Lebertiidae	12.5	0.0030
24	Adult	RG_LILC3_HESS-4_2020-08-27	Y	895710	Sperchonidae	12.5	0.0104
46	none	RG_LILC3_HESS-4_2020-08-27	Y	84195	Ostracoda	12.5	0.0131
1	Nymph	RG_LILC3_HESS-4_2020-08-27	Y	100755	Baetidae	12.5	0.0139
3	Nymph	RG_LILC3_HESS-4_2020-08-27	Y	101232	Ephemerellidae	12.5	0.0019
14	Nymph	RG_LILC3_HESS-4_2020-08-27	Y	100504	Heptageniidae	12.5	0.0031
1	Nymph	RG_LILC3_HESS-4_2020-08-27	Y	102643	Capniidae	12.5	0.0010
3	Nymph	RG_LILC3_HESS-4_2020-08-27	Y	103202	Chloroperlidae	12.5	0.0090
23	Nymph	RG_LILC3_HESS-4_2020-08-27	Y	102517	Nemouridae	12.5	0.0931
1	Nymph	RG_LILC3_HESS-4_2020-08-27	Y	102914	Perlidae	100	0.2623
2	Nymph	RG_LILC3_HESS-4_2020-08-27	Y	102994	Perlodidae	12.5	0.0007
5		RG_LILC3_HESS-4_2020-08-27	Y	115398	Hydropsychidae	100	0.5374
1		RG_LILC3_HESS-4_2020-08-27	Y	115398	Hydropsychidae	12.5	0.1035
12		RG_LILC3_HESS-4_2020-08-27	Y	115096	Rhyacophilidae	12.5	0.7050
550		RG_LILC3_HESS-4_2020-08-27	Y	127917	Chironomidae	12.5	0.6531
3		RG_LILC3_HESS-4_2020-08-27	Y	135830	Empididae	12.5	0.0025
1	larvae	RG_LILC3_HESS-4_2020-08-27	Y	125351	Psychodidae	12.5	0.0003
30	none	RG_LILC3_HESS-5_2020-08-27	N		Nematoda	12.5	0.0028
9	none	RG_LILC3_HESS-5_2020-08-27	Y	54502	Planariidae	12.5	0.0397
1	none	RG_LILC3_HESS-5_2020-08-27	Y	68510	Enchytraeidae	12.5	0.0001
2	none	RG_LILC3_HESS-5_2020-08-27	Y	68440	Lumbriculidae	12.5	0.0048
7	Adult	RG_LILC3_HESS-5_2020-08-27	Y	83033	Lebertiidae	12.5	0.0031
18	Adult	RG_LILC3_HESS-5_2020-08-27	Y	895710	Sperchonidae	12.5	0.0094
45	none	RG_LILC3_HESS-5_2020-08-27	Y	84195	Ostracoda	12.5	0.0104
3	Nymph	RG_LILC3_HESS-5_2020-08-27	Y	100755	Baetidae	12.5	0.0007
2	Nymph	RG_LILC3_HESS-5_2020-08-27	Y	100504	Heptageniidae	12.5	0.0054
1	Nymph	RG_LILC3_HESS-5_2020-08-27	Y	103202	Chloroperlidae	12.5	0.0031
2	Nymph	RG_LILC3_HESS-5_2020-08-27	Y	102517	Nemouridae	100	0.0108
10	Nymph	RG_LILC3_HESS-5_2020-08-27	Y	102517	Nemouridae	12.5	0.0544
1	Nymph	RG_LILC3_HESS-5_2020-08-27	Y	102994	Perlodidae	12.5	0.0001
16		RG_LILC3_HESS-5_2020-08-27	Y	115398	Hydropsychidae	100	2.2039
1		RG_LILC3_HESS-5_2020-08-27	Y	115933	Limnephilidae	100	0.3992
10		RG_LILC3_HESS-5_2020-08-27	Y	115096	Rhyacophilidae	100	0.9722
2		RG_LILC3_HESS-5_2020-08-27	Y	115096	Rhyacophilidae	12.5	0.0807
388		RG_LILC3_HESS-5_2020-08-27	Y	127917	Chironomidae	12.5	0.2867
5		RG_LILC3_HESS-5_2020-08-27	Y	135830	Empididae	12.5	0.0090
2	larvae	RG_LILC3_HESS-5_2020-08-27	Y	125351	Psychodidae	12.5	0.0001
10	none	RG_LILC3_HESS-6_2020-08-27	N		Nematoda	12.5	0.0007
3	none	RG_LILC3_HESS-6_2020-08-27	Y	54502	Planariidae	12.5	0.0113
2	none	RG_LILC3_HESS-6_2020-08-27	Y	68440	Lumbriculidae	12.5	0.0122
8	Adult	RG_LILC3_HESS-6_2020-08-27	Y	83033	Lebertiidae	12.5	0.0017
11	Adult	RG_LILC3_HESS-6_2020-08-27	Y	895710	Sperchonidae	12.5	0.0043
105	none	RG_LILC3_HESS-6_2020-08-27	Y	84195	Ostracoda	12.5	0.0266
1	Nymph	RG_LILC3_HESS-6_2020-08-27	Y	100755	Baetidae	12.5	0.0000
1	Nymph	RG_LILC3_HESS-6_2020-08-27	Y	101232	Ephemerellidae	12.5	0.0001
4	Nymph	RG_LILC3_HESS-6_2020-08-27	Y	100504	Heptageniidae	12.5	0.0009
1	Nymph	RG_LILC3_HESS-6_2020-08-27	Y	102643	Capniidae	12.5	0.0019
5	Nymph	RG_LILC3_HESS-6_2020-08-27	Y	103202	Chloroperlidae	12.5	0.0080
1	Nymph	RG_LILC3_HESS-6_2020-08-27	Y	102517	Nemouridae	100	0.0110
2	Nymph	RG_LILC3_HESS-6_2020-08-27	Y	102517	Nemouridae	12.5	0.0136
1		RG_LILC3_HESS-6_2020-08-27	Y	598182	Apataniidae	12.5	0.0003
1		RG_LILC3_HESS-6_2020-08-27	Y	115398	Hydropsychidae	100	0.1162
1		RG_LILC3_HESS-6_2020-08-27	Y	115933	Limnephilidae	12.5	0.0003
14		RG_LILC3_HESS-6_2020-08-27	Y	115096	Rhyacophilidae	100	1.3583
7		RG_LILC3_HESS-6_2020-08-27	Y	115096	Rhyacophilidae	12.5	0.4598
307		RG_LILC3_HESS-6_2020-08-27	Y	127917	Chironomidae	12.5	0.2722
3		RG_LILC3_HESS-6_2020-08-27	Y	135830	Empididae	12.5	0.0050
1	larvae	RG_LILC3_HESS-6_2020-08-27	Y	150025	Muscidae	12.5	0.0003

quantity	life_stage_code	observ_sample_code	ITIS_TAXON_NAME_Y-N	ITIS_TSN	BENCH_TAXON_NAME	PERCENT_SAMPLED	RAW_BIOMASS
25	none	RG_LILC3_HESS-7_2020-08-27	N		Nematoda	12.5	0.0053
14	none	RG_LILC3_HESS-7_2020-08-27	Y	54502	Planariidae	12.5	0.0294
1	Adult/indeterminate	RG_LILC3_HESS-7_2020-08-27	Y	82769	Trombidiformes	12.5	0.0005
11	Adult	RG_LILC3_HESS-7_2020-08-27	Y	83033	Lebertiidae	12.5	0.0056
12	Adult	RG_LILC3_HESS-7_2020-08-27	Y	895710	Sperchonidae	12.5	0.0062
88	none	RG_LILC3_HESS-7_2020-08-27	Y	84195	Ostracoda	12.5	0.0183
1	Nymph	RG_LILC3_HESS-7_2020-08-27	Y	100755	Baetidae	12.5	0.0063
1	Nymph	RG_LILC3_HESS-7_2020-08-27	Y	101232	Ephemerellidae	12.5	0.0011
12	Nymph	RG_LILC3_HESS-7_2020-08-27	Y	100504	Heptageniidae	12.5	0.0038
1	Nymph	RG_LILC3_HESS-7_2020-08-27	Y	102643	Capniidae	12.5	0.0036
2	Nymph	RG_LILC3_HESS-7_2020-08-27	Y	103202	Chloroperlidae	12.5	0.0059
8	Nymph	RG_LILC3_HESS-7_2020-08-27	Y	102517	Nemouridae	12.5	0.0295
3		RG_LILC3_HESS-7_2020-08-27	Y	115398	Hydropsychidae	12.5	0.3072
1		RG_LILC3_HESS-7_2020-08-27	Y	115933	Limnephilidae	12.5	0.0006
6		RG_LILC3_HESS-7_2020-08-27	Y	115096	Rhyacophilidae	12.5	0.2281
503		RG_LILC3_HESS-7_2020-08-27	Y	127917	Chironomidae	12.5	0.3503
4		RG_LILC3_HESS-7_2020-08-27	Y	135830	Empididae	12.5	0.0063
1	larvae	RG_LILC3_HESS-7_2020-08-27	Y	126640	Simuliidae	12.5	0.0010
1	larvae	RG_LILC3_HESS-7_2020-08-27	Y	118840	Tipulidae	12.5	0.0008
26	none	RG_LILC3_HESS-8_2020-08-27	N		Nematoda	25	0.0040
15	none	RG_LILC3_HESS-8_2020-08-27	Y	54502	Planariidae	25	0.0480
9	Adult	RG_LILC3_HESS-8_2020-08-27	Y	83033	Lebertiidae	25	0.0043
8	Adult	RG_LILC3_HESS-8_2020-08-27	Y	895710	Sperchonidae	25	0.0035
46	none	RG_LILC3_HESS-8_2020-08-27	Y	84195	Ostracoda	25	0.0105
4	Nymph	RG_LILC3_HESS-8_2020-08-27	Y	100755	Baetidae	25	0.0016
1	Nymph	RG_LILC3_HESS-8_2020-08-27	Y	101232	Ephemerellidae	25	0.0005
1	Nymph	RG_LILC3_HESS-8_2020-08-27	Y	100504	Heptageniidae	25	0.0001
1	Nymph	RG_LILC3_HESS-8_2020-08-27	Y	102643	Capniidae	25	0.0045
10	Nymph	RG_LILC3_HESS-8_2020-08-27	Y	102517	Nemouridae	25	0.0350
11		RG_LILC3_HESS-8_2020-08-27	Y	115398	Hydropsychidae	100	1.1458
1		RG_LILC3_HESS-8_2020-08-27	Y	115398	Hydropsychidae	25	0.0207
12		RG_LILC3_HESS-8_2020-08-27	Y	115096	Rhyacophilidae	100	1.0096
8		RG_LILC3_HESS-8_2020-08-27	Y	115096	Rhyacophilidae	25	0.3495
613		RG_LILC3_HESS-8_2020-08-27	Y	127917	Chironomidae	25	0.5287
2		RG_LILC3_HESS-8_2020-08-27	Y	135830	Empididae	25	0.0042
1	larvae	RG_LILC3_HESS-8_2020-08-27	Y	150025	Muscidae	25	0.0037
1	larvae	RG_LILC3_HESS-8_2020-08-27	Y	125351	Psychodidae	25	0.0002
1	larvae	RG_LILC3_HESS-8_2020-08-27	Y	118840	Tipulidae	25	0.0013
11	none	RG_LILC3_HESS-9_2020-08-27	N		Nematoda	12.5	0.0012
15	none	RG_LILC3_HESS-9_2020-08-27	Y	54502	Planariidae	12.5	0.0239
8	none	RG_LILC3_HESS-9_2020-08-27	Y	68440	Lumbriculidae	12.5	0.0311
15	Adult	RG_LILC3_HESS-9_2020-08-27	Y	83033	Lebertiidae	12.5	0.0050
13	Adult	RG_LILC3_HESS-9_2020-08-27	Y	895710	Sperchonidae	12.5	0.0058
123	none	RG_LILC3_HESS-9_2020-08-27	Y	84195	Ostracoda	12.5	0.0340
1	Nymph	RG_LILC3_HESS-9_2020-08-27	Y	100755	Baetidae	12.5	0.0002
1	Nymph	RG_LILC3_HESS-9_2020-08-27	Y	101232	Ephemerellidae	12.5	0.0001
3	Nymph	RG_LILC3_HESS-9_2020-08-27	Y	100504	Heptageniidae	12.5	0.0003
1	Nymph	RG_LILC3_HESS-9_2020-08-27	Y	102643	Capniidae	100	0.0043
2	Nymph	RG_LILC3_HESS-9_2020-08-27	Y	102643	Capniidae	12.5	0.0044
2	Nymph	RG_LILC3_HESS-9_2020-08-27	Y	103202	Chloroperlidae	100	0.0060
9	Nymph	RG_LILC3_HESS-9_2020-08-27	Y	103202	Chloroperlidae	12.5	0.0132
1	Nymph	RG_LILC3_HESS-9_2020-08-27	Y	102517	Nemouridae	100	0.0048
5	Nymph	RG_LILC3_HESS-9_2020-08-27	Y	102517	Nemouridae	12.5	0.0216
3	Nymph	RG_LILC3_HESS-9_2020-08-27	Y	102994	Perlodidae	12.5	0.0008
1		RG_LILC3_HESS-9_2020-08-27	Y	115398	Hydropsychidae	100	0.1723
1		RG_LILC3_HESS-9_2020-08-27	Y	115933	Limnephilidae	12.5	0.0001
2		RG_LILC3_HESS-9_2020-08-27	Y	115096	Rhyacophilidae	100	0.2283
3		RG_LILC3_HESS-9_2020-08-27	Y	115096	Rhyacophilidae	12.5	0.3541
544		RG_LILC3_HESS-9_2020-08-27	Y	127917	Chironomidae	12.5	0.4328
2		RG_LILC3_HESS-9_2020-08-27	Y	135830	Empididae	12.5	0.0013
1	larvae	RG_LILC3_HESS-9_2020-08-27	Y	125351	Psychodidae	12.5	0.0001
1	larvae	RG_LILC3_HESS-9_2020-08-27	Y	126640	Simuliidae	12.5	0.0025
24	none	RG_LILC3_HESS-10_2020-08-27	N		Nematoda	12.5	0.0019
28	none	RG_LILC3_HESS-10_2020-08-27	Y	54502	Planariidae	12.5	0.0725
1	none	RG_LILC3_HESS-10_2020-08-27	Y	68510	Enchytraeidae	12.5	0.0002
2	none	RG_LILC3_HESS-10_2020-08-27	Y	68440	Lumbriculidae	12.5	0.0115
3	Adult/indeterminate	RG_LILC3_HESS-10_2020-08-27	Y	82769	Trombidiformes	12.5	0.0001
16	Adult	RG_LILC3_HESS-10_2020-08-27	Y	83033	Lebertiidae	12.5	0.0085
28	Adult	RG_LILC3_HESS-10_2020-08-27	Y	895710	Sperchonidae	12.5	0.0179
399	none	RG_LILC3_HESS-10_2020-08-27	Y	84195	Ostracoda	12.5	0.1102
2	Nymph	RG_LILC3_HESS-10_2020-08-27	Y	100755	Baetidae	12.5	0.0004
1	Nymph	RG_LILC3_HESS-10_2020-08-27	Y	101232	Ephemerellidae	12.5	0.0002
1	Nymph	RG_LILC3_HESS-10_2020-08-27	Y	100504	Heptageniidae	12.5	0.0001
14	Nymph	RG_LILC3_HESS-10_2020-08-27	Y	102517	Nemouridae	12.5	0.0877
1	Nymph	RG_LILC3_HESS-10_2020-08-27	Y	102994	Perlodidae	12.5	0.0010
27		RG_LILC3_HESS-10_2020-08-27	Y	115398	Hydropsychidae	100	3.1248
4		RG_LILC3_HESS-10_2020-08-27	Y	115933	Limnephilidae	12.5	0.0004
9		RG_LILC3_HESS-10_2020-08-27	Y	115096	Rhyacophilidae	100	0.8679
8		RG_LILC3_HESS-10_2020-08-27	Y	115096	Rhyacophilidae	12.5	0.2965
922		RG_LILC3_HESS-10_2020-08-27	Y	127917	Chironomidae	12.5	0.8314
6		RG_LILC3_HESS-10_2020-08-27	Y	135830	Empididae	12.5	0.0094
1	larvae	RG_LILC3_HESS-10_2020-08-27	Y	125351	Psychodidae	12.5	0.0001
3	none	RG_SLINE_HESS_1_2020-08-31	N		Nematoda	50	0.0004
15	none	RG_SLINE_HESS_1_2020-08-31	Y	68440	Lumbriculidae	50	0.0514
1	Adult	RG_SLINE_HESS_1_2020-08-31	Y	83033	Lebertiidae	50	0.0002
47	none	RG_SLINE_HESS_1_2020-08-31	Y	84195	Ostracoda	50	0.0099
11	Nymph	RG_SLINE_HESS_1_2020-08-31	Y	568544	Ameletidae	50	0.0253
14	Nymph	RG_SLINE_HESS_1_2020-08-31	Y	100755	Baetidae	50	0.0474
12	Nymph	RG_SLINE_HESS_1_2020-08-31	Y	101232	Ephemerellidae	50	0.0171
29	Nymph	RG_SLINE_HESS_1_2020-08-31	Y	100504	Heptageniidae	50	0.1007
1	Nymph	RG_SLINE_HESS_1_2020-08-31	Y	102643	Capniidae	50	0.0004
69	Nymph	RG_SLINE_HESS_1_2020-08-31	Y	103202	Chloroperlidae	50	0.0936
15	Nymph	RG_SLINE_HESS_1_2020-08-31	Y	102840	Leuctridae	50	0.0068
5	Nymph	RG_SLINE_HESS_1_2020-08-31	Y	102517	Nemouridae	50	0.0090
5	Nymph	RG_SLINE_HESS_1_2020-08-31	Y	102994	Perlodidae	50	0.0691
21		RG_SLINE_HESS_1_2020-08-31	Y	117120	Glossosomatidae	50	0.0325
8		RG_SLINE_HESS_1_2020-08-31	Y	115933	Limnephilidae	50	0.0478
9		RG_SLINE_HESS_1_2020-08-31	Y	115096	Rhyacophilidae	50	0.0625
2		RG_SLINE_HESS_1_2020-08-31	Y	568757	Uenoidae	50	0.0008
61		RG_SLINE_HESS_1_2020-08-31	Y	127917	Chironomidae	50	0.0189
16		RG_SLINE_HESS_1_2020-08-31	Y	135830	Empididae	50	0.0464
1	larvae	RG_SLINE_HESS_1_2020-08-31	Y	130914	Pelecorhyncidae	50	0.0001
1	larvae	RG_SLINE_HESS_1_2020-08-31	Y	125351	Psychodidae	50	0.0001
2	larvae	RG_SLINE_HESS_1_2020-08-31	Y	118840	Tipulidae	50	0.0012
1	none	RG_SLINE_HESS_2_2020-08-31	N		Nematoda	100	0.0003
23	none	RG_SLINE_HESS_2_2020-08-31	Y	68440	Lumbriculidae	100	0.0665

quantity	life_stage_code	observ_sample_code	ITIS_TAXON_NAME_Y-N	ITIS_TSN	BENCH_TAXON_NAME	PERCENT_SAMPLED	RAW_BIOMASS
13	Nymph	RG_SLINE_HESS_2_2020-08-31	Y	100755	Baetidae	100	0.0504
16	Nymph	RG_SLINE_HESS_2_2020-08-31	Y	101232	Ephemerellidae	100	0.0316
39	Nymph	RG_SLINE_HESS_2_2020-08-31	Y	100504	Heptageniidae	100	0.1027
2	Nymph	RG_SLINE_HESS_2_2020-08-31	Y	102643	Capniidae	100	0.0011
33	Nymph	RG_SLINE_HESS_2_2020-08-31	Y	103202	Chloroperlidae	100	0.0379
11	Nymph	RG_SLINE_HESS_2_2020-08-31	Y	102840	Leuctridae	100	0.0070
3	Nymph	RG_SLINE_HESS_2_2020-08-31	Y	102517	Nemouridae	100	0.0046
1	Nymph	RG_SLINE_HESS_2_2020-08-31	Y	102488	Peltoperlidae	100	0.0003
6	Nymph	RG_SLINE_HESS_2_2020-08-31	Y	102994	Perlodidae	100	0.0808
2	Nymph	RG_SLINE_HESS_2_2020-08-31	Y	102788	Taeniopterygidae	100	0.0001
39		RG_SLINE_HESS_2_2020-08-31	Y	117120	Glossosomatidae	100	0.0640
14		RG_SLINE_HESS_2_2020-08-31	Y	115096	Rhyacophilidae	100	0.1314
3		RG_SLINE_HESS_2_2020-08-31	Y	568757	Uenoidae	100	0.0011
29		RG_SLINE_HESS_2_2020-08-31	Y	127917	Chironomidae	100	0.0113
8		RG_SLINE_HESS_2_2020-08-31	Y	135830	Empididae	100	0.0136
1	larvae	RG_SLINE_HESS_2_2020-08-31	Y	125351	Psychodidae	100	0.0001
6	none	RG_SLINE_HESS_3_2020-08-31	N		Nematoda	100	0.0006
1	none	RG_SLINE_HESS_3_2020-08-31	Y	54502	Planariidae	100	0.0003
5	none	RG_SLINE_HESS_3_2020-08-31	Y	68440	Lumbriculidae	100	0.0072
1	Adult	RG_SLINE_HESS_3_2020-08-31	Y	83033	Lebertiidae	100	0.0004
6	Adult	RG_SLINE_HESS_3_2020-08-31	Y	895710	Sperchonidae	100	0.0025
4	none	RG_SLINE_HESS_3_2020-08-31	Y	84195	Ostracoda	100	0.0016
1		RG_SLINE_HESS_3_2020-08-31	Y	114093	Elmidae	100	0.0001
1	Nymph	RG_SLINE_HESS_3_2020-08-31	Y	568544	Ameletidae	100	0.0065
12	Nymph	RG_SLINE_HESS_3_2020-08-31	Y	100755	Baetidae	100	0.0356
17	Nymph	RG_SLINE_HESS_3_2020-08-31	Y	101232	Ephemerellidae	100	0.0126
42	Nymph	RG_SLINE_HESS_3_2020-08-31	Y	100504	Heptageniidae	100	0.0900
7	Nymph	RG_SLINE_HESS_3_2020-08-31	Y	103202	Chloroperlidae	100	0.0074
6	Nymph	RG_SLINE_HESS_3_2020-08-31	Y	102840	Leuctridae	100	0.0013
36	Nymph	RG_SLINE_HESS_3_2020-08-31	Y	102517	Nemouridae	100	0.0418
3	Nymph	RG_SLINE_HESS_3_2020-08-31	Y	102488	Peltoperlidae	100	0.0148
16	Nymph	RG_SLINE_HESS_3_2020-08-31	Y	102994	Perlodidae	100	0.0109
1	Nymph	RG_SLINE_HESS_3_2020-08-31	Y	102788	Taeniopterygidae	100	0.0001
23		RG_SLINE_HESS_3_2020-08-31	Y	117120	Glossosomatidae	100	0.0191
1		RG_SLINE_HESS_3_2020-08-31	Y	115933	Limnephilidae	100	0.0002
22		RG_SLINE_HESS_3_2020-08-31	Y	115096	Rhyacophilidae	100	0.0988
1		RG_SLINE_HESS_3_2020-08-31	Y	568757	Uenoidae	100	0.0005
37		RG_SLINE_HESS_3_2020-08-31	Y	127917	Chironomidae	100	0.0098
14		RG_SLINE_HESS_3_2020-08-31	Y	135830	Empididae	100	0.0258
2	larvae	RG_SLINE_HESS_3_2020-08-31	Y	130914	Pelecorhyncidae	100	0.0015
2	larvae	RG_SLINE_HESS_3_2020-08-31	Y	118840	Tipulidae	100	0.0002
19	none	RG_SLINE_HESS_4_2020-08-31	Y	68440	Lumbriculidae	100	0.0435
1	Adult	RG_SLINE_HESS_4_2020-08-31	Y	895710	Sperchonidae	100	0.0002
2	Nymph	RG_SLINE_HESS_4_2020-08-31	Y	568544	Ameletidae	100	0.0070
16	Nymph	RG_SLINE_HESS_4_2020-08-31	Y	100755	Baetidae	100	0.0543
38	Nymph	RG_SLINE_HESS_4_2020-08-31	Y	101232	Ephemerellidae	100	0.0846
93	Nymph	RG_SLINE_HESS_4_2020-08-31	Y	100504	Heptageniidae	100	0.2100
2	Nymph	RG_SLINE_HESS_4_2020-08-31	Y	102643	Capniidae	100	0.0008
34	Nymph	RG_SLINE_HESS_4_2020-08-31	Y	103202	Chloroperlidae	100	0.0558
10	Nymph	RG_SLINE_HESS_4_2020-08-31	Y	102840	Leuctridae	100	0.0041
12	Nymph	RG_SLINE_HESS_4_2020-08-31	Y	102517	Nemouridae	100	0.0145
5	Nymph	RG_SLINE_HESS_4_2020-08-31	Y	102488	Peltoperlidae	100	0.0216
9	Nymph	RG_SLINE_HESS_4_2020-08-31	Y	102994	Perlodidae	100	0.0577
6		RG_SLINE_HESS_4_2020-08-31	Y	117120	Glossosomatidae	100	0.0081
16		RG_SLINE_HESS_4_2020-08-31	Y	115096	Rhyacophilidae	100	0.4104
1		RG_SLINE_HESS_4_2020-08-31	Y	568757	Uenoidae	100	0.0004
33		RG_SLINE_HESS_4_2020-08-31	Y	127917	Chironomidae	100	0.0120
12		RG_SLINE_HESS_4_2020-08-31	Y	135830	Empididae	100	0.0196
2	none	RG_SLINE_HESS_5_2020-08-31	N		Nematoda	100	0.0004
2	none	RG_SLINE_HESS_5_2020-08-31	Y	54502	Planariidae	100	0.0043
25	none	RG_SLINE_HESS_5_2020-08-31	Y	68440	Lumbriculidae	100	0.0642
12	none	RG_SLINE_HESS_5_2020-08-31	Y	84195	Ostracoda	100	0.0028
12	Nymph	RG_SLINE_HESS_5_2020-08-31	Y	100755	Baetidae	100	0.0375
21	Nymph	RG_SLINE_HESS_5_2020-08-31	Y	101232	Ephemerellidae	100	0.0921
163	Nymph	RG_SLINE_HESS_5_2020-08-31	Y	100504	Heptageniidae	100	0.3290
63	Nymph	RG_SLINE_HESS_5_2020-08-31	Y	103202	Chloroperlidae	100	0.1089
4	Nymph	RG_SLINE_HESS_5_2020-08-31	Y	102840	Leuctridae	100	0.0027
18	Nymph	RG_SLINE_HESS_5_2020-08-31	Y	102517	Nemouridae	100	0.0245
1	Nymph	RG_SLINE_HESS_5_2020-08-31	Y	102488	Peltoperlidae	100	0.0023
11	Nymph	RG_SLINE_HESS_5_2020-08-31	Y	102994	Perlodidae	100	0.1445
8		RG_SLINE_HESS_5_2020-08-31	Y	117120	Glossosomatidae	100	0.0081
20		RG_SLINE_HESS_5_2020-08-31	Y	115096	Rhyacophilidae	100	0.2504
9		RG_SLINE_HESS_5_2020-08-31	Y	568757	Uenoidae	100	0.0035
63		RG_SLINE_HESS_5_2020-08-31	Y	127917	Chironomidae	100	0.0293
33		RG_SLINE_HESS_5_2020-08-31	Y	135830	Empididae	100	0.1003
1	larvae	RG_SLINE_HESS_5_2020-08-31	Y	130914	Pelecorhyncidae	100	0.0081

BENTHIC TISSUE CHEMISTRY

SRC Quality Control Report 2020-2801

(Finalized April 2, 2020)

SASKATCHEWAN RESEARCH COUNCIL
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Apr 02, 2020

This report was generated for samples included in SRC Group # 2020-2801

Quality Control Report

Katharina Batchelar
Minnow Environmental
101-1025 Hillside Ave
Victoria, BC V8T 2A2

Reference Materials and Standards:

A reference material of known concentration is used whenever possible as either a control sample or control standard and analyzed with each batch of samples. These "QC" results are used to assess the performance of the method and must be within clearly defined limits; otherwise corrective action is required.

QC Analysis	Units	Target Value	Obtained Value
Aluminum	ug/g	1340	1370
Aluminum	ug/g	1340	1270
Aluminum	ug/g	1340	1460
Arsenic	ug/g	6.87	7.12
Arsenic	ug/g	6.87	6.33
Arsenic	ug/g	6.87	6.51
Cadmium	ug/g	0.299	0.314
Cadmium	ug/g	0.299	0.278
Cadmium	ug/g	0.299	0.312
Chromium	ug/g	1.57	1.60
Chromium	ug/g	1.57	1.52
Chromium	ug/g	1.57	1.72
Copper	ug/g	14.4	14.6
Copper	ug/g	14.4	13.4
Copper	ug/g	14.4	14.4
Iron	ug/g	312	340
Iron	ug/g	312	291
Iron	ug/g	312	311
Iron	ug/g	312	294
Lead	ug/g	0.404	0.418
Lead	ug/g	0.404	0.384
Lead	ug/g	0.404	0.418
Manganese	ug/g	2.70	2.78
Manganese	ug/g	2.70	3.20
Manganese	ug/g	2.70	2.89
Mercury	ug/g	0.364	0.329
Mercury	ug/g	0.364	0.334
Mercury	ug/g	0.364	0.391
Nickel	ug/g	1.20	1.23
Nickel	ug/g	1.20	1.39
Nickel	ug/g	1.20	1.30
Selenium	ug/g	3.74	3.71

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Apr 02, 2020

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QC Analysis	Units	Target Value	Obtained Value
Selenium	ug/g	3.74	3.31
Selenium	ug/g	3.74	3.44
Silver	ug/g	0.0245	0.0262
Silver	ug/g	0.0245	0.0246
Silver	ug/g	0.0245	0.0260
Zinc	ug/g	47.8	46.2
Zinc	ug/g	47.8	40.1
Zinc	ug/g	47.8	46.1

Please note, duplicates could not be analyzed for ICP due to insufficient sample available.

All quality control results were within the specified limits and considered acceptable.

Roxane Ortmann - Quality Assurance Supervisor

BENTHIC TISSUE CHEMISTRY

SRC Laboratory Report 2020-2801

(Finalized April 2, 2020)

SASKATCHEWAN RESEARCH COUNCIL

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental
101-1025 Hillside Ave
Victoria, BC V8T 2A2
Attn: Katharina Batchelar

Date Samples Received: Mar-11-2020 Client P.O.: VPO00616225 Ref# 20-15

All results have been reviewed and approved by a Qualified Person in accordance with the Saskatchewan Environmental Code, Corrective Action Plan Chapter, for the purposes of certifying a laboratory analysis

Results from Lab Section 2 authorized by Keith Gipman, Supervisor
Results from Lab Section 6 authorized by Marion McConnell, Supervisor

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* Test methods and data are validated by the laboratory's Quality Assurance Program.

* Routine methods follow recognized procedures from sources such as
    * Standard Methods for the Examination of Water and Wastewater APHA AWWA WEF
    * Environment Canada
    * US EPA
    * CANMET

* The results reported relate only to the test samples as provided by the client.

* Samples will be kept for 30 days after the final report is sent. Please contact the lab if you have any special requirements.

* Additional information is available upon request.

* Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

This is a final report.

SASKATCHEWAN RESEARCH COUNCIL

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

101-1025 Hillside Ave
Victoria, BC V8T 2A2
Attn: Katharina Batchelar

Sample #: **2020012704**
Date Sampled: **Feb 26, 2020**
Sample Matrix: **TISSUE**
Description: **02/26/2020 15:00 RG_LCUT_INV-1_20200226**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	890	90	5	0.0555
Antimony	ug/g	0.07	0.04	0.02	0.0555
Arsenic	ug/g	0.53	0.1	0.05	0.0555
Barium	ug/g	19	3	0.5	0.0555
Beryllium	ug/g	0.03	0.02	0.02	0.0555
Boron	ug/g	<5		5	0.0555
Cadmium	ug/g	2.5	0.2	0.02	0.0555
Chromium	ug/g	1.3	0.8	0.5	0.0555
Cobalt	ug/g	1.0	0.5	0.5	0.0555
Copper	ug/g	31	5	0.5	0.0555
Iron	ug/g	370	60	5	0.0555
Lead	ug/g	0.38	0.1	0.05	0.0555
Manganese	ug/g	17	2	0.5	0.0555
Mercury	ug/g	0.05	0.02	0.01	0.0555
Molybdenum	ug/g	0.32	0.1	0.05	0.0555
Nickel	ug/g	7.3	2	0.5	0.0555
Selenium	ug/g	7.1	0.7	0.05	0.0555
Silver	ug/g	0.05	0.03	0.02	0.0555
Strontium	ug/g	9.5	1	0.1	0.0555
Thallium	ug/g	0.05	0.02	0.01	0.0555
Tin	ug/g	<0.2		0.2	0.0555
Titanium	ug/g	11	2	0.5	0.0555
Uranium	ug/g	0.13	0.05	0.02	0.0555
Vanadium	ug/g	2.7	0.7	0.2	0.0555
Zinc	ug/g	240	40	5	0.0555
Lab Section 6					
Moisture	%	83.25	8	0.02	0.0555

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012705**
Date Sampled: **Feb 26, 2020**
Sample Matrix: **TISSUE**
Description: **02/26/2020 15:06 RG_LCUT_INV-2_20200226**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	1500	200	5	0.064
Antimony	ug/g	0.08	0.04	0.02	0.064
Arsenic	ug/g	0.46	0.05	0.05	0.064
Barium	ug/g	25	4	0.5	0.064
Beryllium	ug/g	0.06	0.02	0.02	0.064
Boron	ug/g	<5		5	0.064
Cadmium	ug/g	4.3	0.4	0.02	0.064
Chromium	ug/g	2.2	1	0.5	0.064
Cobalt	ug/g	1.1	0.5	0.5	0.064
Copper	ug/g	26	4	0.5	0.064
Iron	ug/g	660	70	5	0.064
Lead	ug/g	0.65	0.2	0.05	0.064
Manganese	ug/g	21	3	0.5	0.064
Mercury	ug/g	0.05	0.02	0.01	0.064
Molybdenum	ug/g	0.37	0.1	0.05	0.064
Nickel	ug/g	8.1	2	0.5	0.064
Selenium	ug/g	8.5	0.8	0.05	0.064
Silver	ug/g	0.05	0.03	0.02	0.064
Strontium	ug/g	18	2	0.1	0.064
Thallium	ug/g	0.07	0.02	0.01	0.064
Tin	ug/g	<0.2		0.2	0.064
Titanium	ug/g	13	2	0.5	0.064
Uranium	ug/g	0.26	0.06	0.02	0.064
Vanadium	ug/g	4.4	0.7	0.2	0.064
Zinc	ug/g	290	40	5	0.064
Lab Section 6					
Moisture	%	82.81	8	0.02	0.064

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012706**
Date Sampled: **Feb 26, 2020**
Sample Matrix: **TISSUE**
Description: **02/26/2020 15:12 RG_LCUT_INV-3_20200226**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	910	90	5	0.0418
Antimony	ug/g	0.06	0.03	0.02	0.0418
Arsenic	ug/g	0.55	0.1	0.05	0.0418
Barium	ug/g	18	3	0.5	0.0418
Beryllium	ug/g	0.04	0.02	0.02	0.0418
Boron	ug/g	<5		5	0.0418
Cadmium	ug/g	8.6	0.9	0.02	0.0418
Chromium	ug/g	1.3	0.8	0.5	0.0418
Cobalt	ug/g	1.4	0.5	0.5	0.0418
Copper	ug/g	31	5	0.5	0.0418
Iron	ug/g	390	60	5	0.0418
Lead	ug/g	0.39	0.1	0.05	0.0418
Manganese	ug/g	14	2	0.5	0.0418
Mercury	ug/g	0.04	0.02	0.01	0.0418
Molybdenum	ug/g	0.34	0.1	0.05	0.0418
Nickel	ug/g	9.5	2	0.5	0.0418
Selenium	ug/g	8.3	0.8	0.05	0.0418
Silver	ug/g	0.05	0.03	0.02	0.0418
Strontium	ug/g	10	1	0.1	0.0418
Thallium	ug/g	0.07	0.02	0.01	0.0418
Tin	ug/g	<0.2		0.2	0.0418
Titanium	ug/g	9.1	2	0.5	0.0418
Uranium	ug/g	0.16	0.05	0.02	0.0418
Vanadium	ug/g	2.8	0.7	0.2	0.0418
Zinc	ug/g	450	70	5	0.0418
Lab Section 6					
Moisture	%	85.52	8	0.02	0.0418

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012707**
Date Sampled: **Feb 26, 2020**
Sample Matrix: **TISSUE**
Description: **02/26/2020 15:13 RG_LCUT_INV-4_20200226**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	780	80	5	0.062
Antimony	ug/g	0.05	0.03	0.02	0.062
Arsenic	ug/g	0.49	0.05	0.05	0.062
Barium	ug/g	15	2	0.5	0.062
Beryllium	ug/g	0.03	0.02	0.02	0.062
Boron	ug/g	<5		5	0.062
Cadmium	ug/g	3.1	0.3	0.02	0.062
Chromium	ug/g	1.4	0.8	0.5	0.062
Cobalt	ug/g	1.1	0.5	0.5	0.062
Copper	ug/g	33	5	0.5	0.062
Iron	ug/g	320	50	5	0.062
Lead	ug/g	0.30	0.1	0.05	0.062
Manganese	ug/g	14	2	0.5	0.062
Mercury	ug/g	0.06	0.02	0.01	0.062
Molybdenum	ug/g	0.32	0.1	0.05	0.062
Nickel	ug/g	7.2	2	0.5	0.062
Selenium	ug/g	7.8	0.8	0.05	0.062
Silver	ug/g	0.05	0.03	0.02	0.062
Strontium	ug/g	8.3	1	0.1	0.062
Thallium	ug/g	0.04	0.02	0.01	0.062
Tin	ug/g	<0.2		0.2	0.062
Titanium	ug/g	10	2	0.5	0.062
Uranium	ug/g	0.12	0.05	0.02	0.062
Vanadium	ug/g	2.3	0.6	0.2	0.062
Zinc	ug/g	220	30	5	0.062
Lab Section 6					
Moisture	%	83.79	8	0.02	0.062

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012708**
Date Sampled: **Feb 26, 2020**
Sample Matrix: **TISSUE**
Description: **02/26/2020 15:21 RG_LCUT_INV-5_20200226**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	1300	100	5	0.0481
Antimony	ug/g	0.08	0.04	0.02	0.0481
Arsenic	ug/g	0.60	0.2	0.05	0.0481
Barium	ug/g	25	4	0.5	0.0481
Beryllium	ug/g	0.05	0.02	0.02	0.0481
Boron	ug/g	<5		5	0.0481
Cadmium	ug/g	3.1	0.3	0.02	0.0481
Chromium	ug/g	1.8	0.9	0.5	0.0481
Cobalt	ug/g	0.9	0.5	0.5	0.0481
Copper	ug/g	33	5	0.5	0.0481
Iron	ug/g	500	50	5	0.0481
Lead	ug/g	0.50	0.1	0.05	0.0481
Manganese	ug/g	19	3	0.5	0.0481
Mercury	ug/g	0.04	0.02	0.01	0.0481
Molybdenum	ug/g	0.37	0.1	0.05	0.0481
Nickel	ug/g	8.2	2	0.5	0.0481
Selenium	ug/g	6.9	0.7	0.05	0.0481
Silver	ug/g	0.06	0.03	0.02	0.0481
Strontium	ug/g	14	1	0.1	0.0481
Thallium	ug/g	0.05	0.02	0.01	0.0481
Tin	ug/g	<0.2		0.2	0.0481
Titanium	ug/g	17	2	0.5	0.0481
Uranium	ug/g	0.17	0.06	0.02	0.0481
Vanadium	ug/g	3.8	1	0.2	0.0481
Zinc	ug/g	230	30	5	0.0481
Lab Section 6					
Moisture	%	86.53	9	0.02	0.0481

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012709**
Date Sampled: **Feb 26, 2020**
Sample Matrix: **TISSUE**
Description: **02/26/2020 15:27 RG_LCUT_INV-6_20200226**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	1200	100	5	0.0629
Antimony	ug/g	0.08	0.04	0.02	0.0629
Arsenic	ug/g	0.80	0.2	0.05	0.0629
Barium	ug/g	23	3	0.5	0.0629
Beryllium	ug/g	0.06	0.02	0.02	0.0629
Boron	ug/g	<5		5	0.0629
Cadmium	ug/g	2.8	0.3	0.02	0.0629
Chromium	ug/g	2.0	1	0.5	0.0629
Cobalt	ug/g	1.2	0.5	0.5	0.0629
Copper	ug/g	34	5	0.5	0.0629
Iron	ug/g	500	50	5	0.0629
Lead	ug/g	0.51	0.1	0.05	0.0629
Manganese	ug/g	19	3	0.5	0.0629
Mercury	ug/g	0.05	0.02	0.01	0.0629
Molybdenum	ug/g	0.36	0.1	0.05	0.0629
Nickel	ug/g	10	2	0.5	0.0629
Selenium	ug/g	6.8	0.7	0.05	0.0629
Silver	ug/g	0.06	0.03	0.02	0.0629
Strontium	ug/g	13	1	0.1	0.0629
Thallium	ug/g	0.06	0.02	0.01	0.0629
Tin	ug/g	<0.2		0.2	0.0629
Titanium	ug/g	14	2	0.5	0.0629
Uranium	ug/g	0.20	0.05	0.02	0.0629
Vanadium	ug/g	3.6	0.9	0.2	0.0629
Zinc	ug/g	260	40	5	0.0629
Lab Section 6					
Moisture	%	84.87	8	0.02	0.0629

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012710**
Date Sampled: **Feb 26, 2020**
Sample Matrix: **TISSUE**
Description: **02/26/2020 15:33 RG_LCUT_INV-7_20200226**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	790	80	5	0.0703
Antimony	ug/g	0.06	0.03	0.02	0.0703
Arsenic	ug/g	0.56	0.1	0.05	0.0703
Barium	ug/g	16	2	0.5	0.0703
Beryllium	ug/g	0.03	0.02	0.02	0.0703
Boron	ug/g	<5		5	0.0703
Cadmium	ug/g	5.4	0.5	0.02	0.0703
Chromium	ug/g	1.1	0.7	0.5	0.0703
Cobalt	ug/g	1.0	0.5	0.5	0.0703
Copper	ug/g	34	5	0.5	0.0703
Iron	ug/g	330	50	5	0.0703
Lead	ug/g	0.33	0.1	0.05	0.0703
Manganese	ug/g	17	2	0.5	0.0703
Mercury	ug/g	0.05	0.02	0.01	0.0703
Molybdenum	ug/g	0.34	0.1	0.05	0.0703
Nickel	ug/g	9.0	2	0.5	0.0703
Selenium	ug/g	7.5	0.8	0.05	0.0703
Silver	ug/g	0.06	0.03	0.02	0.0703
Strontium	ug/g	9.4	1	0.1	0.0703
Thallium	ug/g	0.05	0.02	0.01	0.0703
Tin	ug/g	<0.2		0.2	0.0703
Titanium	ug/g	9.9	2	0.5	0.0703
Uranium	ug/g	0.15	0.05	0.02	0.0703
Vanadium	ug/g	2.4	0.6	0.2	0.0703
Zinc	ug/g	300	40	5	0.0703
Lab Section 6					
Moisture	%	85.18	8	0.02	0.0703

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

SASKATCHEWAN RESEARCH COUNCIL

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012711**
Date Sampled: **Feb 26, 2020**
Sample Matrix: **TISSUE**
Description: **02/26/2020 15:39 RG_LCUT_INV-8_20200226**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	930	90	5	0.0624
Antimony	ug/g	0.06	0.03	0.02	0.0624
Arsenic	ug/g	0.54	0.1	0.05	0.0624
Barium	ug/g	19	3	0.5	0.0624
Beryllium	ug/g	0.04	0.02	0.02	0.0624
Boron	ug/g	<5		5	0.0624
Cadmium	ug/g	2.2	0.2	0.02	0.0624
Chromium	ug/g	1.3	0.8	0.5	0.0624
Cobalt	ug/g	0.7	0.5	0.5	0.0624
Copper	ug/g	35	5	0.5	0.0624
Iron	ug/g	370	60	5	0.0624
Lead	ug/g	0.40	0.1	0.05	0.0624
Manganese	ug/g	16	2	0.5	0.0624
Mercury	ug/g	0.04	0.02	0.01	0.0624
Molybdenum	ug/g	0.33	0.1	0.05	0.0624
Nickel	ug/g	7.2	2	0.5	0.0624
Selenium	ug/g	6.5	0.6	0.05	0.0624
Silver	ug/g	0.05	0.03	0.02	0.0624
Strontium	ug/g	9.7	1	0.1	0.0624
Thallium	ug/g	0.04	0.02	0.01	0.0624
Tin	ug/g	<0.2		0.2	0.0624
Titanium	ug/g	9.4	2	0.5	0.0624
Uranium	ug/g	0.14	0.05	0.02	0.0624
Vanadium	ug/g	2.8	0.7	0.2	0.0624
Zinc	ug/g	200	30	5	0.0624
Lab Section 6					
Moisture	%	84.27	8	0.02	0.0624

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012712**
Date Sampled: **Feb 26, 2020**
Sample Matrix: **TISSUE**
Description: **02/26/2020 15:37 RG_LCUT_INV-9_20200226**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	1100	100	5	0.0661
Antimony	ug/g	0.08	0.04	0.02	0.0661
Arsenic	ug/g	0.62	0.2	0.05	0.0661
Barium	ug/g	23	3	0.5	0.0661
Beryllium	ug/g	0.04	0.02	0.02	0.0661
Boron	ug/g	<5		5	0.0661
Cadmium	ug/g	2.6	0.3	0.02	0.0661
Chromium	ug/g	1.5	0.8	0.5	0.0661
Cobalt	ug/g	1.0	0.5	0.5	0.0661
Copper	ug/g	32	5	0.5	0.0661
Iron	ug/g	430	60	5	0.0661
Lead	ug/g	0.45	0.1	0.05	0.0661
Manganese	ug/g	18	3	0.5	0.0661
Mercury	ug/g	0.04	0.02	0.01	0.0661
Molybdenum	ug/g	0.33	0.1	0.05	0.0661
Nickel	ug/g	9.1	2	0.5	0.0661
Selenium	ug/g	6.8	0.7	0.05	0.0661
Silver	ug/g	0.06	0.03	0.02	0.0661
Strontium	ug/g	9.1	1	0.1	0.0661
Thallium	ug/g	0.05	0.02	0.01	0.0661
Tin	ug/g	<0.2		0.2	0.0661
Titanium	ug/g	12	2	0.5	0.0661
Uranium	ug/g	0.16	0.05	0.02	0.0661
Vanadium	ug/g	3.4	0.8	0.2	0.0661
Zinc	ug/g	220	30	5	0.0661
Lab Section 6					
Moisture	%	86.60	9	0.02	0.0661

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012713**
Date Sampled: **Feb 26, 2020**
Sample Matrix: **TISSUE**
Description: **02/26/2020 15:46 RG_LCUT_INV-10_20200226**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	860	90	5	0.1062
Antimony	ug/g	0.06	0.03	0.02	0.1062
Arsenic	ug/g	0.45	0.07	0.02	0.1062
Barium	ug/g	16	2	0.05	0.1062
Beryllium	ug/g	0.03	0.02	0.02	0.1062
Boron	ug/g	2	2	2	0.1062
Cadmium	ug/g	3.1	0.3	0.02	0.1062
Chromium	ug/g	1.1	0.3	0.1	0.1062
Cobalt	ug/g	0.83	0.1	0.02	0.1062
Copper	ug/g	38	4	0.1	0.1062
Iron	ug/g	340	50	5	0.1062
Lead	ug/g	0.35	0.09	0.02	0.1062
Manganese	ug/g	14	2	0.2	0.1062
Mercury	ug/g	0.05	0.02	0.01	0.1062
Molybdenum	ug/g	0.33	0.1	0.05	0.1062
Nickel	ug/g	8.0	1	0.1	0.1062
Selenium	ug/g	7.8	0.8	0.02	0.1062
Silver	ug/g	0.05	0.03	0.02	0.1062
Strontium	ug/g	8.6	1	0.1	0.1062
Thallium	ug/g	0.04	0.02	0.01	0.1062
Tin	ug/g	<0.1		0.1	0.1062
Titanium	ug/g	10	2	0.5	0.1062
Uranium	ug/g	0.16	0.04	0.01	0.1062
Vanadium	ug/g	2.6	0.6	0.2	0.1062
Zinc	ug/g	220	20	1	0.1062
Lab Section 6					
Moisture	%	87.84	9	0.02	0.1062

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012714**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 14:35 RG_LI8_INV-1_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	730	70	5	0.0834
Antimony	ug/g	0.06	0.03	0.02	0.0834
Arsenic	ug/g	0.57	0.1	0.05	0.0834
Barium	ug/g	16	2	0.5	0.0834
Beryllium	ug/g	0.03	0.02	0.02	0.0834
Boron	ug/g	<5		5	0.0834
Cadmium	ug/g	2.4	0.2	0.02	0.0834
Chromium	ug/g	1.1	0.7	0.5	0.0834
Cobalt	ug/g	<0.5		0.5	0.0834
Copper	ug/g	16	2	0.5	0.0834
Iron	ug/g	820	80	5	0.0834
Lead	ug/g	0.29	0.1	0.05	0.0834
Manganese	ug/g	24	4	0.5	0.0834
Mercury	ug/g	0.01	0.01	0.01	0.0834
Molybdenum	ug/g	0.35	0.1	0.05	0.0834
Nickel	ug/g	7.8	2	0.5	0.0834
Selenium	ug/g	5.5	0.6	0.05	0.0834
Silver	ug/g	0.04	0.03	0.02	0.0834
Strontium	ug/g	12	1	0.1	0.0834
Thallium	ug/g	0.03	0.02	0.01	0.0834
Tin	ug/g	<0.2		0.2	0.0834
Titanium	ug/g	7.2	2	0.5	0.0834
Uranium	ug/g	0.11	0.04	0.02	0.0834
Vanadium	ug/g	2.2	0.6	0.2	0.0834
Zinc	ug/g	240	40	5	0.0834
Lab Section 6					
Moisture	%	81.39	8	0.02	0.0834

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012715**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 14:38 RG_LI8_INV-2_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	270	40	5	0.0539
Antimony	ug/g	0.03	0.02	0.02	0.0539
Arsenic	ug/g	0.45	0.05	0.05	0.0539
Barium	ug/g	6.4	2	0.5	0.0539
Beryllium	ug/g	<0.02		0.02	0.0539
Boron	ug/g	<5		5	0.0539
Cadmium	ug/g	2.0	0.2	0.02	0.0539
Chromium	ug/g	2.2	1	0.5	0.0539
Cobalt	ug/g	<0.5		0.5	0.0539
Copper	ug/g	19	3	0.5	0.0539
Iron	ug/g	190	30	5	0.0539
Lead	ug/g	0.12	0.08	0.05	0.0539
Manganese	ug/g	17	2	0.5	0.0539
Mercury	ug/g	0.01	0.01	0.01	0.0539
Molybdenum	ug/g	0.28	0.1	0.05	0.0539
Nickel	ug/g	7.6	2	0.5	0.0539
Selenium	ug/g	5.5	0.6	0.05	0.0539
Silver	ug/g	0.04	0.03	0.02	0.0539
Strontium	ug/g	5.5	0.8	0.1	0.0539
Thallium	ug/g	0.02	0.01	0.01	0.0539
Tin	ug/g	<0.2		0.2	0.0539
Titanium	ug/g	5.0	1	0.5	0.0539
Uranium	ug/g	0.09	0.04	0.02	0.0539
Vanadium	ug/g	0.9	0.4	0.2	0.0539
Zinc	ug/g	270	40	5	0.0539
Lab Section 6					
Moisture	%	82.25	8	0.02	0.0539

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012716**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 14:47 RG_LI8_INV-3_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	370	60	5	0.0828
Antimony	ug/g	0.03	0.02	0.02	0.0828
Arsenic	ug/g	0.42	0.05	0.05	0.0828
Barium	ug/g	8.8	2	0.5	0.0828
Beryllium	ug/g	<0.02		0.02	0.0828
Boron	ug/g	<5		5	0.0828
Cadmium	ug/g	3.3	0.3	0.02	0.0828
Chromium	ug/g	0.6	0.6	0.5	0.0828
Cobalt	ug/g	0.6	0.5	0.5	0.0828
Copper	ug/g	13	2	0.5	0.0828
Iron	ug/g	210	30	5	0.0828
Lead	ug/g	0.17	0.09	0.05	0.0828
Manganese	ug/g	58	6	0.5	0.0828
Mercury	ug/g	0.02	0.01	0.01	0.0828
Molybdenum	ug/g	0.28	0.1	0.05	0.0828
Nickel	ug/g	6.2	2	0.5	0.0828
Selenium	ug/g	5.4	0.5	0.05	0.0828
Silver	ug/g	0.03	0.02	0.02	0.0828
Strontium	ug/g	6.1	0.9	0.1	0.0828
Thallium	ug/g	0.02	0.01	0.01	0.0828
Tin	ug/g	<0.2		0.2	0.0828
Titanium	ug/g	5.5	1	0.5	0.0828
Uranium	ug/g	0.06	0.03	0.02	0.0828
Vanadium	ug/g	1.1	0.4	0.2	0.0828
Zinc	ug/g	340	50	5	0.0828
Lab Section 6					
Moisture	%	76.40	8	0.02	0.0828

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012717**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 14:51 RG_LI8_INV-4_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	800	80	5	0.0874
Antimony	ug/g	0.06	0.03	0.02	0.0874
Arsenic	ug/g	0.65	0.2	0.05	0.0874
Barium	ug/g	25	4	0.5	0.0874
Beryllium	ug/g	0.03	0.02	0.02	0.0874
Boron	ug/g	<5		5	0.0874
Cadmium	ug/g	2.6	0.3	0.02	0.0874
Chromium	ug/g	1.3	0.8	0.5	0.0874
Cobalt	ug/g	0.5	0.5	0.5	0.0874
Copper	ug/g	15	2	0.5	0.0874
Iron	ug/g	490	70	5	0.0874
Lead	ug/g	0.34	0.1	0.05	0.0874
Manganese	ug/g	29	4	0.5	0.0874
Mercury	ug/g	0.01	0.01	0.01	0.0874
Molybdenum	ug/g	0.28	0.1	0.05	0.0874
Nickel	ug/g	7.9	2	0.5	0.0874
Selenium	ug/g	4.6	0.7	0.05	0.0874
Silver	ug/g	0.04	0.03	0.02	0.0874
Strontium	ug/g	18	2	0.1	0.0874
Thallium	ug/g	0.03	0.02	0.01	0.0874
Tin	ug/g	<0.2		0.2	0.0874
Titanium	ug/g	9.4	2	0.5	0.0874
Uranium	ug/g	0.14	0.05	0.02	0.0874
Vanadium	ug/g	2.5	0.6	0.2	0.0874
Zinc	ug/g	230	30	5	0.0874
Lab Section 6					
Moisture	%	74.53	7	0.02	0.0874

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012718**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 14:58 RG_LI8_INV-5_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	600	60	5	0.1215
Antimony	ug/g	0.07	0.04	0.02	0.1215
Arsenic	ug/g	0.49	0.07	0.02	0.1215
Barium	ug/g	16	2	0.05	0.1215
Beryllium	ug/g	0.03	0.02	0.02	0.1215
Boron	ug/g	2	2	2	0.1215
Cadmium	ug/g	2.1	0.2	0.02	0.1215
Chromium	ug/g	1.0	0.2	0.1	0.1215
Cobalt	ug/g	0.37	0.09	0.02	0.1215
Copper	ug/g	18	2	0.1	0.1215
Iron	ug/g	340	50	5	0.1215
Lead	ug/g	0.31	0.08	0.02	0.1215
Manganese	ug/g	22	2	0.2	0.1215
Mercury	ug/g	0.12	0.03	0.01	0.1215
Molybdenum	ug/g	0.28	0.1	0.05	0.1215
Nickel	ug/g	5.3	0.8	0.1	0.1215
Selenium	ug/g	4.7	0.5	0.02	0.1215
Silver	ug/g	0.04	0.03	0.02	0.1215
Strontium	ug/g	11	1	0.1	0.1215
Thallium	ug/g	0.02	0.01	0.01	0.1215
Tin	ug/g	<0.1		0.1	0.1215
Titanium	ug/g	7.8	2	0.5	0.1215
Uranium	ug/g	0.11	0.03	0.01	0.1215
Vanadium	ug/g	2.1	0.5	0.2	0.1215
Zinc	ug/g	270	30	1	0.1215
Lab Section 6					
Moisture	%	74.10	7	0.02	0.1215

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

SASKATCHEWAN RESEARCH COUNCIL

Environmental Analytical Laboratories
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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012719**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 15:05 RG_LI8_INV-6_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	670	70	5	0.1085
Antimony	ug/g	0.06	0.03	0.02	0.1085
Arsenic	ug/g	0.52	0.08	0.02	0.1085
Barium	ug/g	20	2	0.05	0.1085
Beryllium	ug/g	0.03	0.02	0.02	0.1085
Boron	ug/g	2	2	2	0.1085
Cadmium	ug/g	3.0	0.3	0.02	0.1085
Chromium	ug/g	1.2	0.3	0.1	0.1085
Cobalt	ug/g	0.59	0.09	0.02	0.1085
Copper	ug/g	17	2	0.1	0.1085
Iron	ug/g	410	60	5	0.1085
Lead	ug/g	0.32	0.08	0.02	0.1085
Manganese	ug/g	28	3	0.2	0.1085
Mercury	ug/g	0.02	0.01	0.01	0.1085
Molybdenum	ug/g	0.31	0.1	0.05	0.1085
Nickel	ug/g	8.4	1	0.1	0.1085
Selenium	ug/g	5.2	0.5	0.02	0.1085
Silver	ug/g	0.04	0.03	0.02	0.1085
Strontium	ug/g	13	1	0.1	0.1085
Thallium	ug/g	0.03	0.02	0.01	0.1085
Tin	ug/g	<0.1		0.1	0.1085
Titanium	ug/g	7.0	2	0.5	0.1085
Uranium	ug/g	0.20	0.03	0.01	0.1085
Vanadium	ug/g	2.3	0.6	0.2	0.1085
Zinc	ug/g	300	30	1	0.1085
Lab Section 6					
Moisture	%	81.56	8	0.02	0.1085

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012720**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 15:13 RG_LI8_INV-7_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	740	70	5	0.1576
Antimony	ug/g	0.05	0.03	0.02	0.1576
Arsenic	ug/g	0.55	0.08	0.02	0.1576
Barium	ug/g	20	2	0.05	0.1576
Beryllium	ug/g	0.03	0.02	0.02	0.1576
Boron	ug/g	<2		2	0.1576
Cadmium	ug/g	3.1	0.3	0.02	0.1576
Chromium	ug/g	1.4	0.4	0.1	0.1576
Cobalt	ug/g	0.55	0.08	0.02	0.1576
Copper	ug/g	15	2	0.1	0.1576
Iron	ug/g	440	70	5	0.1576
Lead	ug/g	0.35	0.09	0.02	0.1576
Manganese	ug/g	51	5	0.2	0.1576
Mercury	ug/g	0.02	0.01	0.01	0.1576
Molybdenum	ug/g	0.28	0.1	0.05	0.1576
Nickel	ug/g	7.4	1	0.1	0.1576
Selenium	ug/g	4.5	0.4	0.02	0.1576
Silver	ug/g	0.04	0.03	0.02	0.1576
Strontium	ug/g	14	1	0.1	0.1576
Thallium	ug/g	0.03	0.02	0.01	0.1576
Tin	ug/g	<0.1		0.1	0.1576
Titanium	ug/g	6.8	2	0.5	0.1576
Uranium	ug/g	0.16	0.04	0.01	0.1576
Vanadium	ug/g	2.7	0.7	0.2	0.1576
Zinc	ug/g	260	30	1	0.1576
Lab Section 6					
Moisture	%	76.23	8	0.02	0.1576

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012721**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 15:18 RG_LI8_INV-8_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	400	60	5	0.1394
Antimony	ug/g	0.04	0.03	0.02	0.1394
Arsenic	ug/g	0.52	0.08	0.02	0.1394
Barium	ug/g	14	1	0.05	0.1394
Beryllium	ug/g	0.02	0.02	0.02	0.1394
Boron	ug/g	<2		2	0.1394
Cadmium	ug/g	6.0	0.6	0.02	0.1394
Chromium	ug/g	0.7	0.2	0.1	0.1394
Cobalt	ug/g	0.47	0.07	0.02	0.1394
Copper	ug/g	16	2	0.1	0.1394
Iron	ug/g	240	40	5	0.1394
Lead	ug/g	0.23	0.06	0.02	0.1394
Manganese	ug/g	32	3	0.2	0.1394
Mercury	ug/g	0.02	0.01	0.01	0.1394
Molybdenum	ug/g	0.28	0.1	0.05	0.1394
Nickel	ug/g	5.8	0.9	0.1	0.1394
Selenium	ug/g	4.8	0.5	0.02	0.1394
Silver	ug/g	0.04	0.03	0.02	0.1394
Strontium	ug/g	10	1	0.1	0.1394
Thallium	ug/g	0.03	0.02	0.01	0.1394
Tin	ug/g	<0.1		0.1	0.1394
Titanium	ug/g	6.9	2	0.5	0.1394
Uranium	ug/g	0.08	0.03	0.01	0.1394
Vanadium	ug/g	1.9	0.6	0.2	0.1394
Zinc	ug/g	270	30	1	0.1394
Lab Section 6					
Moisture	%	76.06	8	0.02	0.1394

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012722**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 15:21 RG_LI8_INV-9_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	580	60	5	0.1042
Antimony	ug/g	0.04	0.03	0.02	0.1042
Arsenic	ug/g	0.46	0.07	0.02	0.1042
Barium	ug/g	14	1	0.05	0.1042
Beryllium	ug/g	<0.02		0.02	0.1042
Boron	ug/g	<2		2	0.1042
Cadmium	ug/g	3.3	0.3	0.02	0.1042
Chromium	ug/g	1.0	0.2	0.1	0.1042
Cobalt	ug/g	0.63	0.09	0.02	0.1042
Copper	ug/g	14	1	0.1	0.1042
Iron	ug/g	330	50	5	0.1042
Lead	ug/g	0.28	0.07	0.02	0.1042
Manganese	ug/g	71	7	0.2	0.1042
Mercury	ug/g	0.02	0.01	0.01	0.1042
Molybdenum	ug/g	0.29	0.1	0.05	0.1042
Nickel	ug/g	7.2	1	0.1	0.1042
Selenium	ug/g	5.8	0.6	0.02	0.1042
Silver	ug/g	0.03	0.02	0.02	0.1042
Strontium	ug/g	4.2	0.6	0.1	0.1042
Thallium	ug/g	0.03	0.02	0.01	0.1042
Tin	ug/g	<0.1		0.1	0.1042
Titanium	ug/g	6.4	2	0.5	0.1042
Uranium	ug/g	0.08	0.03	0.01	0.1042
Vanadium	ug/g	2.0	0.5	0.2	0.1042
Zinc	ug/g	320	30	1	0.1042
Lab Section 6					
Moisture	%	80.51	8	0.02	0.1042

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012723**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 15:24 RG_LI8_INV-10_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	690	70	5	0.1236
Antimony	ug/g	0.04	0.03	0.02	0.1236
Arsenic	ug/g	0.49	0.07	0.02	0.1236
Barium	ug/g	17	2	0.05	0.1236
Beryllium	ug/g	0.03	0.02	0.02	0.1236
Boron	ug/g	<2		2	0.1236
Cadmium	ug/g	2.6	0.3	0.02	0.1236
Chromium	ug/g	1.1	0.3	0.1	0.1236
Cobalt	ug/g	0.44	0.07	0.02	0.1236
Copper	ug/g	15	2	0.1	0.1236
Iron	ug/g	420	60	5	0.1236
Lead	ug/g	0.28	0.07	0.02	0.1236
Manganese	ug/g	26	3	0.2	0.1236
Mercury	ug/g	0.01	0.01	0.01	0.1236
Molybdenum	ug/g	0.30	0.1	0.05	0.1236
Nickel	ug/g	5.7	0.8	0.1	0.1236
Selenium	ug/g	4.5	0.4	0.02	0.1236
Silver	ug/g	0.04	0.03	0.02	0.1236
Strontium	ug/g	12	1	0.1	0.1236
Thallium	ug/g	0.03	0.02	0.01	0.1236
Tin	ug/g	<0.1		0.1	0.1236
Titanium	ug/g	7.2	2	0.5	0.1236
Uranium	ug/g	0.10	0.02	0.01	0.1236
Vanadium	ug/g	2.2	0.6	0.2	0.1236
Zinc	ug/g	260	30	1	0.1236
Lab Section 6					
Moisture	%	71.94	7	0.02	0.1236

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012724**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 12:21 RG_LISP24_INV-1_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	780	80	5	0.0603
Antimony	ug/g	0.13	0.05	0.02	0.0603
Arsenic	ug/g	0.79	0.2	0.05	0.0603
Barium	ug/g	37	6	0.5	0.0603
Beryllium	ug/g	0.03	0.02	0.02	0.0603
Boron	ug/g	<5		5	0.0603
Cadmium	ug/g	6.3	0.6	0.02	0.0603
Chromium	ug/g	1.6	0.9	0.5	0.0603
Cobalt	ug/g	4.5	0.5	0.5	0.0603
Copper	ug/g	20	3	0.5	0.0603
Iron	ug/g	1600	200	5	0.0603
Lead	ug/g	0.37	0.1	0.05	0.0603
Manganese	ug/g	980	100	0.5	0.0603
Mercury	ug/g	0.02	0.01	0.01	0.0603
Molybdenum	ug/g	0.60	0.2	0.05	0.0603
Nickel	ug/g	21	3	0.5	0.0603
Selenium	ug/g	6.7	0.7	0.05	0.0603
Silver	ug/g	0.04	0.03	0.02	0.0603
Strontium	ug/g	22	2	0.1	0.0603
Thallium	ug/g	0.05	0.02	0.01	0.0603
Tin	ug/g	0.5	0.2	0.2	0.0603
Titanium	ug/g	7.7	2	0.5	0.0603
Uranium	ug/g	0.23	0.06	0.02	0.0603
Vanadium	ug/g	3.0	0.8	0.2	0.0603
Zinc	ug/g	330	50	5	0.0603
Lab Section 6					
Moisture	%	82.38	8	0.02	0.0603

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012725**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 12:28 RG_LISP24_INV-2_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	400	60	5	0.134
Antimony	ug/g	0.07	0.04	0.02	0.134
Arsenic	ug/g	0.51	0.08	0.02	0.134
Barium	ug/g	15	2	0.05	0.134
Beryllium	ug/g	<0.02		0.02	0.134
Boron	ug/g	<2		2	0.134
Cadmium	ug/g	6.2	0.6	0.02	0.134
Chromium	ug/g	0.7	0.2	0.1	0.134
Cobalt	ug/g	3.7	0.4	0.02	0.134
Copper	ug/g	21	2	0.1	0.134
Iron	ug/g	940	90	5	0.134
Lead	ug/g	0.20	0.05	0.02	0.134
Manganese	ug/g	640	60	0.2	0.134
Mercury	ug/g	0.02	0.01	0.01	0.134
Molybdenum	ug/g	0.56	0.1	0.05	0.134
Nickel	ug/g	13	1	0.1	0.134
Selenium	ug/g	6.2	0.6	0.02	0.134
Silver	ug/g	0.03	0.02	0.02	0.134
Strontium	ug/g	5.8	0.9	0.1	0.134
Thallium	ug/g	0.03	0.02	0.01	0.134
Tin	ug/g	0.2	0.1	0.1	0.134
Titanium	ug/g	4.2	1	0.5	0.134
Uranium	ug/g	0.08	0.03	0.01	0.134
Vanadium	ug/g	1.5	0.5	0.2	0.134
Zinc	ug/g	270	30	1	0.134
Lab Section 6					
Moisture	%	79.79	8	0.02	0.134

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012726**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 12:33 RG_LISP24_INV-3_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	880	90	5	0.0959
Antimony	ug/g	0.10	0.04	0.02	0.0959
Arsenic	ug/g	0.70	0.2	0.05	0.0959
Barium	ug/g	37	6	0.5	0.0959
Beryllium	ug/g	0.04	0.02	0.02	0.0959
Boron	ug/g	<5		5	0.0959
Cadmium	ug/g	3.3	0.3	0.02	0.0959
Chromium	ug/g	1.6	0.9	0.5	0.0959
Cobalt	ug/g	3.2	0.5	0.5	0.0959
Copper	ug/g	21	3	0.5	0.0959
Iron	ug/g	1900	200	5	0.0959
Lead	ug/g	0.43	0.1	0.05	0.0959
Manganese	ug/g	720	70	0.5	0.0959
Mercury	ug/g	0.02	0.01	0.01	0.0959
Molybdenum	ug/g	0.49	0.1	0.05	0.0959
Nickel	ug/g	16	2	0.5	0.0959
Selenium	ug/g	6.2	0.6	0.05	0.0959
Silver	ug/g	0.04	0.03	0.02	0.0959
Strontium	ug/g	21	2	0.1	0.0959
Thallium	ug/g	0.04	0.02	0.01	0.0959
Tin	ug/g	0.4	0.2	0.2	0.0959
Titanium	ug/g	7.8	2	0.5	0.0959
Uranium	ug/g	0.21	0.05	0.02	0.0959
Vanadium	ug/g	3.3	0.8	0.2	0.0959
Zinc	ug/g	250	40	5	0.0959
Lab Section 6					
Moisture	%	83.08	8	0.02	0.0959

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012727**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 12:34 RG_LISP24_INV-4_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	350	50	5	0.1546
Antimony	ug/g	0.06	0.03	0.02	0.1546
Arsenic	ug/g	0.48	0.07	0.02	0.1546
Barium	ug/g	13	1	0.05	0.1546
Beryllium	ug/g	<0.02		0.02	0.1546
Boron	ug/g	<2		2	0.1546
Cadmium	ug/g	2.5	0.2	0.02	0.1546
Chromium	ug/g	0.8	0.3	0.1	0.1546
Cobalt	ug/g	2.5	0.2	0.02	0.1546
Copper	ug/g	26	3	0.1	0.1546
Iron	ug/g	620	60	5	0.1546
Lead	ug/g	0.15	0.05	0.02	0.1546
Manganese	ug/g	500	50	0.2	0.1546
Mercury	ug/g	0.02	0.01	0.01	0.1546
Molybdenum	ug/g	0.49	0.1	0.05	0.1546
Nickel	ug/g	9.7	1	0.1	0.1546
Selenium	ug/g	4.8	0.5	0.02	0.1546
Silver	ug/g	0.04	0.03	0.02	0.1546
Strontium	ug/g	6.8	1	0.1	0.1546
Thallium	ug/g	0.02	0.01	0.01	0.1546
Tin	ug/g	0.2	0.1	0.1	0.1546
Titanium	ug/g	3.7	1	0.5	0.1546
Uranium	ug/g	0.07	0.02	0.01	0.1546
Vanadium	ug/g	1.2	0.5	0.2	0.1546
Zinc	ug/g	200	20	1	0.1546
Lab Section 6					
Moisture	%	78.87	8	0.02	0.1546

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

SASKATCHEWAN RESEARCH COUNCIL

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012728**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 12:28 RG_LISP24_INV-5_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	490	70	5	0.0996
Antimony	ug/g	0.07	0.04	0.02	0.0996
Arsenic	ug/g	0.63	0.2	0.05	0.0996
Barium	ug/g	20	3	0.5	0.0996
Beryllium	ug/g	0.02	0.02	0.02	0.0996
Boron	ug/g	<5		5	0.0996
Cadmium	ug/g	3.4	0.3	0.02	0.0996
Chromium	ug/g	1.0	0.7	0.5	0.0996
Cobalt	ug/g	2.9	0.5	0.5	0.0996
Copper	ug/g	25	4	0.5	0.0996
Iron	ug/g	1100	100	5	0.0996
Lead	ug/g	0.25	0.1	0.05	0.0996
Manganese	ug/g	680	70	0.5	0.0996
Mercury	ug/g	0.02	0.01	0.01	0.0996
Molybdenum	ug/g	0.55	0.1	0.05	0.0996
Nickel	ug/g	13	2	0.5	0.0996
Selenium	ug/g	6.3	0.6	0.05	0.0996
Silver	ug/g	0.04	0.03	0.02	0.0996
Strontium	ug/g	7.5	1	0.1	0.0996
Thallium	ug/g	0.02	0.01	0.01	0.0996
Tin	ug/g	0.3	0.2	0.2	0.0996
Titanium	ug/g	4.3	1	0.5	0.0996
Uranium	ug/g	0.13	0.05	0.02	0.0996
Vanadium	ug/g	2.0	0.5	0.2	0.0996
Zinc	ug/g	240	40	5	0.0996
Lab Section 6					
Moisture	%	85.07	8	0.02	0.0996

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012729**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 12:31 RG_LISP24_INV-6_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	450	70	5	0.1492
Antimony	ug/g	0.07	0.04	0.02	0.1492
Arsenic	ug/g	0.54	0.08	0.02	0.1492
Barium	ug/g	15	2	0.05	0.1492
Beryllium	ug/g	<0.02		0.02	0.1492
Boron	ug/g	<2		2	0.1492
Cadmium	ug/g	6.5	0.6	0.02	0.1492
Chromium	ug/g	1.0	0.2	0.1	0.1492
Cobalt	ug/g	3.7	0.4	0.02	0.1492
Copper	ug/g	20	2	0.1	0.1492
Iron	ug/g	880	90	5	0.1492
Lead	ug/g	0.20	0.05	0.02	0.1492
Manganese	ug/g	660	70	0.2	0.1492
Mercury	ug/g	0.02	0.01	0.01	0.1492
Molybdenum	ug/g	0.51	0.1	0.05	0.1492
Nickel	ug/g	11	1	0.1	0.1492
Selenium	ug/g	6.4	0.6	0.02	0.1492
Silver	ug/g	0.03	0.02	0.02	0.1492
Strontium	ug/g	6.2	0.9	0.1	0.1492
Thallium	ug/g	0.02	0.01	0.01	0.1492
Tin	ug/g	0.2	0.1	0.1	0.1492
Titanium	ug/g	3.4	1	0.5	0.1492
Uranium	ug/g	0.12	0.03	0.01	0.1492
Vanadium	ug/g	1.7	0.6	0.2	0.1492
Zinc	ug/g	280	30	1	0.1492
Lab Section 6					
Moisture	%	78.83	8	0.02	0.1492

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012730**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 12:38 RG_LISP24_INV-7_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	260	40	5	0.2204
Antimony	ug/g	0.06	0.03	0.02	0.2204
Arsenic	ug/g	0.48	0.07	0.02	0.2204
Barium	ug/g	14	1	0.05	0.2204
Beryllium	ug/g	<0.02		0.02	0.2204
Boron	ug/g	<2		2	0.2204
Cadmium	ug/g	6.5	0.6	0.02	0.2204
Chromium	ug/g	0.5	0.2	0.1	0.2204
Cobalt	ug/g	4.0	0.4	0.02	0.2204
Copper	ug/g	20	2	0.1	0.2204
Iron	ug/g	620	60	5	0.2204
Lead	ug/g	0.13	0.05	0.02	0.2204
Manganese	ug/g	610	60	0.2	0.2204
Mercury	ug/g	0.02	0.01	0.01	0.2204
Molybdenum	ug/g	0.46	0.1	0.05	0.2204
Nickel	ug/g	13	1	0.1	0.2204
Selenium	ug/g	6.8	0.7	0.02	0.2204
Silver	ug/g	0.04	0.03	0.02	0.2204
Strontium	ug/g	6.9	1	0.1	0.2204
Thallium	ug/g	0.02	0.01	0.01	0.2204
Tin	ug/g	0.2	0.1	0.1	0.2204
Titanium	ug/g	2.3	0.9	0.5	0.2204
Uranium	ug/g	0.08	0.03	0.01	0.2204
Vanadium	ug/g	1.0	0.4	0.2	0.2204
Zinc	ug/g	290	30	1	0.2204
Lab Section 6					
Moisture	%	85.76	8	0.02	0.2204

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012731**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 12:43 RG_LISP24_INV-8_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	260	30	2	0.344
Antimony	ug/g	0.07	0.02	0.01	0.344
Arsenic	ug/g	0.45	0.07	0.01	0.344
Barium	ug/g	14	1	0.02	0.344
Beryllium	ug/g	0.01	0.01	0.01	0.344
Boron	ug/g	<1		1	0.344
Cadmium	ug/g	3.3	0.3	0.01	0.344
Chromium	ug/g	0.49	0.1	0.05	0.344
Cobalt	ug/g	3.7	0.4	0.01	0.344
Copper	ug/g	20	2	0.05	0.344
Iron	ug/g	590	60	2	0.344
Lead	ug/g	0.15	0.04	0.01	0.344
Manganese	ug/g	702	70	0.1	0.344
Mercury	ug/g	0.020	0.01	0.005	0.344
Molybdenum	ug/g	0.49	0.07	0.02	0.344
Nickel	ug/g	14	1	0.05	0.344
Selenium	ug/g	7.3	0.7	0.01	0.344
Silver	ug/g	0.03	0.02	0.01	0.344
Strontium	ug/g	4.3	0.6	0.05	0.344
Thallium	ug/g	0.019	0.01	0.005	0.344
Tin	ug/g	0.17	0.05	0.05	0.344
Titanium	ug/g	2.3	0.6	0.2	0.344
Uranium	ug/g	0.074	0.02	0.005	0.344
Vanadium	ug/g	1.0	0.2	0.1	0.344
Zinc	ug/g	200	20	0.5	0.344
Lab Section 6					
Moisture	%	80.20	8	0.02	0.344

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012732**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 13:08 RG_LISP24_INV-9_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	240	40	5	0.2216
Antimony	ug/g	0.05	0.03	0.02	0.2216
Arsenic	ug/g	0.40	0.06	0.02	0.2216
Barium	ug/g	12	1	0.05	0.2216
Beryllium	ug/g	<0.02		0.02	0.2216
Boron	ug/g	<2		2	0.2216
Cadmium	ug/g	3.5	0.4	0.02	0.2216
Chromium	ug/g	0.5	0.2	0.1	0.2216
Cobalt	ug/g	2.4	0.2	0.02	0.2216
Copper	ug/g	21	2	0.1	0.2216
Iron	ug/g	660	70	5	0.2216
Lead	ug/g	0.13	0.05	0.02	0.2216
Manganese	ug/g	480	50	0.2	0.2216
Mercury	ug/g	0.02	0.01	0.01	0.2216
Molybdenum	ug/g	0.45	0.1	0.05	0.2216
Nickel	ug/g	11	1	0.1	0.2216
Selenium	ug/g	6.7	0.7	0.02	0.2216
Silver	ug/g	0.03	0.02	0.02	0.2216
Strontium	ug/g	6.3	0.9	0.1	0.2216
Thallium	ug/g	0.02	0.01	0.01	0.2216
Tin	ug/g	0.2	0.1	0.1	0.2216
Titanium	ug/g	2.6	0.9	0.5	0.2216
Uranium	ug/g	0.13	0.03	0.01	0.2216
Vanadium	ug/g	1.0	0.4	0.2	0.2216
Zinc	ug/g	210	20	1	0.2216
Lab Section 6					
Moisture	%	85.66	8	0.02	0.2216

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012733**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 13:10 RG_LISP24_INV-10_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	380	40	2	0.266
Antimony	ug/g	0.07	0.02	0.01	0.266
Arsenic	ug/g	0.52	0.08	0.01	0.266
Barium	ug/g	17	2	0.02	0.266
Beryllium	ug/g	0.02	0.01	0.01	0.266
Boron	ug/g	1	1	1	0.266
Cadmium	ug/g	3.6	0.4	0.01	0.266
Chromium	ug/g	0.73	0.2	0.05	0.266
Cobalt	ug/g	3.3	0.3	0.01	0.266
Copper	ug/g	17	2	0.05	0.266
Iron	ug/g	950	100	20	0.266
Lead	ug/g	0.20	0.03	0.01	0.266
Manganese	ug/g	731	70	0.1	0.266
Mercury	ug/g	0.024	0.01	0.005	0.266
Molybdenum	ug/g	0.51	0.08	0.02	0.266
Nickel	ug/g	13	1	0.05	0.266
Selenium	ug/g	7.5	0.8	0.01	0.266
Silver	ug/g	0.03	0.02	0.01	0.266
Strontium	ug/g	6.9	0.7	0.05	0.266
Thallium	ug/g	0.029	0.01	0.005	0.266
Tin	ug/g	0.27	0.05	0.05	0.266
Titanium	ug/g	2.6	0.6	0.2	0.266
Uranium	ug/g	0.12	0.02	0.005	0.266
Vanadium	ug/g	1.5	0.4	0.1	0.266
Zinc	ug/g	210	20	0.5	0.266
Lab Section 6					
Moisture	%	83.36	8	0.02	0.266

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012734**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 08:26 RG_LIDSL_INV-1_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	270	40	5	0.2051
Antimony	ug/g	0.05	0.03	0.02	0.2051
Arsenic	ug/g	0.53	0.08	0.02	0.2051
Barium	ug/g	12	1	0.05	0.2051
Beryllium	ug/g	<0.02		0.02	0.2051
Boron	ug/g	<2		2	0.2051
Cadmium	ug/g	3.1	0.3	0.02	0.2051
Chromium	ug/g	0.5	0.2	0.1	0.2051
Cobalt	ug/g	2.2	0.2	0.02	0.2051
Copper	ug/g	20	2	0.1	0.2051
Iron	ug/g	430	60	5	0.2051
Lead	ug/g	0.15	0.05	0.02	0.2051
Manganese	ug/g	360	40	0.2	0.2051
Mercury	ug/g	0.02	0.01	0.01	0.2051
Molybdenum	ug/g	0.46	0.1	0.05	0.2051
Nickel	ug/g	13	1	0.1	0.2051
Selenium	ug/g	5.2	0.5	0.02	0.2051
Silver	ug/g	0.04	0.03	0.02	0.2051
Strontium	ug/g	8.8	1	0.1	0.2051
Thallium	ug/g	0.02	0.01	0.01	0.2051
Tin	ug/g	<0.1		0.1	0.2051
Titanium	ug/g	2.8	1	0.5	0.2051
Uranium	ug/g	0.11	0.03	0.01	0.2051
Vanadium	ug/g	1.1	0.4	0.2	0.2051
Zinc	ug/g	240	20	1	0.2051
Lab Section 6					
Moisture	%	88.49	9	0.02	0.2051

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012735**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 08:28 RG_LIDSL_INV-2_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	280	30	2	0.284
Antimony	ug/g	0.04	0.02	0.01	0.284
Arsenic	ug/g	0.34	0.05	0.01	0.284
Barium	ug/g	12	1	0.02	0.284
Beryllium	ug/g	0.01	0.01	0.01	0.284
Boron	ug/g	<1		1	0.284
Cadmium	ug/g	2.5	0.2	0.01	0.284
Chromium	ug/g	0.51	0.1	0.05	0.284
Cobalt	ug/g	1.8	0.2	0.01	0.284
Copper	ug/g	17	2	0.05	0.284
Iron	ug/g	400	40	2	0.284
Lead	ug/g	0.14	0.04	0.01	0.284
Manganese	ug/g	338	30	0.1	0.284
Mercury	ug/g	0.019	0.01	0.005	0.284
Molybdenum	ug/g	0.43	0.06	0.02	0.284
Nickel	ug/g	9.8	1	0.05	0.284
Selenium	ug/g	6.3	0.6	0.01	0.284
Silver	ug/g	0.03	0.02	0.01	0.284
Strontium	ug/g	6.2	0.6	0.05	0.284
Thallium	ug/g	0.017	0.009	0.005	0.284
Tin	ug/g	0.09	0.05	0.05	0.284
Titanium	ug/g	2.5	0.6	0.2	0.284
Uranium	ug/g	0.094	0.02	0.005	0.284
Vanadium	ug/g	1.0	0.2	0.1	0.284
Zinc	ug/g	210	20	0.5	0.284
Lab Section 6					
Moisture	%	92.76	9	0.02	0.284

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012736**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 08:38 RG_LIDSL_INV-3_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	260	40	5	0.1586
Antimony	ug/g	0.05	0.03	0.02	0.1586
Arsenic	ug/g	0.37	0.09	0.02	0.1586
Barium	ug/g	12	1	0.05	0.1586
Beryllium	ug/g	<0.02		0.02	0.1586
Boron	ug/g	<2		2	0.1586
Cadmium	ug/g	3.6	0.4	0.02	0.1586
Chromium	ug/g	0.4	0.2	0.1	0.1586
Cobalt	ug/g	2.4	0.2	0.02	0.1586
Copper	ug/g	20	2	0.1	0.1586
Iron	ug/g	410	60	5	0.1586
Lead	ug/g	0.14	0.05	0.02	0.1586
Manganese	ug/g	440	40	0.2	0.1586
Mercury	ug/g	0.02	0.01	0.01	0.1586
Molybdenum	ug/g	0.42	0.1	0.05	0.1586
Nickel	ug/g	12	1	0.1	0.1586
Selenium	ug/g	5.1	0.5	0.02	0.1586
Silver	ug/g	0.04	0.03	0.02	0.1586
Strontium	ug/g	6.1	0.9	0.1	0.1586
Thallium	ug/g	0.02	0.01	0.01	0.1586
Tin	ug/g	<0.1		0.1	0.1586
Titanium	ug/g	2.9	1	0.5	0.1586
Uranium	ug/g	0.07	0.02	0.01	0.1586
Vanadium	ug/g	0.9	0.4	0.2	0.1586
Zinc	ug/g	210	20	1	0.1586
Lab Section 6					
Moisture	%	83.99	8	0.02	0.1586

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

SASKATCHEWAN RESEARCH COUNCIL

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012737**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 08:42 RG_LIDSL_INV-4_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	270	40	5	0.1081
Antimony	ug/g	0.05	0.03	0.02	0.1081
Arsenic	ug/g	0.39	0.1	0.02	0.1081
Barium	ug/g	11	1	0.05	0.1081
Beryllium	ug/g	<0.02		0.02	0.1081
Boron	ug/g	<2		2	0.1081
Cadmium	ug/g	3.0	0.3	0.02	0.1081
Chromium	ug/g	0.4	0.2	0.1	0.1081
Cobalt	ug/g	2.1	0.2	0.02	0.1081
Copper	ug/g	21	2	0.1	0.1081
Iron	ug/g	470	70	5	0.1081
Lead	ug/g	0.14	0.05	0.02	0.1081
Manganese	ug/g	390	40	0.2	0.1081
Mercury	ug/g	0.02	0.01	0.01	0.1081
Molybdenum	ug/g	0.45	0.1	0.05	0.1081
Nickel	ug/g	12	1	0.1	0.1081
Selenium	ug/g	6.4	0.6	0.02	0.1081
Silver	ug/g	0.04	0.03	0.02	0.1081
Strontium	ug/g	4.3	0.6	0.1	0.1081
Thallium	ug/g	0.02	0.01	0.01	0.1081
Tin	ug/g	0.1	0.1	0.1	0.1081
Titanium	ug/g	2.6	0.9	0.5	0.1081
Uranium	ug/g	0.08	0.03	0.01	0.1081
Vanadium	ug/g	1.0	0.4	0.2	0.1081
Zinc	ug/g	220	20	1	0.1081
Lab Section 6					
Moisture	%	86.01	9	0.02	0.1081

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012738**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 08:46 RG_LIDSL_INV-5_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	310	50	5	0.0867
Antimony	ug/g	0.04	0.03	0.02	0.0867
Arsenic	ug/g	0.52	0.1	0.05	0.0867
Barium	ug/g	12	2	0.5	0.0867
Beryllium	ug/g	<0.02		0.02	0.0867
Boron	ug/g	<5		5	0.0867
Cadmium	ug/g	5.1	0.5	0.02	0.0867
Chromium	ug/g	0.5	0.5	0.5	0.0867
Cobalt	ug/g	1.9	0.5	0.5	0.0867
Copper	ug/g	20	3	0.5	0.0867
Iron	ug/g	570	60	5	0.0867
Lead	ug/g	0.17	0.09	0.05	0.0867
Manganese	ug/g	290	30	0.5	0.0867
Mercury	ug/g	0.01	0.01	0.01	0.0867
Molybdenum	ug/g	0.47	0.1	0.05	0.0867
Nickel	ug/g	9.3	2	0.5	0.0867
Selenium	ug/g	5.4	0.5	0.05	0.0867
Silver	ug/g	0.04	0.03	0.02	0.0867
Strontium	ug/g	6.0	0.9	0.1	0.0867
Thallium	ug/g	0.02	0.01	0.01	0.0867
Tin	ug/g	<0.2		0.2	0.0867
Titanium	ug/g	3.0	1	0.5	0.0867
Uranium	ug/g	0.10	0.04	0.02	0.0867
Vanadium	ug/g	1.2	0.5	0.2	0.0867
Zinc	ug/g	290	40	5	0.0867
Lab Section 6					
Moisture	%	90.42	9	0.02	0.0867

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012739**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 08:46 RG_LIDSL_INV-6_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	390	60	5	0.2284
Antimony	ug/g	0.05	0.03	0.02	0.2284
Arsenic	ug/g	0.40	0.06	0.02	0.2284
Barium	ug/g	15	2	0.05	0.2284
Beryllium	ug/g	<0.02		0.02	0.2284
Boron	ug/g	<2		2	0.2284
Cadmium	ug/g	3.9	0.4	0.02	0.2284
Chromium	ug/g	0.9	0.3	0.1	0.2284
Cobalt	ug/g	2.5	0.2	0.02	0.2284
Copper	ug/g	17	2	0.1	0.2284
Iron	ug/g	540	50	5	0.2284
Lead	ug/g	0.21	0.05	0.02	0.2284
Manganese	ug/g	540	50	0.2	0.2284
Mercury	ug/g	0.03	0.02	0.01	0.2284
Molybdenum	ug/g	0.50	0.1	0.05	0.2284
Nickel	ug/g	14	1	0.1	0.2284
Selenium	ug/g	6.0	0.6	0.02	0.2284
Silver	ug/g	0.03	0.02	0.02	0.2284
Strontium	ug/g	6.1	0.9	0.1	0.2284
Thallium	ug/g	0.02	0.01	0.01	0.2284
Tin	ug/g	0.2	0.1	0.1	0.2284
Titanium	ug/g	3.0	1	0.5	0.2284
Uranium	ug/g	0.08	0.03	0.01	0.2284
Vanadium	ug/g	1.4	0.5	0.2	0.2284
Zinc	ug/g	190	20	1	0.2284
Lab Section 6					
Moisture	%	74.21	7	0.02	0.2284

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012740**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 08:52 RG_LIDSL_INV-7_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	300	30	2	0.2724
Antimony	ug/g	0.05	0.02	0.01	0.2724
Arsenic	ug/g	0.41	0.06	0.01	0.2724
Barium	ug/g	15	2	0.02	0.2724
Beryllium	ug/g	0.01	0.01	0.01	0.2724
Boron	ug/g	1	1	1	0.2724
Cadmium	ug/g	2.8	0.3	0.01	0.2724
Chromium	ug/g	0.55	0.1	0.05	0.2724
Cobalt	ug/g	2.5	0.2	0.01	0.2724
Copper	ug/g	18	2	0.05	0.2724
Iron	ug/g	590	60	2	0.2724
Lead	ug/g	0.17	0.04	0.01	0.2724
Manganese	ug/g	456	40	0.1	0.2724
Mercury	ug/g	0.020	0.01	0.005	0.2724
Molybdenum	ug/g	0.38	0.1	0.02	0.2724
Nickel	ug/g	14	1	0.05	0.2724
Selenium	ug/g	6.8	0.7	0.01	0.2724
Silver	ug/g	0.04	0.02	0.01	0.2724
Strontium	ug/g	8.5	0.8	0.05	0.2724
Thallium	ug/g	0.020	0.01	0.005	0.2724
Tin	ug/g	0.22	0.05	0.05	0.2724
Titanium	ug/g	2.2	0.6	0.2	0.2724
Uranium	ug/g	0.096	0.02	0.005	0.2724
Vanadium	ug/g	1.2	0.3	0.1	0.2724
Zinc	ug/g	230	20	0.5	0.2724
Lab Section 6					
Moisture	%	86.94	9	0.02	0.2724

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012741**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 08:58 RG_LIDSL_INV-8_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	370	60	5	0.0901
Antimony	ug/g	0.05	0.03	0.02	0.0901
Arsenic	ug/g	0.39	0.05	0.05	0.0901
Barium	ug/g	13	2	0.5	0.0901
Beryllium	ug/g	<0.02		0.02	0.0901
Boron	ug/g	<5		5	0.0901
Cadmium	ug/g	3.6	0.4	0.02	0.0901
Chromium	ug/g	0.6	0.6	0.5	0.0901
Cobalt	ug/g	1.0	0.5	0.5	0.0901
Copper	ug/g	25	4	0.5	0.0901
Iron	ug/g	550	60	5	0.0901
Lead	ug/g	0.18	0.09	0.05	0.0901
Manganese	ug/g	120	10	0.5	0.0901
Mercury	ug/g	0.01	0.01	0.01	0.0901
Molybdenum	ug/g	0.33	0.1	0.05	0.0901
Nickel	ug/g	7.1	2	0.5	0.0901
Selenium	ug/g	4.7	0.7	0.05	0.0901
Silver	ug/g	0.05	0.03	0.02	0.0901
Strontium	ug/g	9.1	1	0.1	0.0901
Thallium	ug/g	0.02	0.01	0.01	0.0901
Tin	ug/g	<0.2		0.2	0.0901
Titanium	ug/g	3.4	1	0.5	0.0901
Uranium	ug/g	0.07	0.04	0.02	0.0901
Vanadium	ug/g	1.5	0.5	0.2	0.0901
Zinc	ug/g	220	30	5	0.0901
Lab Section 6					
Moisture	%	76.10	8	0.02	0.0901

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012742**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 08:56 RG_LIDSL_INV-9_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	220	30	5	0.1077
Antimony	ug/g	0.03	0.02	0.02	0.1077
Arsenic	ug/g	0.21	0.05	0.02	0.1077
Barium	ug/g	8.3	0.8	0.05	0.1077
Beryllium	ug/g	<0.02		0.02	0.1077
Boron	ug/g	<2		2	0.1077
Cadmium	ug/g	2.7	0.3	0.02	0.1077
Chromium	ug/g	0.5	0.2	0.1	0.1077
Cobalt	ug/g	0.85	0.1	0.02	0.1077
Copper	ug/g	23	2	0.1	0.1077
Iron	ug/g	290	40	5	0.1077
Lead	ug/g	0.08	0.04	0.02	0.1077
Manganese	ug/g	110	10	0.2	0.1077
Mercury	ug/g	0.01	0.01	0.01	0.1077
Molybdenum	ug/g	0.28	0.1	0.05	0.1077
Nickel	ug/g	4.8	0.7	0.1	0.1077
Selenium	ug/g	4.0	0.4	0.02	0.1077
Silver	ug/g	0.05	0.03	0.02	0.1077
Strontium	ug/g	5.7	0.8	0.1	0.1077
Thallium	ug/g	0.01	0.01	0.01	0.1077
Tin	ug/g	<0.1		0.1	0.1077
Titanium	ug/g	2.6	0.9	0.5	0.1077
Uranium	ug/g	0.04	0.02	0.01	0.1077
Vanadium	ug/g	0.8	0.4	0.2	0.1077
Zinc	ug/g	210	20	1	0.1077
Lab Section 6					
Moisture	%	74.60	7	0.02	0.1077

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012743**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 09:00 RG_LIDSL_INV-10_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	360	50	5	0.0622
Antimony	ug/g	0.07	0.04	0.02	0.0622
Arsenic	ug/g	0.39	0.05	0.05	0.0622
Barium	ug/g	13	2	0.5	0.0622
Beryllium	ug/g	<0.02		0.02	0.0622
Boron	ug/g	<5		5	0.0622
Cadmium	ug/g	2.6	0.3	0.02	0.0622
Chromium	ug/g	0.7	0.6	0.5	0.0622
Cobalt	ug/g	1.0	0.5	0.5	0.0622
Copper	ug/g	19	3	0.5	0.0622
Iron	ug/g	460	70	5	0.0622
Lead	ug/g	0.18	0.09	0.05	0.0622
Manganese	ug/g	140	10	0.5	0.0622
Mercury	ug/g	0.01	0.01	0.01	0.0622
Molybdenum	ug/g	0.32	0.1	0.05	0.0622
Nickel	ug/g	5.7	1	0.5	0.0622
Selenium	ug/g	4.6	0.7	0.05	0.0622
Silver	ug/g	0.04	0.03	0.02	0.0622
Strontium	ug/g	11	1	0.1	0.0622
Thallium	ug/g	0.02	0.01	0.01	0.0622
Tin	ug/g	<0.2		0.2	0.0622
Titanium	ug/g	4.5	1	0.5	0.0622
Uranium	ug/g	0.07	0.04	0.02	0.0622
Vanadium	ug/g	1.3	0.5	0.2	0.0622
Zinc	ug/g	200	30	5	0.0622
Lab Section 6					
Moisture	%	87.81	9	0.02	0.0622

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012744**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 14:20 RG_LILC3_INV-1_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	5000	500	5	0.048
Antimony	ug/g	0.20	0.05	0.02	0.048
Arsenic	ug/g	1.6	0.2	0.05	0.048
Barium	ug/g	54	5	0.5	0.048
Beryllium	ug/g	0.24	0.06	0.02	0.048
Boron	ug/g	12	5	5	0.048
Cadmium	ug/g	4.7	0.5	0.02	0.048
Chromium	ug/g	8.6	2	0.5	0.048
Cobalt	ug/g	8.5	2	0.5	0.048
Copper	ug/g	25	4	0.5	0.048
Iron	ug/g	5100	500	5	0.048
Lead	ug/g	2.2	0.3	0.05	0.048
Manganese	ug/g	850	80	0.5	0.048
Mercury	ug/g	0.02	0.01	0.01	0.048
Molybdenum	ug/g	1.3	0.2	0.05	0.048
Nickel	ug/g	38	6	0.5	0.048
Selenium	ug/g	5.8	0.6	0.05	0.048
Silver	ug/g	0.07	0.04	0.02	0.048
Strontium	ug/g	63	6	0.1	0.048
Thallium	ug/g	0.11	0.03	0.01	0.048
Tin	ug/g	0.3	0.2	0.2	0.048
Titanium	ug/g	20	3	0.5	0.048
Uranium	ug/g	0.72	0.1	0.02	0.048
Vanadium	ug/g	17	2	0.2	0.048
Zinc	ug/g	280	40	5	0.048
Lab Section 6					
Moisture	%	71.75	7	0.02	0.048

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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Apr 02, 2020

Minnow Environmental

Sample #: **2020012745**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 14:23 RG_LILC3_INV-2_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	500	50	5	0.0523
Antimony	ug/g	0.08	0.04	0.02	0.0523
Arsenic	ug/g	0.64	0.2	0.05	0.0523
Barium	ug/g	19	3	0.5	0.0523
Beryllium	ug/g	<0.02		0.02	0.0523
Boron	ug/g	<5		5	0.0523
Cadmium	ug/g	2.7	0.3	0.02	0.0523
Chromium	ug/g	1.1	0.7	0.5	0.0523
Cobalt	ug/g	3.2	0.5	0.5	0.0523
Copper	ug/g	17	2	0.5	0.0523
Iron	ug/g	1900	200	5	0.0523
Lead	ug/g	0.23	0.1	0.05	0.0523
Manganese	ug/g	600	60	0.5	0.0523
Mercury	ug/g	0.02	0.01	0.01	0.0523
Molybdenum	ug/g	0.56	0.1	0.05	0.0523
Nickel	ug/g	9.1	2	0.5	0.0523
Selenium	ug/g	8.2	0.8	0.05	0.0523
Silver	ug/g	0.03	0.02	0.02	0.0523
Strontium	ug/g	6.9	1	0.1	0.0523
Thallium	ug/g	0.04	0.02	0.01	0.0523
Tin	ug/g	0.6	0.2	0.2	0.0523
Titanium	ug/g	5.0	1	0.5	0.0523
Uranium	ug/g	0.13	0.05	0.02	0.0523
Vanadium	ug/g	2.2	0.6	0.2	0.0523
Zinc	ug/g	200	30	5	0.0523
Lab Section 6					
Moisture	%	80.15	8	0.02	0.0523

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

SASKATCHEWAN RESEARCH COUNCIL

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012746**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 14:36 RG_LILC3_INV-3_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	240	40	5	0.1029
Antimony	ug/g	0.05	0.03	0.02	0.1029
Arsenic	ug/g	0.48	0.07	0.02	0.1029
Barium	ug/g	9.7	1	0.05	0.1029
Beryllium	ug/g	<0.02		0.02	0.1029
Boron	ug/g	<2		2	0.1029
Cadmium	ug/g	1.8	0.3	0.02	0.1029
Chromium	ug/g	0.6	0.2	0.1	0.1029
Cobalt	ug/g	2.0	0.2	0.02	0.1029
Copper	ug/g	27	3	0.1	0.1029
Iron	ug/g	960	100	5	0.1029
Lead	ug/g	0.11	0.04	0.02	0.1029
Manganese	ug/g	290	30	0.2	0.1029
Mercury	ug/g	0.03	0.02	0.01	0.1029
Molybdenum	ug/g	0.42	0.1	0.05	0.1029
Nickel	ug/g	5.8	0.9	0.1	0.1029
Selenium	ug/g	9.0	0.9	0.02	0.1029
Silver	ug/g	0.04	0.03	0.02	0.1029
Strontium	ug/g	5.8	0.9	0.1	0.1029
Thallium	ug/g	0.02	0.01	0.01	0.1029
Tin	ug/g	0.3	0.1	0.1	0.1029
Titanium	ug/g	2.4	0.9	0.5	0.1029
Uranium	ug/g	0.07	0.02	0.01	0.1029
Vanadium	ug/g	1.0	0.4	0.2	0.1029
Zinc	ug/g	230	20	1	0.1029
Lab Section 6					
Moisture	%	81.56	8	0.02	0.1029

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012747**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 14:42 RG_LILC3_INV-4_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	330	50	5	0.1337
Antimony	ug/g	0.07	0.04	0.02	0.1337
Arsenic	ug/g	0.59	0.09	0.02	0.1337
Barium	ug/g	12	1	0.05	0.1337
Beryllium	ug/g	<0.02		0.02	0.1337
Boron	ug/g	<2		2	0.1337
Cadmium	ug/g	3.0	0.3	0.02	0.1337
Chromium	ug/g	0.9	0.3	0.1	0.1337
Cobalt	ug/g	2.6	0.3	0.02	0.1337
Copper	ug/g	32	3	0.1	0.1337
Iron	ug/g	1100	100	5	0.1337
Lead	ug/g	0.15	0.05	0.02	0.1337
Manganese	ug/g	330	30	0.2	0.1337
Mercury	ug/g	0.02	0.01	0.01	0.1337
Molybdenum	ug/g	0.53	0.1	0.05	0.1337
Nickel	ug/g	8.3	1	0.1	0.1337
Selenium	ug/g	9.7	1	0.02	0.1337
Silver	ug/g	0.05	0.03	0.02	0.1337
Strontium	ug/g	5.7	0.8	0.1	0.1337
Thallium	ug/g	0.03	0.02	0.01	0.1337
Tin	ug/g	0.3	0.1	0.1	0.1337
Titanium	ug/g	3.4	1	0.5	0.1337
Uranium	ug/g	0.10	0.02	0.01	0.1337
Vanadium	ug/g	1.4	0.5	0.2	0.1337
Zinc	ug/g	260	30	1	0.1337
Lab Section 6					
Moisture	%	86.15	9	0.02	0.1337

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012748**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 14:46 RG_LILC3_INV-5_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	310	50	5	0.1719
Antimony	ug/g	0.07	0.04	0.02	0.1719
Arsenic	ug/g	0.70	0.1	0.02	0.1719
Barium	ug/g	12	1	0.05	0.1719
Beryllium	ug/g	<0.02		0.02	0.1719
Boron	ug/g	<2		2	0.1719
Cadmium	ug/g	3.6	0.4	0.02	0.1719
Chromium	ug/g	0.7	0.2	0.1	0.1719
Cobalt	ug/g	2.8	0.3	0.02	0.1719
Copper	ug/g	24	2	0.1	0.1719
Iron	ug/g	1100	100	5	0.1719
Lead	ug/g	0.14	0.05	0.02	0.1719
Manganese	ug/g	380	40	0.2	0.1719
Mercury	ug/g	0.03	0.02	0.01	0.1719
Molybdenum	ug/g	0.54	0.1	0.05	0.1719
Nickel	ug/g	9.9	1	0.1	0.1719
Selenium	ug/g	9.5	1	0.02	0.1719
Silver	ug/g	0.04	0.03	0.02	0.1719
Strontium	ug/g	4.3	0.6	0.1	0.1719
Thallium	ug/g	0.04	0.02	0.01	0.1719
Tin	ug/g	0.3	0.1	0.1	0.1719
Titanium	ug/g	3.4	1	0.5	0.1719
Uranium	ug/g	0.11	0.03	0.01	0.1719
Vanadium	ug/g	1.4	0.5	0.2	0.1719
Zinc	ug/g	220	20	1	0.1719
Lab Section 6					
Moisture	%	83.03	8	0.02	0.1719

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012749**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 14:52 RG_LILC3_INV-6_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	730	70	5	0.1714
Antimony	ug/g	0.13	0.05	0.02	0.1714
Arsenic	ug/g	1.1	0.2	0.02	0.1714
Barium	ug/g	27	3	0.05	0.1714
Beryllium	ug/g	0.03	0.02	0.02	0.1714
Boron	ug/g	2	2	2	0.1714
Cadmium	ug/g	4.2	0.4	0.02	0.1714
Chromium	ug/g	2.1	0.3	0.1	0.1714
Cobalt	ug/g	4.5	0.4	0.02	0.1714
Copper	ug/g	28	3	0.1	0.1714
Iron	ug/g	2200	300	50	0.1714
Lead	ug/g	0.39	0.1	0.02	0.1714
Manganese	ug/g	560	60	0.2	0.1714
Mercury	ug/g	0.02	0.01	0.01	0.1714
Molybdenum	ug/g	0.63	0.2	0.05	0.1714
Nickel	ug/g	15	2	0.1	0.1714
Selenium	ug/g	8.9	0.9	0.02	0.1714
Silver	ug/g	0.04	0.03	0.02	0.1714
Strontium	ug/g	12	1	0.1	0.1714
Thallium	ug/g	0.05	0.02	0.01	0.1714
Tin	ug/g	0.5	0.1	0.1	0.1714
Titanium	ug/g	5.0	1	0.5	0.1714
Uranium	ug/g	0.24	0.04	0.01	0.1714
Vanadium	ug/g	3.6	0.9	0.2	0.1714
Zinc	ug/g	250	20	1	0.1714
Lab Section 6					
Moisture	%	86.96	9	0.02	0.1714

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012750**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 15:00 RG_LILC3_INV-7_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	470	70	5	0.1866
Antimony	ug/g	0.09	0.04	0.02	0.1866
Arsenic	ug/g	0.64	0.1	0.02	0.1866
Barium	ug/g	16	2	0.05	0.1866
Beryllium	ug/g	<0.02		0.02	0.1866
Boron	ug/g	<2		2	0.1866
Cadmium	ug/g	2.5	0.2	0.02	0.1866
Chromium	ug/g	1.0	0.2	0.1	0.1866
Cobalt	ug/g	3.2	0.3	0.02	0.1866
Copper	ug/g	32	3	0.1	0.1866
Iron	ug/g	1800	300	50	0.1866
Lead	ug/g	0.20	0.05	0.02	0.1866
Manganese	ug/g	500	50	0.2	0.1866
Mercury	ug/g	0.03	0.02	0.01	0.1866
Molybdenum	ug/g	0.56	0.1	0.05	0.1866
Nickel	ug/g	9.1	1	0.1	0.1866
Selenium	ug/g	10	1	0.02	0.1866
Silver	ug/g	0.04	0.03	0.02	0.1866
Strontium	ug/g	6.5	1	0.1	0.1866
Thallium	ug/g	0.03	0.02	0.01	0.1866
Tin	ug/g	0.5	0.1	0.1	0.1866
Titanium	ug/g	5.0	1	0.5	0.1866
Uranium	ug/g	0.11	0.03	0.01	0.1866
Vanadium	ug/g	2.0	0.5	0.2	0.1866
Zinc	ug/g	210	20	1	0.1866
Lab Section 6					
Moisture	%	83.94	8	0.02	0.1866

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012751**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 15:08 RG_LILC3_INV-8_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	400	60	5	0.1732
Antimony	ug/g	0.08	0.04	0.02	0.1732
Arsenic	ug/g	0.83	0.1	0.02	0.1732
Barium	ug/g	16	2	0.05	0.1732
Beryllium	ug/g	<0.02		0.02	0.1732
Boron	ug/g	<2		2	0.1732
Cadmium	ug/g	5.5	0.6	0.02	0.1732
Chromium	ug/g	0.9	0.3	0.1	0.1732
Cobalt	ug/g	3.8	0.4	0.02	0.1732
Copper	ug/g	23	2	0.1	0.1732
Iron	ug/g	1800	300	50	0.1732
Lead	ug/g	0.19	0.06	0.02	0.1732
Manganese	ug/g	540	50	0.2	0.1732
Mercury	ug/g	0.02	0.01	0.01	0.1732
Molybdenum	ug/g	0.58	0.1	0.05	0.1732
Nickel	ug/g	10	1	0.1	0.1732
Selenium	ug/g	9.4	0.9	0.02	0.1732
Silver	ug/g	0.03	0.02	0.02	0.1732
Strontium	ug/g	5.4	0.8	0.1	0.1732
Thallium	ug/g	0.04	0.02	0.01	0.1732
Tin	ug/g	0.5	0.1	0.1	0.1732
Titanium	ug/g	3.5	1	0.5	0.1732
Uranium	ug/g	0.12	0.03	0.01	0.1732
Vanadium	ug/g	1.8	0.6	0.2	0.1732
Zinc	ug/g	250	20	1	0.1732
Lab Section 6					
Moisture	%	87.81	9	0.02	0.1732

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012752**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 15:20 RG_LILC3_INV-9_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	520	50	5	0.1081
Antimony	ug/g	0.08	0.04	0.02	0.1081
Arsenic	ug/g	0.88	0.1	0.02	0.1081
Barium	ug/g	19	2	0.05	0.1081
Beryllium	ug/g	<0.02		0.02	0.1081
Boron	ug/g	<2		2	0.1081
Cadmium	ug/g	2.9	0.3	0.02	0.1081
Chromium	ug/g	1.0	0.2	0.1	0.1081
Cobalt	ug/g	3.6	0.4	0.02	0.1081
Copper	ug/g	19	2	0.1	0.1081
Iron	ug/g	1600	200	5	0.1081
Lead	ug/g	0.21	0.05	0.02	0.1081
Manganese	ug/g	700	70	0.2	0.1081
Mercury	ug/g	0.03	0.02	0.01	0.1081
Molybdenum	ug/g	0.62	0.2	0.05	0.1081
Nickel	ug/g	12	1	0.1	0.1081
Selenium	ug/g	9.8	1	0.02	0.1081
Silver	ug/g	0.03	0.02	0.02	0.1081
Strontium	ug/g	5.9	0.9	0.1	0.1081
Thallium	ug/g	0.04	0.02	0.01	0.1081
Tin	ug/g	0.5	0.1	0.1	0.1081
Titanium	ug/g	4.8	1	0.5	0.1081
Uranium	ug/g	0.13	0.03	0.01	0.1081
Vanadium	ug/g	2.2	0.6	0.2	0.1081
Zinc	ug/g	190	20	1	0.1081
Lab Section 6					
Moisture	%	84.83	8	0.02	0.1081

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012753**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 15:30 RG_LILC3_INV-10_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	330	50	5	0.1912
Antimony	ug/g	0.10	0.04	0.02	0.1912
Arsenic	ug/g	0.83	0.1	0.02	0.1912
Barium	ug/g	14	1	0.05	0.1912
Beryllium	ug/g	<0.02		0.02	0.1912
Boron	ug/g	<2		2	0.1912
Cadmium	ug/g	3.7	0.4	0.02	0.1912
Chromium	ug/g	0.8	0.3	0.1	0.1912
Cobalt	ug/g	3.7	0.4	0.02	0.1912
Copper	ug/g	24	2	0.1	0.1912
Iron	ug/g	1600	200	50	0.1912
Lead	ug/g	0.16	0.05	0.02	0.1912
Manganese	ug/g	570	60	0.2	0.1912
Mercury	ug/g	0.04	0.02	0.01	0.1912
Molybdenum	ug/g	0.50	0.1	0.05	0.1912
Nickel	ug/g	8.6	1	0.1	0.1912
Selenium	ug/g	12	1	0.02	0.1912
Silver	ug/g	0.04	0.03	0.02	0.1912
Strontium	ug/g	5.2	0.8	0.1	0.1912
Thallium	ug/g	0.04	0.02	0.01	0.1912
Tin	ug/g	0.5	0.1	0.1	0.1912
Titanium	ug/g	3.0	1	0.5	0.1912
Uranium	ug/g	0.10	0.02	0.01	0.1912
Vanadium	ug/g	1.6	0.5	0.2	0.1912
Zinc	ug/g	250	20	1	0.1912
Lab Section 6					
Moisture	%	85.53	8	0.02	0.1912

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

SASKATCHEWAN RESEARCH COUNCIL

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012754**
Date Sampled: **Feb 26, 2020**
Sample Matrix: **TISSUE**
Description: **02/26/2020 11:30 RG_SLINE_INV-1_20200226**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	130	20	5	0.062
Antimony	ug/g	<0.02		0.02	0.062
Arsenic	ug/g	0.48	0.05	0.05	0.062
Barium	ug/g	7.8	2	0.5	0.062
Beryllium	ug/g	<0.02		0.02	0.062
Boron	ug/g	<5		5	0.062
Cadmium	ug/g	2.9	0.3	0.02	0.062
Chromium	ug/g	<0.5		0.5	0.062
Cobalt	ug/g	<0.5		0.5	0.062
Copper	ug/g	18	3	0.5	0.062
Iron	ug/g	130	20	5	0.062
Lead	ug/g	0.07	0.06	0.05	0.062
Manganese	ug/g	20	3	0.5	0.062
Mercury	ug/g	0.02	0.01	0.01	0.062
Molybdenum	ug/g	0.37	0.1	0.05	0.062
Nickel	ug/g	2.4	0.5	0.5	0.062
Selenium	ug/g	7.6	0.8	0.05	0.062
Silver	ug/g	0.11	0.04	0.02	0.062
Strontium	ug/g	9.5	1	0.1	0.062
Thallium	ug/g	0.04	0.02	0.01	0.062
Tin	ug/g	<0.2		0.2	0.062
Titanium	ug/g	1.8	0.8	0.5	0.062
Uranium	ug/g	0.11	0.04	0.02	0.062
Vanadium	ug/g	0.5	0.3	0.2	0.062
Zinc	ug/g	430	60	5	0.062
Lab Section 6					
Moisture	%	88.94	9	0.02	0.062

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012755**
Date Sampled: **Feb 26, 2020**
Sample Matrix: **TISSUE**
Description: **02/26/2020 11:35 RG_SLINE_INV-2_20200226**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	160	20	5	0.0419
Antimony	ug/g	<0.02		0.02	0.0419
Arsenic	ug/g	0.53	0.1	0.05	0.0419
Barium	ug/g	5.6	1	0.5	0.0419
Beryllium	ug/g	<0.02		0.02	0.0419
Boron	ug/g	<5		5	0.0419
Cadmium	ug/g	3.8	0.4	0.02	0.0419
Chromium	ug/g	<0.5		0.5	0.0419
Cobalt	ug/g	<0.5		0.5	0.0419
Copper	ug/g	14	2	0.5	0.0419
Iron	ug/g	110	20	5	0.0419
Lead	ug/g	0.05	0.05	0.05	0.0419
Manganese	ug/g	18	3	0.5	0.0419
Mercury	ug/g	0.02	0.01	0.01	0.0419
Molybdenum	ug/g	0.27	0.1	0.05	0.0419
Nickel	ug/g	2.1	0.5	0.5	0.0419
Selenium	ug/g	6.7	0.7	0.05	0.0419
Silver	ug/g	0.08	0.04	0.02	0.0419
Strontium	ug/g	6.9	1	0.1	0.0419
Thallium	ug/g	0.04	0.02	0.01	0.0419
Tin	ug/g	<0.2		0.2	0.0419
Titanium	ug/g	1.8	0.8	0.5	0.0419
Uranium	ug/g	0.09	0.04	0.02	0.0419
Vanadium	ug/g	0.6	0.3	0.2	0.0419
Zinc	ug/g	470	70	5	0.0419
Lab Section 6					
Moisture	%	89.77	9	0.02	0.0419

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012756**
Date Sampled: **Feb 26, 2020**
Sample Matrix: **TISSUE**
Description: **02/26/2020 11:38 RG_SLINE_INV-3_20200226**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	130	20	5	0.0563
Antimony	ug/g	<0.02		0.02	0.0563
Arsenic	ug/g	0.39	0.05	0.05	0.0563
Barium	ug/g	7.6	2	0.5	0.0563
Beryllium	ug/g	<0.02		0.02	0.0563
Boron	ug/g	<5		5	0.0563
Cadmium	ug/g	1.6	0.2	0.02	0.0563
Chromium	ug/g	<0.5		0.5	0.0563
Cobalt	ug/g	<0.5		0.5	0.0563
Copper	ug/g	11	2	0.5	0.0563
Iron	ug/g	99	20	5	0.0563
Lead	ug/g	0.06	0.06	0.05	0.0563
Manganese	ug/g	16	2	0.5	0.0563
Mercury	ug/g	0.02	0.01	0.01	0.0563
Molybdenum	ug/g	0.32	0.1	0.05	0.0563
Nickel	ug/g	1.5	0.5	0.5	0.0563
Selenium	ug/g	5.0	0.5	0.05	0.0563
Silver	ug/g	0.07	0.04	0.02	0.0563
Strontium	ug/g	3.2	0.5	0.1	0.0563
Thallium	ug/g	0.04	0.02	0.01	0.0563
Tin	ug/g	<0.2		0.2	0.0563
Titanium	ug/g	1.4	0.6	0.5	0.0563
Uranium	ug/g	0.06	0.03	0.02	0.0563
Vanadium	ug/g	0.4	0.3	0.2	0.0563
Zinc	ug/g	200	30	5	0.0563
Lab Section 6					
Moisture	%	84.51	8	0.02	0.0563

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012757**
Date Sampled: **Feb 26, 2020**
Sample Matrix: **TISSUE**
Description: **02/26/2020 11:42 RG_SLINE_INV-4_20200226**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	170	20	5	0.0467
Antimony	ug/g	0.02	0.02	0.02	0.0467
Arsenic	ug/g	0.38	0.05	0.05	0.0467
Barium	ug/g	5.6	1	0.5	0.0467
Beryllium	ug/g	<0.02		0.02	0.0467
Boron	ug/g	<5		5	0.0467
Cadmium	ug/g	1.6	0.2	0.02	0.0467
Chromium	ug/g	0.6	0.6	0.5	0.0467
Cobalt	ug/g	<0.5		0.5	0.0467
Copper	ug/g	14	2	0.5	0.0467
Iron	ug/g	130	20	5	0.0467
Lead	ug/g	0.08	0.06	0.05	0.0467
Manganese	ug/g	14	2	0.5	0.0467
Mercury	ug/g	0.02	0.01	0.01	0.0467
Molybdenum	ug/g	0.30	0.1	0.05	0.0467
Nickel	ug/g	2.1	0.5	0.5	0.0467
Selenium	ug/g	5.9	0.6	0.05	0.0467
Silver	ug/g	0.08	0.04	0.02	0.0467
Strontium	ug/g	5.5	0.8	0.1	0.0467
Thallium	ug/g	0.03	0.02	0.01	0.0467
Tin	ug/g	<0.2		0.2	0.0467
Titanium	ug/g	2.0	0.8	0.5	0.0467
Uranium	ug/g	0.14	0.05	0.02	0.0467
Vanadium	ug/g	0.6	0.3	0.2	0.0467
Zinc	ug/g	330	50	5	0.0467
Lab Section 6					
Moisture	%	89.22	9	0.02	0.0467

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012758**
Date Sampled: **Feb 26, 2020**
Sample Matrix: **TISSUE**
Description: **02/26/2020 11:46 RG_SLINE_INV-5_20200226**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	87	20	5	0.0414
Antimony	ug/g	<0.02		0.02	0.0414
Arsenic	ug/g	0.40	0.05	0.05	0.0414
Barium	ug/g	5.1	1	0.5	0.0414
Beryllium	ug/g	<0.02		0.02	0.0414
Boron	ug/g	<5		5	0.0414
Cadmium	ug/g	2.8	0.3	0.02	0.0414
Chromium	ug/g	<0.5		0.5	0.0414
Cobalt	ug/g	<0.5		0.5	0.0414
Copper	ug/g	13	2	0.5	0.0414
Iron	ug/g	88	20	5	0.0414
Lead	ug/g	<0.05		0.05	0.0414
Manganese	ug/g	13	2	0.5	0.0414
Mercury	ug/g	0.01	0.01	0.01	0.0414
Molybdenum	ug/g	0.26	0.1	0.05	0.0414
Nickel	ug/g	1.9	0.5	0.5	0.0414
Selenium	ug/g	5.2	0.5	0.05	0.0414
Silver	ug/g	0.08	0.04	0.02	0.0414
Strontium	ug/g	10	1	0.1	0.0414
Thallium	ug/g	0.05	0.02	0.01	0.0414
Tin	ug/g	<0.2		0.2	0.0414
Titanium	ug/g	1.2	0.6	0.5	0.0414
Uranium	ug/g	0.08	0.04	0.02	0.0414
Vanadium	ug/g	0.3	0.2	0.2	0.0414
Zinc	ug/g	370	60	5	0.0414
Lab Section 6					
Moisture	%	87.65	9	0.02	0.0414

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012759**
Date Sampled: **Feb 26, 2020**
Sample Matrix: **TISSUE**
Description: **02/26/2020 11:51 RG_SLINE_INV-6_20200226**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	110	20	5	0.1041
Antimony	ug/g	<0.02		0.02	0.1041
Arsenic	ug/g	0.50	0.08	0.02	0.1041
Barium	ug/g	5.9	0.6	0.05	0.1041
Beryllium	ug/g	<0.02		0.02	0.1041
Boron	ug/g	<2		2	0.1041
Cadmium	ug/g	2.2	0.2	0.02	0.1041
Chromium	ug/g	0.3	0.2	0.1	0.1041
Cobalt	ug/g	0.16	0.02	0.02	0.1041
Copper	ug/g	12	1	0.1	0.1041
Iron	ug/g	98	20	5	0.1041
Lead	ug/g	0.07	0.04	0.02	0.1041
Manganese	ug/g	28	3	0.2	0.1041
Mercury	ug/g	0.02	0.01	0.01	0.1041
Molybdenum	ug/g	0.26	0.1	0.05	0.1041
Nickel	ug/g	1.4	0.4	0.1	0.1041
Selenium	ug/g	7.9	0.8	0.02	0.1041
Silver	ug/g	0.11	0.04	0.02	0.1041
Strontium	ug/g	2.6	0.4	0.1	0.1041
Thallium	ug/g	0.03	0.02	0.01	0.1041
Tin	ug/g	<0.1		0.1	0.1041
Titanium	ug/g	1.8	0.8	0.5	0.1041
Uranium	ug/g	0.09	0.03	0.01	0.1041
Vanadium	ug/g	0.4	0.3	0.2	0.1041
Zinc	ug/g	270	30	1	0.1041
Lab Section 6					
Moisture	%	85.99	8	0.02	0.1041

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012760**
Date Sampled: **Feb 26, 2020**
Sample Matrix: **TISSUE**
Description: **02/26/2020 11:56 RG_SLINE_INV-7_20200226**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	110	20	5	0.0324
Antimony	ug/g	0.02	0.02	0.02	0.0324
Arsenic	ug/g	0.79	0.2	0.05	0.0324
Barium	ug/g	9.0	2	0.5	0.0324
Beryllium	ug/g	<0.02		0.02	0.0324
Boron	ug/g	<5		5	0.0324
Cadmium	ug/g	2.3	0.2	0.02	0.0324
Chromium	ug/g	<0.5		0.5	0.0324
Cobalt	ug/g	<0.5		0.5	0.0324
Copper	ug/g	14	2	0.5	0.0324
Iron	ug/g	110	20	5	0.0324
Lead	ug/g	0.06	0.06	0.05	0.0324
Manganese	ug/g	22	3	0.5	0.0324
Mercury	ug/g	0.02	0.01	0.01	0.0324
Molybdenum	ug/g	0.33	0.1	0.05	0.0324
Nickel	ug/g	2.4	0.5	0.5	0.0324
Selenium	ug/g	6.3	0.6	0.05	0.0324
Silver	ug/g	0.10	0.04	0.02	0.0324
Strontium	ug/g	15	2	0.1	0.0324
Thallium	ug/g	0.04	0.02	0.01	0.0324
Tin	ug/g	<0.2		0.2	0.0324
Titanium	ug/g	1.2	0.6	0.5	0.0324
Uranium	ug/g	0.09	0.04	0.02	0.0324
Vanadium	ug/g	0.6	0.3	0.2	0.0324
Zinc	ug/g	430	60	5	0.0324
Lab Section 6					
Moisture	%	89.52	9	0.02	0.0324

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012761**
Date Sampled: **Feb 26, 2020**
Sample Matrix: **TISSUE**
Description: **02/26/2020 12:01 RG_SLINE_INV-8_20200226**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	260	40	5	0.0381
Antimony	ug/g	0.02	0.02	0.02	0.0381
Arsenic	ug/g	0.39	0.05	0.05	0.0381
Barium	ug/g	5.1	1	0.5	0.0381
Beryllium	ug/g	<0.02		0.02	0.0381
Boron	ug/g	<5		5	0.0381
Cadmium	ug/g	2.8	0.3	0.02	0.0381
Chromium	ug/g	0.6	0.6	0.5	0.0381
Cobalt	ug/g	<0.5		0.5	0.0381
Copper	ug/g	14	2	0.5	0.0381
Iron	ug/g	190	30	5	0.0381
Lead	ug/g	0.15	0.08	0.05	0.0381
Manganese	ug/g	16	2	0.5	0.0381
Mercury	ug/g	0.03	0.02	0.01	0.0381
Molybdenum	ug/g	0.33	0.1	0.05	0.0381
Nickel	ug/g	2.1	0.5	0.5	0.0381
Selenium	ug/g	8.5	0.8	0.05	0.0381
Silver	ug/g	0.10	0.04	0.02	0.0381
Strontium	ug/g	5.4	0.8	0.1	0.0381
Thallium	ug/g	0.04	0.02	0.01	0.0381
Tin	ug/g	<0.2		0.2	0.0381
Titanium	ug/g	3.4	1	0.5	0.0381
Uranium	ug/g	0.20	0.05	0.02	0.0381
Vanadium	ug/g	0.9	0.4	0.2	0.0381
Zinc	ug/g	400	60	5	0.0381
Lab Section 6					
Moisture	%	91.55	9	0.02	0.0381

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012762**
Date Sampled: **Feb 26, 2020**
Sample Matrix: **TISSUE**
Description: **02/26/2020 12:06 RG_SLINE_INV-9_20200226**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	190	30	5	0.0326
Antimony	ug/g	<0.02		0.02	0.0326
Arsenic	ug/g	0.63	0.2	0.05	0.0326
Barium	ug/g	5.7	1	0.5	0.0326
Beryllium	ug/g	<0.02		0.02	0.0326
Boron	ug/g	<5		5	0.0326
Cadmium	ug/g	2.4	0.2	0.02	0.0326
Chromium	ug/g	<0.5		0.5	0.0326
Cobalt	ug/g	<0.5		0.5	0.0326
Copper	ug/g	12	2	0.5	0.0326
Iron	ug/g	140	20	5	0.0326
Lead	ug/g	0.10	0.07	0.05	0.0326
Manganese	ug/g	15	2	0.5	0.0326
Mercury	ug/g	0.04	0.02	0.01	0.0326
Molybdenum	ug/g	0.35	0.1	0.05	0.0326
Nickel	ug/g	2.0	0.5	0.5	0.0326
Selenium	ug/g	8.8	0.9	0.05	0.0326
Silver	ug/g	0.11	0.04	0.02	0.0326
Strontium	ug/g	5.0	0.8	0.1	0.0326
Thallium	ug/g	0.03	0.02	0.01	0.0326
Tin	ug/g	<0.2		0.2	0.0326
Titanium	ug/g	2.5	0.9	0.5	0.0326
Uranium	ug/g	0.22	0.06	0.02	0.0326
Vanadium	ug/g	0.7	0.4	0.2	0.0326
Zinc	ug/g	420	60	5	0.0326
Lab Section 6					
Moisture	%	93.43	9	0.02	0.0326

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

SASKATCHEWAN RESEARCH COUNCIL

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012763**
Date Sampled: **Feb 26, 2020**
Sample Matrix: **TISSUE**
Description: **02/26/2020 12:11 RG_SLINE_INV-10_20200226**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	450	200	50	0.0057
Antimony	ug/g	0.2	0.1	0.1	0.0057
Arsenic	ug/g	<0.5		0.5	0.0057
Barium	ug/g	9	5	5	0.0057
Beryllium	ug/g	<0.02		0.02	0.0057
Boron	ug/g	<50		50	0.0057
Cadmium	ug/g	2.4	0.2	0.02	0.0057
Chromium	ug/g	12	8	5	0.0057
Cobalt	ug/g	9	5	5	0.0057
Copper	ug/g	18	9	5	0.0057
Iron	ug/g	300	100	50	0.0057
Lead	ug/g	<0.5		0.5	0.0057
Manganese	ug/g	17	9	5	0.0057
Mercury	ug/g	0.03	0.02	0.02	0.0057
Molybdenum	ug/g	<0.5		0.5	0.0057
Nickel	ug/g	7	5	5	0.0057
Selenium	ug/g	7.7	2	0.5	0.0057
Silver	ug/g	0.10	0.04	0.02	0.0057
Strontium	ug/g	8	3	1	0.0057
Thallium	ug/g	<0.1		0.1	0.0057
Tin	ug/g	<2		2	0.0057
Titanium	ug/g	14	6	5	0.0057
Uranium	ug/g	0.2	0.1	0.1	0.0057
Vanadium	ug/g	1	1	1	0.0057
Zinc	ug/g	450	100	50	0.0057
Lab Section 6					
Moisture	%	90.57	9	0.02	0.0057

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012764**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 12:58 RG_FO23_INV-1_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	1700	200	50	0.0054
Antimony	ug/g	<0.1		0.1	0.0054
Arsenic	ug/g	<0.5		0.5	0.0054
Barium	ug/g	30	5	5	0.0054
Beryllium	ug/g	0.05	0.02	0.02	0.0054
Boron	ug/g	<50		50	0.0054
Cadmium	ug/g	1.7	0.2	0.02	0.0054
Chromium	ug/g	<5		5	0.0054
Cobalt	ug/g	<5		5	0.0054
Copper	ug/g	13	8	5	0.0054
Iron	ug/g	1200	200	50	0.0054
Lead	ug/g	<0.5		0.5	0.0054
Manganese	ug/g	63	20	5	0.0054
Mercury	ug/g	0.02	0.02	0.02	0.0054
Molybdenum	ug/g	<0.5		0.5	0.0054
Nickel	ug/g	<5		5	0.0054
Selenium	ug/g	5.7	1	0.5	0.0054
Silver	ug/g	0.10	0.04	0.02	0.0054
Strontium	ug/g	11	3	1	0.0054
Thallium	ug/g	<0.1		0.1	0.0054
Tin	ug/g	<2		2	0.0054
Titanium	ug/g	29	10	5	0.0054
Uranium	ug/g	<0.1		0.1	0.0054
Vanadium	ug/g	4	2	1	0.0054
Zinc	ug/g	400	100	50	0.0054
Lab Section 6					
Moisture	%	83.45	8	0.02	0.0054

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012765**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 13:07 RG_FO23_INV-2_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	1500	200	50	0.0066
Antimony	ug/g	<0.1		0.1	0.0066
Arsenic	ug/g	0.8	0.5	0.5	0.0066
Barium	ug/g	20	5	5	0.0066
Beryllium	ug/g	0.05	0.02	0.02	0.0066
Boron	ug/g	<50		50	0.0066
Cadmium	ug/g	2.1	0.2	0.02	0.0066
Chromium	ug/g	<5		5	0.0066
Cobalt	ug/g	<5		5	0.0066
Copper	ug/g	10	7	5	0.0066
Iron	ug/g	820	200	50	0.0066
Lead	ug/g	<0.5		0.5	0.0066
Manganese	ug/g	46	10	5	0.0066
Mercury	ug/g	0.02	0.02	0.02	0.0066
Molybdenum	ug/g	<0.5		0.5	0.0066
Nickel	ug/g	<5		5	0.0066
Selenium	ug/g	5.3	1	0.5	0.0066
Silver	ug/g	0.06	0.03	0.02	0.0066
Strontium	ug/g	8	3	1	0.0066
Thallium	ug/g	<0.1		0.1	0.0066
Tin	ug/g	<2		2	0.0066
Titanium	ug/g	22	8	5	0.0066
Uranium	ug/g	<0.1		0.1	0.0066
Vanadium	ug/g	4	2	1	0.0066
Zinc	ug/g	300	100	50	0.0066
Lab Section 6					
Moisture	%	67.72	7	0.02	0.0066

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012766**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 13:17 RG_FO23_INV-3_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	660	70	5	0.0364
Antimony	ug/g	0.02	0.02	0.02	0.0364
Arsenic	ug/g	0.43	0.05	0.05	0.0364
Barium	ug/g	11	2	0.5	0.0364
Beryllium	ug/g	0.02	0.02	0.02	0.0364
Boron	ug/g	<5		5	0.0364
Cadmium	ug/g	0.44	0.07	0.02	0.0364
Chromium	ug/g	1.1	0.7	0.5	0.0364
Cobalt	ug/g	<0.5		0.5	0.0364
Copper	ug/g	15	2	0.5	0.0364
Iron	ug/g	410	60	5	0.0364
Lead	ug/g	0.20	0.1	0.05	0.0364
Manganese	ug/g	22	3	0.5	0.0364
Mercury	ug/g	0.02	0.01	0.01	0.0364
Molybdenum	ug/g	0.21	0.1	0.05	0.0364
Nickel	ug/g	2.4	0.5	0.5	0.0364
Selenium	ug/g	6.3	0.6	0.05	0.0364
Silver	ug/g	0.14	0.05	0.02	0.0364
Strontium	ug/g	4.8	0.7	0.1	0.0364
Thallium	ug/g	0.02	0.01	0.01	0.0364
Tin	ug/g	<0.2		0.2	0.0364
Titanium	ug/g	6.3	2	0.5	0.0364
Uranium	ug/g	0.04	0.03	0.02	0.0364
Vanadium	ug/g	1.6	0.5	0.2	0.0364
Zinc	ug/g	500	50	5	0.0364
Lab Section 6					
Moisture	%	78.69	8	0.02	0.0364

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Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012767**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 13:20 RG_FO23_INV-4_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	1700	200	50	0.0086
Antimony	ug/g	<0.1		0.1	0.0086
Arsenic	ug/g	0.6	0.5	0.5	0.0086
Barium	ug/g	25	5	5	0.0086
Beryllium	ug/g	0.06	0.02	0.02	0.0086
Boron	ug/g	<50		50	0.0086
Cadmium	ug/g	0.75	0.1	0.02	0.0086
Chromium	ug/g	6	6	5	0.0086
Cobalt	ug/g	<5		5	0.0086
Copper	ug/g	6	6	5	0.0086
Iron	ug/g	1000	200	50	0.0086
Lead	ug/g	0.6	0.6	0.5	0.0086
Manganese	ug/g	49	10	5	0.0086
Mercury	ug/g	<0.02		0.02	0.0086
Molybdenum	ug/g	<0.5		0.5	0.0086
Nickel	ug/g	<5		5	0.0086
Selenium	ug/g	2.8	1	0.5	0.0086
Silver	ug/g	0.05	0.03	0.02	0.0086
Strontium	ug/g	370	40	1	0.0086
Thallium	ug/g	<0.1		0.1	0.0086
Tin	ug/g	<2		2	0.0086
Titanium	ug/g	19	8	5	0.0086
Uranium	ug/g	0.8	0.3	0.1	0.0086
Vanadium	ug/g	6	2	1	0.0086
Zinc	ug/g	180	90	50	0.0086
Lab Section 6					
Moisture	%	84.55	8	0.02	0.0086

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012768**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 13:23 RG_FO23_INV-5_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	1000	200	50	0.0153
Antimony	ug/g	<0.1		0.1	0.0153
Arsenic	ug/g	0.6	0.5	0.5	0.0153
Barium	ug/g	15	5	5	0.0153
Beryllium	ug/g	0.04	0.02	0.02	0.0153
Boron	ug/g	<50		50	0.0153
Cadmium	ug/g	1.4	0.2	0.02	0.0153
Chromium	ug/g	<5		5	0.0153
Cobalt	ug/g	<5		5	0.0153
Copper	ug/g	9	7	5	0.0153
Iron	ug/g	610	200	50	0.0153
Lead	ug/g	<0.5		0.5	0.0153
Manganese	ug/g	31	10	5	0.0153
Mercury	ug/g	<0.02		0.02	0.0153
Molybdenum	ug/g	<0.5		0.5	0.0153
Nickel	ug/g	<5		5	0.0153
Selenium	ug/g	4.1	1	0.5	0.0153
Silver	ug/g	0.06	0.03	0.02	0.0153
Strontium	ug/g	6	2	1	0.0153
Thallium	ug/g	<0.1		0.1	0.0153
Tin	ug/g	<2		2	0.0153
Titanium	ug/g	11	6	5	0.0153
Uranium	ug/g	<0.1		0.1	0.0153
Vanadium	ug/g	3	2	1	0.0153
Zinc	ug/g	290	100	50	0.0153
Lab Section 6					
Moisture	%	80.59	8	0.02	0.0153

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Variability in detection limits due to sample size.
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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012769**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 13:26 RG_FO23_INV-6_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	2000	300	50	0.0037
Antimony	ug/g	<0.1		0.1	0.0037
Arsenic	ug/g	<0.5		0.5	0.0037
Barium	ug/g	30	5	5	0.0037
Beryllium	ug/g	0.09	0.02	0.02	0.0037
Boron	ug/g	<50		50	0.0037
Cadmium	ug/g	2.6	0.3	0.02	0.0037
Chromium	ug/g	<5		5	0.0037
Cobalt	ug/g	<5		5	0.0037
Copper	ug/g	9	7	5	0.0037
Iron	ug/g	1200	200	50	0.0037
Lead	ug/g	0.5	0.5	0.5	0.0037
Manganese	ug/g	48	10	5	0.0037
Mercury	ug/g	<0.02		0.02	0.0037
Molybdenum	ug/g	<0.5		0.5	0.0037
Nickel	ug/g	<5		5	0.0037
Selenium	ug/g	5.2	1	0.5	0.0037
Silver	ug/g	0.07	0.04	0.02	0.0037
Strontium	ug/g	13	3	1	0.0037
Thallium	ug/g	<0.1		0.1	0.0037
Tin	ug/g	<2		2	0.0037
Titanium	ug/g	20	8	5	0.0037
Uranium	ug/g	0.1	0.1	0.1	0.0037
Vanadium	ug/g	5	2	1	0.0037
Zinc	ug/g	270	100	50	0.0037
Lab Section 6					
Moisture	%	79.88	8	0.02	0.0037

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

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Variability in detection limits due to sample size.
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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012770**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 13:30 RG_FO23_INV-7_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	2700	400	50	0.001
Antimony	ug/g	0.3	0.2	0.1	0.001
Arsenic	ug/g	<0.5		0.5	0.001
Barium	ug/g	34	5	5	0.001
Beryllium	ug/g	0.10	0.02	0.02	0.001
Boron	ug/g	<50		50	0.001
Cadmium	ug/g	1.2	0.2	0.02	0.001
Chromium	ug/g	5	5	5	0.001
Cobalt	ug/g	<5		5	0.001
Copper	ug/g	14	8	5	0.001
Iron	ug/g	1600	200	50	0.001
Lead	ug/g	<0.5		0.5	0.001
Manganese	ug/g	60	20	5	0.001
Mercury	ug/g	0.04	0.03	0.02	0.001
Molybdenum	ug/g	0.5	0.5	0.5	0.001
Nickel	ug/g	<5		5	0.001
Selenium	ug/g	4.6	1	0.5	0.001
Silver	ug/g	0.10	0.04	0.02	0.001
Strontium	ug/g	16	4	1	0.001
Thallium	ug/g	<0.1		0.1	0.001
Tin	ug/g	<2		2	0.001
Titanium	ug/g	34	10	5	0.001
Uranium	ug/g	0.2	0.1	0.1	0.001
Vanadium	ug/g	6	2	1	0.001
Zinc	ug/g	260	100	50	0.001
Lab Section 6					
Moisture	%	89.84	9	0.02	0.001

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012771**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 13:33 RG_FO23_INV-8_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	1200	200	50	0.0198
Antimony	ug/g	<0.1		0.1	0.0198
Arsenic	ug/g	0.7	0.5	0.5	0.0198
Barium	ug/g	18	5	5	0.0198
Beryllium	ug/g	0.05	0.02	0.02	0.0198
Boron	ug/g	<50		50	0.0198
Cadmium	ug/g	1.5	0.2	0.02	0.0198
Chromium	ug/g	<5		5	0.0198
Cobalt	ug/g	<5		5	0.0198
Copper	ug/g	12	8	5	0.0198
Iron	ug/g	710	200	50	0.0198
Lead	ug/g	<0.5		0.5	0.0198
Manganese	ug/g	42	10	5	0.0198
Mercury	ug/g	<0.02		0.02	0.0198
Molybdenum	ug/g	<0.5		0.5	0.0198
Nickel	ug/g	<5		5	0.0198
Selenium	ug/g	6.0	2	0.5	0.0198
Silver	ug/g	0.06	0.03	0.02	0.0198
Strontium	ug/g	9	3	1	0.0198
Thallium	ug/g	<0.1		0.1	0.0198
Tin	ug/g	<2		2	0.0198
Titanium	ug/g	11	6	5	0.0198
Uranium	ug/g	<0.1		0.1	0.0198
Vanadium	ug/g	3	2	1	0.0198
Zinc	ug/g	250	100	50	0.0198
Lab Section 6					
Moisture	%	86.87	9	0.02	0.0198

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

SASKATCHEWAN RESEARCH COUNCIL

Environmental Analytical Laboratories
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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012772**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 13:36 RG_FO23_INV-9_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	1200	200	50	0.0198
Antimony	ug/g	<0.1		0.1	0.0198
Arsenic	ug/g	0.8	0.5	0.5	0.0198
Barium	ug/g	22	5	5	0.0198
Beryllium	ug/g	0.04	0.02	0.02	0.0198
Boron	ug/g	<50		50	0.0198
Cadmium	ug/g	1.9	0.3	0.02	0.0198
Chromium	ug/g	<5		5	0.0198
Cobalt	ug/g	<5		5	0.0198
Copper	ug/g	9	7	5	0.0198
Iron	ug/g	710	200	50	0.0198
Lead	ug/g	<0.5		0.5	0.0198
Manganese	ug/g	36	10	5	0.0198
Mercury	ug/g	<0.02		0.02	0.0198
Molybdenum	ug/g	<0.5		0.5	0.0198
Nickel	ug/g	<5		5	0.0198
Selenium	ug/g	4.5	1	0.5	0.0198
Silver	ug/g	0.06	0.03	0.02	0.0198
Strontium	ug/g	8	3	1	0.0198
Thallium	ug/g	<0.1		0.1	0.0198
Tin	ug/g	<2		2	0.0198
Titanium	ug/g	13	6	5	0.0198
Uranium	ug/g	<0.1		0.1	0.0198
Vanadium	ug/g	3	2	1	0.0198
Zinc	ug/g	320	100	50	0.0198
Lab Section 6					
Moisture	%	86.62	9	0.02	0.0198

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012773**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 13:40 RG_FO23_INV-10_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	130	20	5	0.0504
Antimony	ug/g	<0.02		0.02	0.0504
Arsenic	ug/g	0.38	0.05	0.05	0.0504
Barium	ug/g	8.5	2	0.5	0.0504
Beryllium	ug/g	<0.02		0.02	0.0504
Boron	ug/g	<5		5	0.0504
Cadmium	ug/g	0.26	0.06	0.02	0.0504
Chromium	ug/g	<0.5		0.5	0.0504
Cobalt	ug/g	<0.5		0.5	0.0504
Copper	ug/g	28	4	0.5	0.0504
Iron	ug/g	120	20	5	0.0504
Lead	ug/g	<0.05		0.05	0.0504
Manganese	ug/g	20	3	0.5	0.0504
Mercury	ug/g	0.02	0.01	0.01	0.0504
Molybdenum	ug/g	0.15	0.08	0.05	0.0504
Nickel	ug/g	1.5	0.5	0.5	0.0504
Selenium	ug/g	6.5	0.6	0.05	0.0504
Silver	ug/g	0.19	0.06	0.02	0.0504
Strontium	ug/g	8.2	1	0.1	0.0504
Thallium	ug/g	<0.01		0.01	0.0504
Tin	ug/g	<0.2		0.2	0.0504
Titanium	ug/g	2.0	0.8	0.5	0.0504
Uranium	ug/g	0.02	0.02	0.02	0.0504
Vanadium	ug/g	0.3	0.2	0.2	0.0504
Zinc	ug/g	580	60	5	0.0504
Lab Section 6					
Moisture	%	82.17	8	0.02	0.0504

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012774**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 10:52 RG_FRUL_INV-1_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	400	60	5	0.0696
Antimony	ug/g	0.02	0.02	0.02	0.0696
Arsenic	ug/g	0.28	0.05	0.05	0.0696
Barium	ug/g	10	2	0.5	0.0696
Beryllium	ug/g	<0.02		0.02	0.0696
Boron	ug/g	<5		5	0.0696
Cadmium	ug/g	0.74	0.1	0.02	0.0696
Chromium	ug/g	0.8	0.6	0.5	0.0696
Cobalt	ug/g	<0.5		0.5	0.0696
Copper	ug/g	24	4	0.5	0.0696
Iron	ug/g	320	50	5	0.0696
Lead	ug/g	0.16	0.09	0.05	0.0696
Manganese	ug/g	34	5	0.5	0.0696
Mercury	ug/g	0.02	0.01	0.01	0.0696
Molybdenum	ug/g	0.18	0.09	0.05	0.0696
Nickel	ug/g	2.3	0.5	0.5	0.0696
Selenium	ug/g	9.3	0.9	0.05	0.0696
Silver	ug/g	0.32	0.08	0.02	0.0696
Strontium	ug/g	5.0	0.8	0.1	0.0696
Thallium	ug/g	0.01	0.01	0.01	0.0696
Tin	ug/g	<0.2		0.2	0.0696
Titanium	ug/g	4.9	1	0.5	0.0696
Uranium	ug/g	0.04	0.03	0.02	0.0696
Vanadium	ug/g	1.2	0.5	0.2	0.0696
Zinc	ug/g	450	70	5	0.0696
Lab Section 6					
Moisture	%	74.42	7	0.02	0.0696

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012775**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 10:58 RG_FRUL_INV-2_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	460	70	5	0.0332
Antimony	ug/g	0.03	0.02	0.02	0.0332
Arsenic	ug/g	0.26	0.05	0.05	0.0332
Barium	ug/g	13	2	0.5	0.0332
Beryllium	ug/g	<0.02		0.02	0.0332
Boron	ug/g	<5		5	0.0332
Cadmium	ug/g	0.93	0.1	0.02	0.0332
Chromium	ug/g	0.8	0.6	0.5	0.0332
Cobalt	ug/g	<0.5		0.5	0.0332
Copper	ug/g	17	2	0.5	0.0332
Iron	ug/g	330	50	5	0.0332
Lead	ug/g	0.15	0.08	0.05	0.0332
Manganese	ug/g	37	6	0.5	0.0332
Mercury	ug/g	0.02	0.01	0.01	0.0332
Molybdenum	ug/g	0.22	0.1	0.05	0.0332
Nickel	ug/g	2.8	0.5	0.5	0.0332
Selenium	ug/g	6.0	0.6	0.05	0.0332
Silver	ug/g	0.28	0.07	0.02	0.0332
Strontium	ug/g	5.2	0.8	0.1	0.0332
Thallium	ug/g	0.01	0.01	0.01	0.0332
Tin	ug/g	<0.2		0.2	0.0332
Titanium	ug/g	5.6	1	0.5	0.0332
Uranium	ug/g	0.05	0.03	0.02	0.0332
Vanadium	ug/g	1.2	0.5	0.2	0.0332
Zinc	ug/g	340	50	5	0.0332
Lab Section 6					
Moisture	%	75.78	8	0.02	0.0332

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012776**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 11:05 RG_FRUL_INV-3_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	160	20	5	0.0405
Antimony	ug/g	<0.02		0.02	0.0405
Arsenic	ug/g	0.23	0.05	0.05	0.0405
Barium	ug/g	6.8	2	0.5	0.0405
Beryllium	ug/g	<0.02		0.02	0.0405
Boron	ug/g	<5		5	0.0405
Cadmium	ug/g	6.1	0.6	0.02	0.0405
Chromium	ug/g	<0.5		0.5	0.0405
Cobalt	ug/g	0.7	0.5	0.5	0.0405
Copper	ug/g	14	2	0.5	0.0405
Iron	ug/g	160	20	5	0.0405
Lead	ug/g	0.07	0.06	0.05	0.0405
Manganese	ug/g	62	6	0.5	0.0405
Mercury	ug/g	0.03	0.02	0.01	0.0405
Molybdenum	ug/g	0.34	0.1	0.05	0.0405
Nickel	ug/g	1.3	0.5	0.5	0.0405
Selenium	ug/g	7.0	0.7	0.05	0.0405
Silver	ug/g	0.22	0.06	0.02	0.0405
Strontium	ug/g	3.4	0.5	0.1	0.0405
Thallium	ug/g	0.02	0.01	0.01	0.0405
Tin	ug/g	<0.2		0.2	0.0405
Titanium	ug/g	2.6	0.9	0.5	0.0405
Uranium	ug/g	0.04	0.03	0.02	0.0405
Vanadium	ug/g	0.5	0.3	0.2	0.0405
Zinc	ug/g	170	20	5	0.0405
Lab Section 6					
Moisture	%	87.10	9	0.02	0.0405

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012777**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 11:06 RG_FRUL_INV-4_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	520	50	5	0.0875
Antimony	ug/g	<0.02		0.02	0.0875
Arsenic	ug/g	0.34	0.05	0.05	0.0875
Barium	ug/g	11	2	0.5	0.0875
Beryllium	ug/g	<0.02		0.02	0.0875
Boron	ug/g	<5		5	0.0875
Cadmium	ug/g	0.88	0.1	0.02	0.0875
Chromium	ug/g	1.0	0.7	0.5	0.0875
Cobalt	ug/g	<0.5		0.5	0.0875
Copper	ug/g	21	3	0.5	0.0875
Iron	ug/g	400	60	5	0.0875
Lead	ug/g	0.18	0.09	0.05	0.0875
Manganese	ug/g	36	5	0.5	0.0875
Mercury	ug/g	0.02	0.01	0.01	0.0875
Molybdenum	ug/g	0.18	0.09	0.05	0.0875
Nickel	ug/g	2.6	0.5	0.5	0.0875
Selenium	ug/g	8.2	0.8	0.05	0.0875
Silver	ug/g	0.31	0.08	0.02	0.0875
Strontium	ug/g	4.0	0.6	0.1	0.0875
Thallium	ug/g	0.02	0.01	0.01	0.0875
Tin	ug/g	<0.2		0.2	0.0875
Titanium	ug/g	5.9	1	0.5	0.0875
Uranium	ug/g	0.05	0.03	0.02	0.0875
Vanadium	ug/g	1.6	0.5	0.2	0.0875
Zinc	ug/g	380	60	5	0.0875
Lab Section 6					
Moisture	%	77.66	8	0.02	0.0875

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012778**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 11:13 RG_FRUL_INV-5_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	460	70	5	0.0711
Antimony	ug/g	0.02	0.02	0.02	0.0711
Arsenic	ug/g	0.42	0.05	0.05	0.0711
Barium	ug/g	14	2	0.5	0.0711
Beryllium	ug/g	<0.02		0.02	0.0711
Boron	ug/g	<5		5	0.0711
Cadmium	ug/g	1.1	0.2	0.02	0.0711
Chromium	ug/g	0.7	0.6	0.5	0.0711
Cobalt	ug/g	<0.5		0.5	0.0711
Copper	ug/g	21	3	0.5	0.0711
Iron	ug/g	340	50	5	0.0711
Lead	ug/g	0.15	0.08	0.05	0.0711
Manganese	ug/g	46	7	0.5	0.0711
Mercury	ug/g	0.02	0.01	0.01	0.0711
Molybdenum	ug/g	0.18	0.09	0.05	0.0711
Nickel	ug/g	1.4	0.5	0.5	0.0711
Selenium	ug/g	6.8	0.7	0.05	0.0711
Silver	ug/g	0.28	0.07	0.02	0.0711
Strontium	ug/g	9.0	1	0.1	0.0711
Thallium	ug/g	0.01	0.01	0.01	0.0711
Tin	ug/g	<0.2		0.2	0.0711
Titanium	ug/g	5.0	1	0.5	0.0711
Uranium	ug/g	0.06	0.03	0.02	0.0711
Vanadium	ug/g	1.3	0.5	0.2	0.0711
Zinc	ug/g	400	60	5	0.0711
Lab Section 6					
Moisture	%	85.84	8	0.02	0.0711

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012779**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 11:17 RG_FRUL_INV-6_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	260	40	5	0.0338
Antimony	ug/g	<0.02		0.02	0.0338
Arsenic	ug/g	0.28	0.05	0.05	0.0338
Barium	ug/g	11	2	0.5	0.0338
Beryllium	ug/g	<0.02		0.02	0.0338
Boron	ug/g	<5		5	0.0338
Cadmium	ug/g	0.66	0.1	0.02	0.0338
Chromium	ug/g	0.5	0.5	0.5	0.0338
Cobalt	ug/g	<0.5		0.5	0.0338
Copper	ug/g	27	4	0.5	0.0338
Iron	ug/g	230	30	5	0.0338
Lead	ug/g	0.10	0.07	0.05	0.0338
Manganese	ug/g	27	4	0.5	0.0338
Mercury	ug/g	0.02	0.01	0.01	0.0338
Molybdenum	ug/g	0.16	0.09	0.05	0.0338
Nickel	ug/g	1.4	0.5	0.5	0.0338
Selenium	ug/g	9.6	1	0.05	0.0338
Silver	ug/g	0.41	0.06	0.02	0.0338
Strontium	ug/g	3.7	0.6	0.1	0.0338
Thallium	ug/g	0.01	0.01	0.01	0.0338
Tin	ug/g	<0.2		0.2	0.0338
Titanium	ug/g	2.5	0.9	0.5	0.0338
Uranium	ug/g	0.04	0.03	0.02	0.0338
Vanadium	ug/g	0.8	0.4	0.2	0.0338
Zinc	ug/g	390	60	5	0.0338
Lab Section 6					
Moisture	%	84.33	8	0.02	0.0338

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012780**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 11:20 RG_FRUL_INV-7_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	800	80	5	0.02808
Antimony	ug/g	0.04	0.03	0.02	0.02808
Arsenic	ug/g	0.49	0.05	0.05	0.02808
Barium	ug/g	13	2	0.5	0.02808
Beryllium	ug/g	0.03	0.02	0.02	0.02808
Boron	ug/g	<5		5	0.02808
Cadmium	ug/g	1.6	0.2	0.02	0.02808
Chromium	ug/g	1.1	0.7	0.5	0.02808
Cobalt	ug/g	0.6	0.5	0.5	0.02808
Copper	ug/g	18	3	0.5	0.02808
Iron	ug/g	490	70	5	0.02808
Lead	ug/g	0.33	0.1	0.05	0.02808
Manganese	ug/g	40	6	0.5	0.02808
Mercury	ug/g	0.02	0.01	0.01	0.02808
Molybdenum	ug/g	0.20	0.1	0.05	0.02808
Nickel	ug/g	1.8	0.5	0.5	0.02808
Selenium	ug/g	6.0	0.6	0.05	0.02808
Silver	ug/g	0.26	0.06	0.02	0.02808
Strontium	ug/g	4.5	0.7	0.1	0.02808
Thallium	ug/g	0.02	0.01	0.01	0.02808
Tin	ug/g	<0.2		0.2	0.02808
Titanium	ug/g	12	2	0.5	0.02808
Uranium	ug/g	0.06	0.03	0.02	0.02808
Vanadium	ug/g	2.3	0.6	0.2	0.02808
Zinc	ug/g	320	50	5	0.02808
Lab Section 6					
Moisture	%	84.00	8	0.02	0.02808

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

SASKATCHEWAN RESEARCH COUNCIL

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012781**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 11:25 RG_FRUL_INV-8_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	630	60	5	0.05811
Antimony	ug/g	0.02	0.02	0.02	0.05811
Arsenic	ug/g	0.33	0.05	0.05	0.05811
Barium	ug/g	14	2	0.5	0.05811
Beryllium	ug/g	0.02	0.02	0.02	0.05811
Boron	ug/g	<5		5	0.05811
Cadmium	ug/g	1.0	0.2	0.02	0.05811
Chromium	ug/g	0.9	0.7	0.5	0.05811
Cobalt	ug/g	<0.5		0.5	0.05811
Copper	ug/g	24	4	0.5	0.05811
Iron	ug/g	380	60	5	0.05811
Lead	ug/g	0.21	0.1	0.05	0.05811
Manganese	ug/g	41	6	0.5	0.05811
Mercury	ug/g	0.02	0.01	0.01	0.05811
Molybdenum	ug/g	0.24	0.1	0.05	0.05811
Nickel	ug/g	1.8	0.5	0.5	0.05811
Selenium	ug/g	8.2	0.8	0.05	0.05811
Silver	ug/g	0.40	0.06	0.02	0.05811
Strontium	ug/g	5.7	0.8	0.1	0.05811
Thallium	ug/g	0.02	0.01	0.01	0.05811
Tin	ug/g	<0.2		0.2	0.05811
Titanium	ug/g	10	2	0.5	0.05811
Uranium	ug/g	0.12	0.05	0.02	0.05811
Vanadium	ug/g	1.7	0.6	0.2	0.05811
Zinc	ug/g	470	70	5	0.05811
Lab Section 6					
Moisture	%	89.61	9	0.02	0.05811

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

SASKATCHEWAN RESEARCH COUNCIL

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012782**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 11:28 RG_FRUL_INV-9_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	420	60	5	0.07975
Antimony	ug/g	<0.02		0.02	0.07975
Arsenic	ug/g	0.46	0.05	0.05	0.07975
Barium	ug/g	10	2	0.5	0.07975
Beryllium	ug/g	<0.02		0.02	0.07975
Boron	ug/g	<5		5	0.07975
Cadmium	ug/g	1.1	0.2	0.02	0.07975
Chromium	ug/g	1.0	0.7	0.5	0.07975
Cobalt	ug/g	0.7	0.5	0.5	0.07975
Copper	ug/g	24	4	0.5	0.07975
Iron	ug/g	270	40	5	0.07975
Lead	ug/g	0.13	0.08	0.05	0.07975
Manganese	ug/g	27	4	0.5	0.07975
Mercury	ug/g	0.02	0.01	0.01	0.07975
Molybdenum	ug/g	0.21	0.1	0.05	0.07975
Nickel	ug/g	1.6	0.5	0.5	0.07975
Selenium	ug/g	8.3	0.8	0.05	0.07975
Silver	ug/g	0.31	0.08	0.02	0.07975
Strontium	ug/g	4.3	0.6	0.1	0.07975
Thallium	ug/g	0.01	0.01	0.01	0.07975
Tin	ug/g	<0.2		0.2	0.07975
Titanium	ug/g	6.5	2	0.5	0.07975
Uranium	ug/g	0.05	0.03	0.02	0.07975
Vanadium	ug/g	1.3	0.5	0.2	0.07975
Zinc	ug/g	400	60	5	0.07975
Lab Section 6					
Moisture	%	89.27	9	0.02	0.07975

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012783**
Date Sampled: **Feb 25, 2020**
Sample Matrix: **TISSUE**
Description: **02/25/2020 11:32 RG_FRUL_INV-10_20200225**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	98	20	5	0.05903
Antimony	ug/g	<0.02		0.02	0.05903
Arsenic	ug/g	0.23	0.05	0.05	0.05903
Barium	ug/g	9.0	2	0.5	0.05903
Beryllium	ug/g	<0.02		0.02	0.05903
Boron	ug/g	<5		5	0.05903
Cadmium	ug/g	0.86	0.1	0.02	0.05903
Chromium	ug/g	<0.5		0.5	0.05903
Cobalt	ug/g	<0.5		0.5	0.05903
Copper	ug/g	27	4	0.5	0.05903
Iron	ug/g	93	20	5	0.05903
Lead	ug/g	<0.05		0.05	0.05903
Manganese	ug/g	36	5	0.5	0.05903
Mercury	ug/g	0.02	0.01	0.01	0.05903
Molybdenum	ug/g	0.15	0.08	0.05	0.05903
Nickel	ug/g	1.2	0.5	0.5	0.05903
Selenium	ug/g	8.3	0.8	0.05	0.05903
Silver	ug/g	0.36	0.09	0.02	0.05903
Strontium	ug/g	6.9	1	0.1	0.05903
Thallium	ug/g	<0.01		0.01	0.05903
Tin	ug/g	<0.2		0.2	0.05903
Titanium	ug/g	2.3	0.9	0.5	0.05903
Uranium	ug/g	0.02	0.02	0.02	0.05903
Vanadium	ug/g	0.3	0.2	0.2	0.05903
Zinc	ug/g	450	70	5	0.05903
Lab Section 6					
Moisture	%	86.31	9	0.02	0.05903

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012784**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 10:16 RG_LIDCOM_INV-1_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	1200	200	20	0.26409
Antimony	ug/g	0.05	0.02	0.01	0.26409
Arsenic	ug/g	0.59	0.09	0.01	0.26409
Barium	ug/g	20	2	0.02	0.26409
Beryllium	ug/g	0.04	0.01	0.01	0.26409
Boron	ug/g	2	1	1	0.26409
Cadmium	ug/g	3.1	0.3	0.01	0.26409
Chromium	ug/g	2.0	0.3	0.05	0.26409
Cobalt	ug/g	1.4	0.1	0.01	0.26409
Copper	ug/g	13	1	0.05	0.26409
Iron	ug/g	910	90	2	0.26409
Lead	ug/g	0.44	0.07	0.01	0.26409
Manganese	ug/g	237	20	0.1	0.26409
Mercury	ug/g	0.030	0.01	0.005	0.26409
Molybdenum	ug/g	0.46	0.07	0.02	0.26409
Nickel	ug/g	12	1	0.05	0.26409
Selenium	ug/g	5.9	0.6	0.01	0.26409
Silver	ug/g	0.03	0.02	0.01	0.26409
Strontium	ug/g	8.5	0.8	0.05	0.26409
Thallium	ug/g	0.036	0.01	0.005	0.26409
Tin	ug/g	0.08	0.05	0.05	0.26409
Titanium	ug/g	15	2	0.2	0.26409
Uranium	ug/g	0.12	0.02	0.005	0.26409
Vanadium	ug/g	3.6	0.5	0.1	0.26409
Zinc	ug/g	180	20	0.5	0.26409
Lab Section 6					
Moisture	%	84.04	8	0.02	0.26409

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012785**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 10:28 RG_LIDCOM_INV-2_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	770	80	5	0.18997
Antimony	ug/g	0.04	0.03	0.02	0.18997
Arsenic	ug/g	0.36	0.09	0.02	0.18997
Barium	ug/g	14	1	0.05	0.18997
Beryllium	ug/g	0.02	0.02	0.02	0.18997
Boron	ug/g	<2		2	0.18997
Cadmium	ug/g	1.9	0.3	0.02	0.18997
Chromium	ug/g	1.2	0.3	0.1	0.18997
Cobalt	ug/g	0.88	0.1	0.02	0.18997
Copper	ug/g	12	1	0.1	0.18997
Iron	ug/g	420	60	5	0.18997
Lead	ug/g	0.30	0.08	0.02	0.18997
Manganese	ug/g	180	20	0.2	0.18997
Mercury	ug/g	0.03	0.02	0.01	0.18997
Molybdenum	ug/g	0.37	0.1	0.05	0.18997
Nickel	ug/g	7.2	1	0.1	0.18997
Selenium	ug/g	5.7	0.6	0.02	0.18997
Silver	ug/g	0.03	0.02	0.02	0.18997
Strontium	ug/g	4.2	0.6	0.1	0.18997
Thallium	ug/g	0.02	0.01	0.01	0.18997
Tin	ug/g	<0.1		0.1	0.18997
Titanium	ug/g	12	2	0.5	0.18997
Uranium	ug/g	0.10	0.02	0.01	0.18997
Vanadium	ug/g	2.1	0.5	0.2	0.18997
Zinc	ug/g	170	20	1	0.18997
Lab Section 6					
Moisture	%	76.76	8	0.02	0.18997

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012786**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 10:42 RG_LIDCOM_INV-3_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	900	90	5	0.14556
Antimony	ug/g	0.03	0.02	0.02	0.14556
Arsenic	ug/g	0.41	0.06	0.02	0.14556
Barium	ug/g	14	1	0.05	0.14556
Beryllium	ug/g	0.03	0.02	0.02	0.14556
Boron	ug/g	2	2	2	0.14556
Cadmium	ug/g	1.8	0.3	0.02	0.14556
Chromium	ug/g	1.8	0.4	0.1	0.14556
Cobalt	ug/g	0.69	0.1	0.02	0.14556
Copper	ug/g	12	1	0.1	0.14556
Iron	ug/g	420	60	5	0.14556
Lead	ug/g	0.26	0.06	0.02	0.14556
Manganese	ug/g	120	10	0.2	0.14556
Mercury	ug/g	0.03	0.02	0.01	0.14556
Molybdenum	ug/g	0.33	0.1	0.05	0.14556
Nickel	ug/g	8.1	1	0.1	0.14556
Selenium	ug/g	7.1	0.7	0.02	0.14556
Silver	ug/g	0.03	0.02	0.02	0.14556
Strontium	ug/g	7.2	1	0.1	0.14556
Thallium	ug/g	0.02	0.01	0.01	0.14556
Tin	ug/g	<0.1		0.1	0.14556
Titanium	ug/g	14	2	0.5	0.14556
Uranium	ug/g	0.09	0.03	0.01	0.14556
Vanadium	ug/g	2.4	0.6	0.2	0.14556
Zinc	ug/g	200	20	1	0.14556
Lab Section 6					
Moisture	%	76.05	8	0.02	0.14556

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012787**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 10:55 RG_LIDCOM_INV-4_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	910	90	5	0.05259
Antimony	ug/g	0.05	0.03	0.02	0.05259
Arsenic	ug/g	0.68	0.2	0.05	0.05259
Barium	ug/g	14	2	0.5	0.05259
Beryllium	ug/g	0.03	0.02	0.02	0.05259
Boron	ug/g	<5		5	0.05259
Cadmium	ug/g	7.2	0.7	0.02	0.05259
Chromium	ug/g	2.6	1	0.5	0.05259
Cobalt	ug/g	2.2	0.5	0.5	0.05259
Copper	ug/g	14	2	0.5	0.05259
Iron	ug/g	460	70	5	0.05259
Lead	ug/g	0.32	0.1	0.05	0.05259
Manganese	ug/g	82	8	0.5	0.05259
Mercury	ug/g	0.03	0.02	0.01	0.05259
Molybdenum	ug/g	0.39	0.1	0.05	0.05259
Nickel	ug/g	7.1	2	0.5	0.05259
Selenium	ug/g	6.3	0.6	0.05	0.05259
Silver	ug/g	0.03	0.02	0.02	0.05259
Strontium	ug/g	7.5	1	0.1	0.05259
Thallium	ug/g	0.03	0.02	0.01	0.05259
Tin	ug/g	<0.2		0.2	0.05259
Titanium	ug/g	16	2	0.5	0.05259
Uranium	ug/g	0.12	0.05	0.02	0.05259
Vanadium	ug/g	2.4	0.6	0.2	0.05259
Zinc	ug/g	510	50	5	0.05259
Lab Section 6					
Moisture	%	85.18	8	0.02	0.05259

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012788**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 11:01 RG_LIDCOM_INV-5_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	600	60	5	0.07661
Antimony	ug/g	0.02	0.02	0.02	0.07661
Arsenic	ug/g	0.26	0.05	0.05	0.07661
Barium	ug/g	8.3	2	0.5	0.07661
Beryllium	ug/g	<0.02		0.02	0.07661
Boron	ug/g	<5		5	0.07661
Cadmium	ug/g	2.2	0.2	0.02	0.07661
Chromium	ug/g	0.8	0.6	0.5	0.07661
Cobalt	ug/g	<0.5		0.5	0.07661
Copper	ug/g	14	2	0.5	0.07661
Iron	ug/g	300	40	5	0.07661
Lead	ug/g	0.20	0.1	0.05	0.07661
Manganese	ug/g	42	6	0.5	0.07661
Mercury	ug/g	0.02	0.01	0.01	0.07661
Molybdenum	ug/g	0.23	0.1	0.05	0.07661
Nickel	ug/g	3.7	0.5	0.5	0.07661
Selenium	ug/g	5.0	0.5	0.05	0.07661
Silver	ug/g	0.03	0.02	0.02	0.07661
Strontium	ug/g	2.9	0.4	0.1	0.07661
Thallium	ug/g	0.02	0.01	0.01	0.07661
Tin	ug/g	<0.2		0.2	0.07661
Titanium	ug/g	9.9	2	0.5	0.07661
Uranium	ug/g	0.05	0.03	0.02	0.07661
Vanadium	ug/g	1.5	0.5	0.2	0.07661
Zinc	ug/g	170	20	5	0.07661
Lab Section 6					
Moisture	%	76.65	8	0.02	0.07661

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012789**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 11:07 RG_LIDCOM_INV-6_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	3000	300	5	0.06269
Antimony	ug/g	0.12	0.05	0.02	0.06269
Arsenic	ug/g	0.82	0.2	0.05	0.06269
Barium	ug/g	46	7	0.5	0.06269
Beryllium	ug/g	0.10	0.02	0.02	0.06269
Boron	ug/g	6	5	5	0.06269
Cadmium	ug/g	4.1	0.4	0.02	0.06269
Chromium	ug/g	4.3	1	0.5	0.06269
Cobalt	ug/g	1.9	0.5	0.5	0.06269
Copper	ug/g	15	2	0.5	0.06269
Iron	ug/g	1700	200	5	0.06269
Lead	ug/g	1.1	0.2	0.05	0.06269
Manganese	ug/g	300	30	0.5	0.06269
Mercury	ug/g	0.03	0.02	0.01	0.06269
Molybdenum	ug/g	0.54	0.1	0.05	0.06269
Nickel	ug/g	14	2	0.5	0.06269
Selenium	ug/g	6.2	0.6	0.05	0.06269
Silver	ug/g	0.04	0.03	0.02	0.06269
Strontium	ug/g	24	2	0.1	0.06269
Thallium	ug/g	0.07	0.02	0.01	0.06269
Tin	ug/g	<0.2		0.2	0.06269
Titanium	ug/g	42	6	0.5	0.06269
Uranium	ug/g	0.29	0.07	0.02	0.06269
Vanadium	ug/g	8.8	1	0.2	0.06269
Zinc	ug/g	290	40	5	0.06269
Lab Section 6					
Moisture	%	85.51	8	0.02	0.06269

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

SASKATCHEWAN RESEARCH COUNCIL

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012790**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 11:18 RG_LIDCOM_INV-7_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	1300	100	5	0.09918
Antimony	ug/g	0.06	0.03	0.02	0.09918
Arsenic	ug/g	0.52	0.1	0.05	0.09918
Barium	ug/g	24	4	0.5	0.09918
Beryllium	ug/g	0.05	0.02	0.02	0.09918
Boron	ug/g	<5		5	0.09918
Cadmium	ug/g	2.0	0.2	0.02	0.09918
Chromium	ug/g	2.0	1	0.5	0.09918
Cobalt	ug/g	1.1	0.5	0.5	0.09918
Copper	ug/g	11	2	0.5	0.09918
Iron	ug/g	780	80	5	0.09918
Lead	ug/g	0.57	0.1	0.05	0.09918
Manganese	ug/g	190	20	0.5	0.09918
Mercury	ug/g	0.03	0.02	0.01	0.09918
Molybdenum	ug/g	0.45	0.1	0.05	0.09918
Nickel	ug/g	7.6	2	0.5	0.09918
Selenium	ug/g	5.9	0.6	0.05	0.09918
Silver	ug/g	0.03	0.02	0.02	0.09918
Strontium	ug/g	12	1	0.1	0.09918
Thallium	ug/g	0.04	0.02	0.01	0.09918
Tin	ug/g	<0.2		0.2	0.09918
Titanium	ug/g	17	2	0.5	0.09918
Uranium	ug/g	0.17	0.06	0.02	0.09918
Vanadium	ug/g	3.9	1	0.2	0.09918
Zinc	ug/g	180	30	5	0.09918
Lab Section 6					
Moisture	%	78.72	8	0.02	0.09918

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012791**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 11:21 RG_LIDCOM_INV-8_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	550	60	5	0.05917
Antimony	ug/g	0.04	0.03	0.02	0.05917
Arsenic	ug/g	0.38	0.05	0.05	0.05917
Barium	ug/g	14	2	0.5	0.05917
Beryllium	ug/g	<0.02		0.02	0.05917
Boron	ug/g	<5		5	0.05917
Cadmium	ug/g	2.6	0.3	0.02	0.05917
Chromium	ug/g	0.8	0.6	0.5	0.05917
Cobalt	ug/g	0.6	0.5	0.5	0.05917
Copper	ug/g	16	2	0.5	0.05917
Iron	ug/g	290	40	5	0.05917
Lead	ug/g	0.17	0.09	0.05	0.05917
Manganese	ug/g	57	6	0.5	0.05917
Mercury	ug/g	0.01	0.01	0.01	0.05917
Molybdenum	ug/g	0.23	0.1	0.05	0.05917
Nickel	ug/g	6.7	2	0.5	0.05917
Selenium	ug/g	4.3	0.6	0.05	0.05917
Silver	ug/g	0.04	0.03	0.02	0.05917
Strontium	ug/g	11	1	0.1	0.05917
Thallium	ug/g	0.02	0.01	0.01	0.05917
Tin	ug/g	<0.2		0.2	0.05917
Titanium	ug/g	11	2	0.5	0.05917
Uranium	ug/g	0.09	0.04	0.02	0.05917
Vanadium	ug/g	1.5	0.5	0.2	0.05917
Zinc	ug/g	230	30	5	0.05917
Lab Section 6					
Moisture	%	72.25	7	0.02	0.05917

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012792**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 11:23 RG_LIDCOM_INV-9_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	560	60	5	0.11939
Antimony	ug/g	0.04	0.03	0.02	0.11939
Arsenic	ug/g	0.47	0.07	0.02	0.11939
Barium	ug/g	16	2	0.05	0.11939
Beryllium	ug/g	0.02	0.02	0.02	0.11939
Boron	ug/g	<2		2	0.11939
Cadmium	ug/g	3.1	0.3	0.02	0.11939
Chromium	ug/g	0.8	0.3	0.1	0.11939
Cobalt	ug/g	0.65	0.1	0.02	0.11939
Copper	ug/g	18	2	0.1	0.11939
Iron	ug/g	580	60	5	0.11939
Lead	ug/g	0.23	0.06	0.02	0.11939
Manganese	ug/g	71	7	0.2	0.11939
Mercury	ug/g	0.02	0.01	0.01	0.11939
Molybdenum	ug/g	0.28	0.1	0.05	0.11939
Nickel	ug/g	8.4	1	0.1	0.11939
Selenium	ug/g	4.8	0.5	0.02	0.11939
Silver	ug/g	0.04	0.03	0.02	0.11939
Strontium	ug/g	12	1	0.1	0.11939
Thallium	ug/g	0.02	0.01	0.01	0.11939
Tin	ug/g	<0.1		0.1	0.11939
Titanium	ug/g	11	2	0.5	0.11939
Uranium	ug/g	0.10	0.02	0.01	0.11939
Vanadium	ug/g	1.7	0.6	0.2	0.11939
Zinc	ug/g	240	20	1	0.11939
Lab Section 6					
Moisture	%	83.31	8	0.02	0.11939

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

Results are reported on a dry basis.
Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Sample #: **2020012793**
Date Sampled: **Feb 24, 2020**
Sample Matrix: **TISSUE**
Description: **02/24/2020 11:25 RG_LIDCOM_INV-10_20200224**

Client PO #: **VPO00616225 Ref# 20-15**
Date Received: **Mar 11, 2020**

Analyte	Units	Result	+/-	DL	Weight (g)
Lab Section 2					
Aluminum	ug/g	860	90	5	0.23394
Antimony	ug/g	0.04	0.03	0.02	0.23394
Arsenic	ug/g	0.51	0.08	0.02	0.23394
Barium	ug/g	19	2	0.05	0.23394
Beryllium	ug/g	0.03	0.02	0.02	0.23394
Boron	ug/g	3	2	2	0.23394
Cadmium	ug/g	3.3	0.3	0.02	0.23394
Chromium	ug/g	1.2	0.3	0.1	0.23394
Cobalt	ug/g	0.86	0.1	0.02	0.23394
Copper	ug/g	17	2	0.1	0.23394
Iron	ug/g	500	50	5	0.23394
Lead	ug/g	0.29	0.07	0.02	0.23394
Manganese	ug/g	110	10	0.2	0.23394
Mercury	ug/g	0.02	0.01	0.01	0.23394
Molybdenum	ug/g	0.30	0.1	0.05	0.23394
Nickel	ug/g	8.8	1	0.1	0.23394
Selenium	ug/g	5.4	0.5	0.02	0.23394
Silver	ug/g	0.04	0.03	0.02	0.23394
Strontium	ug/g	10	1	0.1	0.23394
Thallium	ug/g	0.03	0.02	0.01	0.23394
Tin	ug/g	<0.1		0.1	0.23394
Titanium	ug/g	12	2	0.5	0.23394
Uranium	ug/g	0.15	0.04	0.01	0.23394
Vanadium	ug/g	2.3	0.6	0.2	0.23394
Zinc	ug/g	260	30	1	0.23394
Lab Section 6					
Moisture	%	83.54	8	0.02	0.23394

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 5.9 °C upon receipt.

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Variability in detection limits due to sample size.
There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.

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SRC Group # 2020-2801

Apr 02, 2020

Minnow Environmental

Analyte Methods

Name	Units	Method
Silver	ug/g	PRP-034 / Chm-522
Aluminum	ug/g	PRP-034 / Chm-522
Arsenic	ug/g	PRP-034 / Chm-522
Boron	ug/g	PRP-034 / Chm-522
Barium	ug/g	PRP-034 / Chm-522
Beryllium	ug/g	PRP-034 / Chm-522
Cadmium	ug/g	PRP-034 / Chm-522
Cobalt	ug/g	PRP-034 / Chm-522
Chromium	ug/g	PRP-034 / Chm-522
Copper	ug/g	PRP-034 / Chm-522
Iron	ug/g	PRP-034 / Chm-522
Mercury	ug/g	PRP-034 / Chm-522
Manganese	ug/g	PRP-034 / Chm-522
Molybdenum	ug/g	PRP-034 / Chm-522
Nickel	ug/g	PRP-034 / Chm-522
Lead	ug/g	PRP-034 / Chm-522
Antimony	ug/g	PRP-034 / Chm-522
Selenium	ug/g	PRP-034 / Chm-522
Tin	ug/g	PRP-034 / Chm-522
Strontium	ug/g	PRP-034 / Chm-522
Titanium	ug/g	PRP-034 / Chm-522
Thallium	ug/g	PRP-034 / Chm-522
Uranium	ug/g	PRP-034 / Chm-522
Vanadium	ug/g	PRP-034 / Chm-522
Zinc	ug/g	PRP-034 / Chm-522
Moisture	%	Prp 010

BENTHIC TISSUE CHEMISTRY

TrichAnalytics Laboratory Report 2020-120

(Finalized July 15, 2020)

TrichAnalytics Inc.

Tissue Microchemistry Analysis Report

Client: Katharina Batchelar
Aquatic Scientist
Minnow Environmental
Phone: (250) 595-1627 ext. 22
Email: kbatchelar@minnow.ca

Date Received: 26 Jun 2020
Date of Analysis: 09 Jul 2020
13 Jul 2020
14 Jul 2020
Final Report Date: 15 Jul 2020
Project No.: 2020-120
Method No.: MET-002.04

Client Project: Project 20-15

Analytical Request: Benthic Invertebrate Tissue Microchemistry (total metals and moisture) – 100 samples.
See chain of custody form provided for sample identification numbers.

Notes:

Analytical results are expressed in part per million (ppm) dry weight.
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; (average achieved 102%; range 91 - 109%).
RPD values calculated according to the British Columbia Environmental Laboratory Manual (2020) criteria.

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 — 15 Jul 2020 (Date)

TrichAnalytics Inc.
207-1753 Sean Heights
Saanichton, BC V8M 0B3
www.trichanalytics.com

CALA Testing Accreditation No. A4196

Teck Coal Limited: Project 20-15

Tissue Analysis Results

		Client ID	RG_FO23_INV-1_2020-04-27	RG_FO23_INV-2_2020-04-27	RG_FO23_INV-3_2020-04-27	RG_FO23_INV-4_2020-04-27	RG_FO23_INV-5_2020-04-27
		Lab ID	001	002	003	004	005
		Wet Weight (g)	1.3515	1.2407	0.5031	0.7918	0.7029
		Dry Weight (g)	0.2691	0.2235	0.0881	0.1477	0.1427
		Moisture (%)	80.1	82.0	82.5	81.3	79.7
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.954	1.0	0.961	1.7	1.1
11B	0.090	0.300	3.3	5.4	5.0	8.9	5.2
23Na	5.4	18	4,235	4,006	458	4,971	712
24Mg	0.038	0.127	1,935	1,265	1,047	1,971	2,045
27Al	0.585	1.9	953	2,401	3,574	2,919	3,583
31P	39	130	9,917	6,200	4,826	9,094	8,632
39K	2.9	9.7	7,383	5,331	1,884	8,979	2,715
44Ca	196	653	5,238	5,134	6,480	6,750	11,452
49Ti	0.225	0.750	54	142	214	197	199
51V	0.021	0.070	1.4	2.9	4.7	4.3	4.4
52Cr	0.496	1.7	7.4	22	40	28	23
55Mn	0.017	0.057	56	60	52	81	58
57Fe	1.5	5.0	406	1,029	1,554	1,344	1,284
59Co	0.002	0.007	0.869	1.9	2.7	2.5	2.0
60Ni	0.014	0.047	13	36	60	64	40
63Cu	0.010	0.033	19	18	16	17	21
66Zn	0.372	1.2	471	239	510	289	896
75As	0.387	1.3	<0.387	0.568	0.568	0.725	0.470
77Se	0.373	1.2	7.2	8.9	6.8	7.8	6.2
88Sr	0.001	0.003	5.8	5.0	6.4	9.2	12
95Mo	0.007	0.023	0.253	0.295	0.347	0.512	0.374
107Ag	0.001	0.003	0.129	0.132	0.111	0.132	0.151
111Cd	0.085	0.283	1.6	1.4	2.1	2.0	1.7
118Sn	0.017	0.057	0.361	0.456	1.2	0.704	0.680
121Sb	0.004	0.013	0.029	0.043	0.060	0.063	0.069
137Ba	0.001	0.003	31	47	71	70	90
202Hg	0.027	0.090	0.065	0.053	0.101	0.082	0.105
205Tl	0.002	0.007	0.030	0.057	0.066	0.081	0.060
208Pb	0.003	0.010	0.191	0.442	0.598	0.615	0.537
238U	0.001	0.003	0.054	0.079	0.125	0.172	0.153

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited: Project 20-15

Tissue Analysis Results

		Client ID	RG_FO23_INV-6_2020-04-27	RG_FO23_INV-7_2020-04-27	RG_FO23_INV-8_2020-04-27	RG_FO23_INV-9_2020-04-27	RG_FO23_INV-10_2020-04-27
		Lab ID	006	007	008	009	010
		Wet Weight (g)	0.5768	0.6227	0.9700	0.7493	0.9053
		Dry Weight (g)	0.1292	0.0949	0.1751	0.1696	0.1673
		Moisture (%)	77.6	84.8	81.9	77.4	81.5
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	1.2	2.9	4.0	0.720	1.5
11B	0.090	0.300	7.2	15	20	2.9	4.5
23Na	5.4	18	1,142	2,305	5,586	3,064	5,759
24Mg	0.038	0.127	2,670	2,111	3,194	2,307	2,121
27Al	0.585	1.9	4,526	8,865	11,918	1,243	2,486
31P	39	130	11,544	7,895	11,380	10,498	8,230
39K	2.9	9.7	3,527	5,229	12,072	5,926	6,009
44Ca	196	653	16,867	15,297	17,096	7,733	5,176
49Ti	0.225	0.750	268	574	734	62	158
51V	0.021	0.070	5.0	11	15	1.7	3.4
52Cr	0.496	1.7	44	77	90	16	14
55Mn	0.017	0.057	73	124	147	39	33
57Fe	1.5	5.0	1,886	3,455	4,988	605	1,253
59Co	0.002	0.007	2.5	5.1	7.2	1.1	1.2
60Ni	0.014	0.047	67	125	150	27	21
63Cu	0.010	0.033	22	21	25	14	17
66Zn	0.372	1.2	610	334	422	603	291
75As	0.387	1.3	0.685	1.2	1.9	0.455	0.451
77Se	0.373	1.2	8.4	9.6	11	6.0	8.4
88Sr	0.001	0.003	13	17	15	8.2	6.8
95Mo	0.007	0.023	0.408	0.711	0.881	0.202	0.362
107Ag	0.001	0.003	0.178	0.115	0.127	0.069	0.093
111Cd	0.085	0.283	1.2	3.3	3.8	0.847	1.1
118Sn	0.017	0.057	0.797	1.1	1.3	0.428	0.361
121Sb	0.004	0.013	0.070	0.149	0.214	0.030	0.045
137Ba	0.001	0.003	105	151	190	42	51
202Hg	0.027	0.090	0.090	0.080	0.072	0.080	0.064
205Tl	0.002	0.007	0.066	0.173	0.239	0.020	0.038
208Pb	0.003	0.010	0.715	1.6	2.4	0.221	0.396
238U	0.001	0.003	0.193	0.297	0.441	0.055	0.098

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited: Project 20-15

Tissue Analysis Results

		Client ID	RG_FRUL_INV-1_2020-04-29	RG_FRUL_INV-2_2020-04-29	RG_FRUL_INV-3_2020-04-29	RG_FRUL_INV-4_2020-04-29	RG_FRUL_INV-5_2020-04-29
		Lab ID	011	012	013	014	015
		Wet Weight (g)	0.9502	0.5263	0.7861	0.4237	0.9712
		Dry Weight (g)	0.2481	0.1098	0.2112	0.1045	0.2345
		Moisture (%)	73.9	79.1	73.1	75.3	75.9
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.896	0.861	0.403	0.202	0.419
11B	0.090	0.300	1.5	2.7	1.3	0.644	0.899
23Na	5.4	18	4,728	2,915	3,432	1,241	3,419
24Mg	0.038	0.127	1,478	1,865	1,285	636	1,230
27Al	0.585	1.9	807	1,560	469	337	273
31P	39	130	8,914	9,442	8,183	4,223	8,317
39K	2.9	9.7	8,253	7,992	8,554	3,680	7,793
44Ca	196	653	2,690	5,564	2,739	1,384	2,388
49Ti	0.225	0.750	43	91	31	21	12
51V	0.021	0.070	1.2	2.4	0.667	0.443	0.477
52Cr	0.496	1.7	7.5	10	3.4	5.0	2.8
55Mn	0.017	0.057	42	54	30	16	28
57Fe	1.5	5.0	461	715	201	167	157
59Co	0.002	0.007	1.1	1.2	0.763	0.351	0.490
60Ni	0.014	0.047	14	20	7.3	7.1	5.3
63Cu	0.010	0.033	16	19	19	16	18
66Zn	0.372	1.2	303	270	307	235	360
75As	0.387	1.3	0.543	0.673	0.397	<0.387	<0.387
77Se	0.373	1.2	7.3	6.5	7.6	5.4	7.9
88Sr	0.001	0.003	3.3	5.6	3.7	1.4	2.7
95Mo	0.007	0.023	0.249	0.368	0.220	0.166	0.196
107Ag	0.001	0.003	0.158	0.178	0.160	0.188	0.147
111Cd	0.085	0.283	1.7	1.7	0.991	0.604	0.929
118Sn	0.017	0.057	0.373	0.797	0.324	0.154	0.150
121Sb	0.004	0.013	0.024	0.039	0.021	0.012	0.018
137Ba	0.001	0.003	25	44	19	9.3	17
202Hg	0.027	0.090	0.075	0.064	0.050	0.066	0.078
205Tl	0.002	0.007	0.018	0.027	0.014	0.007	0.010
208Pb	0.003	0.010	0.146	0.327	0.082	0.057	0.080
238U	0.001	0.003	0.037	0.069	0.032	0.014	0.022

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

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g = grams

% = percent

Teck Coal Limited: Project 20-15

Tissue Analysis Results

		Client ID	RG_FRUL_INV-6_2020-04-29	RG_FRUL_INV-7_2020-04-29	RG_FRUL_INV-8_2020-04-29	RG_FRUL_INV-9_2020-04-29	RG_FRUL_INV-10_2020-04-29
		Lab ID	016	017	018	019	020
		Wet Weight (g)	0.4576	1.0050	1.0828	0.9962	0.9241
		Dry Weight (g)	0.0836	0.2085	0.1630	0.1955	0.1517
		Moisture (%)	81.7	79.3	84.9	80.4	83.6
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.311	0.370	1.3	0.220	0.297
11B	0.090	0.300	2.0	1.2	2.8	0.794	2.5
23Na	5.4	18	822	1,562	8,158	1,007	1,289
24Mg	0.038	0.127	845	837	1,432	988	1,201
27Al	0.585	1.9	926	642	1,392	324	625
31P	39	130	4,570	5,816	7,347	6,529	7,089
39K	2.9	9.7	2,486	4,251	7,764	2,557	2,964
44Ca	196	653	6,001	2,699	3,775	3,013	4,345
49Ti	0.225	0.750	63	39	87	15	36
51V	0.021	0.070	1.4	1.1	2.2	0.488	0.891
52Cr	0.496	1.7	7.5	5.7	9.1	5.5	8.3
55Mn	0.017	0.057	49	26	45	25	27
57Fe	1.5	5.0	630	356	656	226	390
59Co	0.002	0.007	0.731	0.564	0.806	0.602	0.599
60Ni	0.014	0.047	15	10	13	8.5	13
63Cu	0.010	0.033	13	17	14	17	23
66Zn	0.372	1.2	259	226	199	268	290
75As	0.387	1.3	<0.387	0.405	0.541	<0.387	<0.387
77Se	0.373	1.2	5.8	6.4	10	5.7	6.7
88Sr	0.001	0.003	6.0	3.1	3.5	2.4	4.2
95Mo	0.007	0.023	0.246	0.184	0.553	0.182	0.209
107Ag	0.001	0.003	0.217	0.160	0.146	0.307	0.323
111Cd	0.085	0.283	1.0	0.774	1.1	0.920	0.983
118Sn	0.017	0.057	0.877	0.407	0.641	0.218	0.369
121Sb	0.004	0.013	0.039	0.024	0.036	0.025	0.019
137Ba	0.001	0.003	61	26	39	19	27
202Hg	0.027	0.090	0.066	0.046	0.064	0.183	0.083
205Tl	0.002	0.007	0.020	0.011	0.032	0.008	0.014
208Pb	0.003	0.010	0.220	0.120	0.278	0.082	0.117
238U	0.001	0.003	0.077	0.023	0.056	0.026	0.036

Notes:

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Teck Coal Limited: Project 20-15

Tissue Analysis Results

		Client ID	RG_LCUT_INV-1_2020-04-27	RG_LCUT_INV-2_2020-04-27	RG_LCUT_INV-3_2020-04-27	RG_LCUT_INV-4_2020-04-27	RG_LCUT_INV-5_2020-04-27
		Lab ID	021	022	023	024	025
		Wet Weight (g)	0.7891	0.6570	0.4583	0.9018	0.9449
		Dry Weight (g)	0.2609	0.1085	0.0704	0.1555	0.1618
		Moisture (%)	66.9	83.5	84.6	82.8	82.9
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	2.7	0.876	0.955	1.0	1.4
11B	0.090	0.300	13	3.2	4.6	4.4	7.1
23Na	5.4	18	2,747	2,645	1,468	1,890	1,408
24Mg	0.038	0.127	2,903	1,296	1,611	1,346	1,513
27Al	0.585	1.9	5,768	2,010	2,407	2,937	4,657
31P	39	130	10,661	10,553	8,125	7,847	7,083
39K	2.9	9.7	10,558	7,861	4,246	5,678	5,486
44Ca	196	653	16,864	5,274	11,510	5,358	14,858
49Ti	0.225	0.750	604	104	172	196	286
51V	0.021	0.070	13	2.2	3.4	4.2	6.6
52Cr	0.496	1.7	8.4	7.9	9.0	9.2	16
55Mn	0.017	0.057	76	24	38	37	62
57Fe	1.5	5.0	2,225	446	705	677	1,447
59Co	0.002	0.007	4.7	1.7	3.1	2.1	3.7
60Ni	0.014	0.047	41	20	22	20	40
63Cu	0.010	0.033	36	45	35	34	32
66Zn	0.372	1.2	274	238	438	273	313
75As	0.387	1.3	2.7	1.2	1.6	1.5	1.8
77Se	0.373	1.2	8.2	7.2	7.1	7.9	9.4
88Sr	0.001	0.003	22	6.7	11	7.2	13
95Mo	0.007	0.023	0.738	0.344	0.465	0.416	0.666
107Ag	0.001	0.003	0.082	0.071	0.093	0.077	0.087
111Cd	0.085	0.283	5.0	3.4	14	6.3	7.6
118Sn	0.017	0.057	0.489	0.748	1.7	0.748	0.954
121Sb	0.004	0.013	0.311	0.078	0.085	0.105	0.256
137Ba	0.001	0.003	131	44	86	74	162
202Hg	0.027	0.090	0.100	0.095	0.158	0.133	0.137
205Tl	0.002	0.007	0.154	0.060	0.094	0.076	0.099
208Pb	0.003	0.010	2.1	0.455	0.761	0.828	1.1
238U	0.001	0.003	0.668	0.116	0.154	0.136	0.241

Notes:

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Teck Coal Limited: Project 20-15

Tissue Analysis Results

		Client ID	RG_LCUT_INV-6_2020-04-27	RG_LCUT_INV-7_2020-04-27	RG_LCUT_INV-8_2020-04-27	RG_LCUT_INV-9_2020-04-27	RG_LCUT_INV-10_2020-04-27
		Lab ID	026	027	028	029	030
		Wet Weight (g)	0.7294	0.5548	1.3484	0.8163	0.6908
		Dry Weight (g)	0.1797	0.1036	0.3152	0.1649	0.1201
		Moisture (%)	75.4	81.3	76.6	79.8	82.6
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	1.5	0.717	2.3	1.2	0.813
11B	0.090	0.300	7.1	3.4	15	6.9	3.8
23Na	5.4	18	2,633	1,822	1,212	3,201	2,408
24Mg	0.038	0.127	2,056	1,405	2,360	1,854	1,629
27Al	0.585	1.9	4,014	1,184	4,984	2,893	2,232
31P	39	130	12,693	7,297	6,059	11,453	9,756
39K	2.9	9.7	13,908	5,655	4,734	13,587	6,080
44Ca	196	653	9,535	4,937	52,118	9,122	9,118
49Ti	0.225	0.750	271	74	367	190	162
51V	0.021	0.070	6.0	1.8	7.8	4.3	3.6
52Cr	0.496	1.7	10	6.8	13	8.8	16
55Mn	0.017	0.057	93	25	59	61	38
57Fe	1.5	5.0	956	413	1,530	717	712
59Co	0.002	0.007	6.1	1.6	4.1	5.7	2.3
60Ni	0.014	0.047	36	18	43	37	33
63Cu	0.010	0.033	50	29	37	55	29
66Zn	0.372	1.2	335	221	516	330	291
75As	0.387	1.3	3.9	1.1	1.9	3.8	1.3
77Se	0.373	1.2	9.9	6.0	11	8.4	7.0
88Sr	0.001	0.003	12	6.5	66	10	9.5
95Mo	0.007	0.023	0.799	0.300	0.677	0.551	0.396
107Ag	0.001	0.003	0.136	0.056	0.104	0.116	0.079
111Cd	0.085	0.283	10	3.9	24	9.6	5.6
118Sn	0.017	0.057	1.2	0.437	0.620	0.865	1.3
121Sb	0.004	0.013	0.190	0.078	0.182	0.212	0.091
137Ba	0.001	0.003	159	47	306	134	78
202Hg	0.027	0.090	0.151	0.176	0.162	0.133	0.137
205Tl	0.002	0.007	0.106	0.047	0.109	0.091	0.056
208Pb	0.003	0.010	1.2	0.433	1.3	1.1	0.621
238U	0.001	0.003	0.236	0.105	0.513	0.206	0.149

Notes:

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Teck Coal Limited: Project 20-15

Tissue Analysis Results

		Client ID	RG_LI8_INV-1_2020-04-30	RG_LI8_INV-2_2020-04-30	RG_LI8_INV-3_2020-04-30	RG_LI8_INV-4_2020-04-30	RG_LI8_INV-5_2020-04-30
		Lab ID	031	032	033	034	035
		Wet Weight (g)	1.0520	1.4708	1.1490	0.7515	1.1816
		Dry Weight (g)	0.1928	0.3362	0.2469	0.1370	0.2607
		Moisture (%)	81.7	77.1	78.5	81.8	77.9
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.585	0.574	0.542	0.710	0.850
11B	0.090	0.300	1.4	1.4	1.8	2.0	2.1
23Na	5.4	18	2,238	4,117	2,470	1,108	4,505
24Mg	0.038	0.127	1,353	1,646	1,207	957	1,944
27Al	0.585	1.9	764	551	804	1,231	1,368
31P	39	130	8,190	10,419	7,339	5,407	14,500
39K	2.9	9.7	5,636	9,572	5,656	3,288	12,375
44Ca	196	653	4,177	5,010	4,704	6,097	6,107
49Ti	0.225	0.750	47	37	48	92	76
51V	0.021	0.070	1.1	0.855	1.3	2.4	1.7
52Cr	0.496	1.7	4.9	3.9	5.8	14	5.0
55Mn	0.017	0.057	71	76	31	40	101
57Fe	1.5	5.0	321	285	358	650	544
59Co	0.002	0.007	0.806	0.612	0.824	1.0	3.0
60Ni	0.014	0.047	12	11	13	26	19
63Cu	0.010	0.033	16	17	17	16	24
66Zn	0.372	1.2	354	299	319	302	648
75As	0.387	1.3	0.445	0.445	0.481	0.497	0.868
77Se	0.373	1.2	5.8	4.8	7.3	4.9	8.5
88Sr	0.001	0.003	5.8	7.7	6.5	6.5	10
95Mo	0.007	0.023	0.240	0.231	0.325	0.325	0.412
107Ag	0.001	0.003	0.030	0.030	0.039	0.058	0.048
111Cd	0.085	0.283	5.1	2.6	3.6	3.7	6.9
118Sn	0.017	0.057	0.439	0.230	0.443	0.650	0.695
121Sb	0.004	0.013	0.030	0.041	0.033	0.051	0.057
137Ba	0.001	0.003	35	38	26	36	49
202Hg	0.027	0.090	0.108	0.066	0.100	0.075	0.121
205Tl	0.002	0.007	0.025	0.024	0.022	0.028	0.042
208Pb	0.003	0.010	0.214	0.206	0.192	0.311	0.301
238U	0.001	0.003	0.072	0.060	0.081	0.175	0.084

Notes:

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Teck Coal Limited: Project 20-15

Tissue Analysis Results

		Client ID	RG_LI8_INV-6_2020-04-30	RG_LI8_INV-7_2020-04-30	RG_LI8_INV-8_2020-04-30	RG_LI8_INV-9_2020-04-30	RG_LI8_INV-10_2020-04-30
		Lab ID	036	037	038	039	040
		Wet Weight (g)	1.1336	1.2237	1.1896	1.0825	1.9704
		Dry Weight (g)	0.2180	0.2278	0.2651	0.1875	0.3599
		Moisture (%)	80.8	81.4	77.7	82.7	81.7
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.799	0.675	0.757	1.3	0.567
11B	0.090	0.300	2.5	2.0	2.0	3.7	1.6
23Na	5.4	18	2,340	2,136	3,895	2,093	1,662
24Mg	0.038	0.127	1,716	1,307	1,933	1,586	922
27Al	0.585	1.9	1,620	1,090	1,012	2,842	1,101
31P	39	130	10,039	8,718	12,318	8,632	7,095
39K	2.9	9.7	6,514	5,561	10,453	6,379	4,770
44Ca	196	653	4,637	5,974	5,156	6,366	3,349
49Ti	0.225	0.750	117	69	58	205	66
51V	0.021	0.070	2.7	1.6	1.4	4.4	1.4
52Cr	0.496	1.7	12	4.9	5.1	9.9	4.0
55Mn	0.017	0.057	81	61	63	85	79
57Fe	1.5	5.0	702	442	472	961	388
59Co	0.002	0.007	1.5	0.876	0.870	1.4	0.602
60Ni	0.014	0.047	26	15	16	26	10
63Cu	0.010	0.033	19	19	21	16	12
66Zn	0.372	1.2	523	359	344	431	292
75As	0.387	1.3	0.594	0.577	0.494	0.681	0.502
77Se	0.373	1.2	8.3	8.0	6.8	7.0	5.7
88Sr	0.001	0.003	7.2	6.8	8.4	10	5.5
95Mo	0.007	0.023	0.379	0.438	0.324	0.458	0.327
107Ag	0.001	0.003	0.039	0.039	0.042	0.054	0.022
111Cd	0.085	0.283	3.8	3.6	3.1	5.6	2.5
118Sn	0.017	0.057	0.439	0.438	0.406	0.623	0.309
121Sb	0.004	0.013	0.063	0.060	0.047	0.107	0.047
137Ba	0.001	0.003	46	42	39	75	35
202Hg	0.027	0.090	0.119	0.084	0.044	0.093	0.097
205Tl	0.002	0.007	0.035	0.036	0.031	0.062	0.024
208Pb	0.003	0.010	0.378	0.353	0.251	0.719	0.266
238U	0.001	0.003	0.115	0.111	0.090	0.136	0.107

Notes:

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Teck Coal Limited: Project 20-15

Tissue Analysis Results

		Client ID	RG_LI24_INV-1_2020-04-28	RG_LI24_INV-2_2020-04-28	RG_LI24_INV-3_2020-04-28	RG_LI24_INV-4_2020-04-28	RG_LI24_INV-5_2020-04-28
		Lab ID	041	042	043	044	045
		Wet Weight (g)	0.7458	0.6755	0.7820	0.4686	0.5269
		Dry Weight (g)	0.1283	0.0943	0.1118	0.0682	0.0812
		Moisture (%)	82.8	86.0	85.7	85.4	84.6
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.804	0.918	1.6	1.3	0.216
11B	0.090	0.300	1.4	1.8	2.7	1.8	0.405
23Na	5.4	18	3,179	4,476	2,982	4,404	1,966
24Mg	0.038	0.127	1,618	1,801	1,493	1,396	600
27Al	0.585	1.9	912	846	1,730	1,029	211
31P	39	130	11,214	12,076	10,130	11,354	7,114
39K	2.9	9.7	8,482	10,686	7,451	9,332	4,707
44Ca	196	653	4,536	6,130	5,327	3,669	1,123
49Ti	0.225	0.750	53	54	115	52	8.5
51V	0.021	0.070	2.5	3.2	4.5	4.3	0.672
52Cr	0.496	1.7	9.8	13	12	8.3	3.9
55Mn	0.017	0.057	23	20	36	32	21
57Fe	1.5	5.0	479	500	648	534	143
59Co	0.002	0.007	0.611	0.851	0.863	0.732	0.252
60Ni	0.014	0.047	19	25	24	17	5.9
63Cu	0.010	0.033	15	21	14	16	7.7
66Zn	0.372	1.2	276	440	312	370	189
75As	0.387	1.3	1.0	1.4	1.1	0.870	0.524
77Se	0.373	1.2	5.8	9.2	6.0	7.0	3.8
88Sr	0.001	0.003	11	13	13	8.5	2.6
95Mo	0.007	0.023	0.451	0.438	0.531	0.605	0.265
107Ag	0.001	0.003	0.074	0.092	0.076	0.096	0.041
111Cd	0.085	0.283	0.930	1.8	1.4	1.5	0.701
118Sn	0.017	0.057	0.504	1.2	1.2	1.1	0.405
121Sb	0.004	0.013	0.074	0.063	0.090	0.078	0.015
137Ba	0.001	0.003	71	46	64	60	46
202Hg	0.027	0.090	0.062	0.097	0.083	0.096	0.077
205Tl	0.002	0.007	0.046	0.073	0.059	0.066	0.024
208Pb	0.003	0.010	0.353	0.351	0.574	0.558	0.135
238U	0.001	0.003	0.148	0.213	0.300	0.217	0.051

Notes:

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Teck Coal Limited: Project 20-15

Tissue Analysis Results

		Client ID	RG_LI24_INV-6_2020-04-28	RG_LI24_INV-7_2020-04-28	RG_LI24_INV-8_2020-04-28	RG_LI24_INV-9_2020-04-28	RG_LI24_INV-10_2020-04-28
		Lab ID	046	047	048	049	050
		Wet Weight (g)	0.8233	0.5608	0.8057	0.7432	1.2601
		Dry Weight (g)	0.1537	0.0578	0.1270	0.0768	0.1984
		Moisture (%)	81.3	89.7	84.2	89.7	84.3
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.619	1.7	1.3	3.7	1.3
11B	0.090	0.300	1.1	3.1	2.4	5.6	2.1
23Na	5.4	18	3,924	662	5,014	1,549	4,434
24Mg	0.038	0.127	1,273	1,215	1,977	2,031	1,630
27Al	0.585	1.9	615	2,331	1,521	4,211	1,053
31P	39	130	11,401	4,966	12,925	6,105	12,030
39K	2.9	9.7	9,128	1,844	11,591	4,325	9,068
44Ca	196	653	3,154	8,669	8,762	12,162	6,353
49Ti	0.225	0.750	32	111	101	271	64
51V	0.021	0.070	1.9	6.4	4.6	9.9	3.7
52Cr	0.496	1.7	3.6	28	8.7	40	7.2
55Mn	0.017	0.057	31	32	28	42	22
57Fe	1.5	5.0	295	1,175	533	1,755	476
59Co	0.002	0.007	0.594	1.8	0.972	2.4	0.773
60Ni	0.014	0.047	9.7	45	22	64	18
63Cu	0.010	0.033	12	17	17	16	15
66Zn	0.372	1.2	346	409	353	313	255
75As	0.387	1.3	1.3	1.2	1.6	2.1	1.8
77Se	0.373	1.2	6.8	4.4	6.9	5.3	5.6
88Sr	0.001	0.003	7.9	14	19	20	13
95Mo	0.007	0.023	0.459	0.556	0.568	0.658	0.395
107Ag	0.001	0.003	0.059	0.097	0.085	0.117	0.084
111Cd	0.085	0.283	1.7	1.4	2.0	1.5	1.0
118Sn	0.017	0.057	0.495	1.6	0.860	1.2	0.430
121Sb	0.004	0.013	0.044	0.117	0.095	0.185	0.088
137Ba	0.001	0.003	63	46	51	76	35
202Hg	0.027	0.090	0.085	0.077	0.070	0.088	0.055
205Tl	0.002	0.007	0.058	0.066	0.079	0.099	0.056
208Pb	0.003	0.010	0.321	0.810	0.550	1.3	0.548
238U	0.001	0.003	0.174	0.272	0.633	0.303	0.148

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited: Project 20-15

Tissue Analysis Results

		Client ID	RG_LIDCOM_INV-1_2020-04-30	RG_LIDCOM_INV-2_2020-04-30	RG_LIDCOM_INV-3_2020-04-30	RG_LIDCOM_INV-4_2020-04-30	RG_LIDCOM_INV-5_2020-04-30
		Lab ID	051	052	053	054	055
		Wet Weight (g)	1.7220	2.4282	1.5403	2.0416	2.6880
		Dry Weight (g)	0.1723	0.3944	0.2753	0.3514	0.6030
		Moisture (%)	90.0	83.8	82.1	82.8	77.6
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.564	0.474	0.724	0.463	0.706
11B	0.090	0.300	4.7	2.5	2.7	3.1	3.1
23Na	5.4	18	2,309	2,283	3,131	2,236	4,820
24Mg	0.038	0.127	1,624	1,076	1,816	1,468	1,589
27Al	0.585	1.9	1,466	1,076	1,681	1,097	1,462
31P	39	130	7,254	9,194	12,739	8,554	13,323
39K	2.9	9.7	5,440	5,481	8,173	5,076	12,987
44Ca	196	653	6,729	3,263	5,333	5,115	3,987
49Ti	0.225	0.750	94	47	85	59	84
51V	0.021	0.070	2.8	1.9	2.2	1.7	2.2
52Cr	0.496	1.7	8.1	4.3	5.8	5.1	3.4
55Mn	0.017	0.057	229	153	187	183	349
57Fe	1.5	5.0	680	535	681	580	655
59Co	0.002	0.007	2.4	1.6	2.3	2.1	3.3
60Ni	0.014	0.047	32	18	24	22	28
63Cu	0.010	0.033	19	16	20	20	22
66Zn	0.372	1.2	557	383	695	606	441
75As	0.387	1.3	0.715	0.755	0.962	0.865	0.967
77Se	0.373	1.2	5.8	4.9	7.6	5.5	7.8
88Sr	0.001	0.003	9.7	4.8	7.4	5.9	6.1
95Mo	0.007	0.023	0.460	0.285	0.506	0.349	0.527
107Ag	0.001	0.003	0.040	0.036	0.052	0.045	0.041
111Cd	0.085	0.283	12	6.3	10	10	6.8
118Sn	0.017	0.057	0.983	0.361	0.448	0.290	0.439
121Sb	0.004	0.013	0.103	0.048	0.073	0.048	0.092
137Ba	0.001	0.003	66	33	43	34	60
202Hg	0.027	0.090	0.141	0.103	0.146	0.124	0.099
205Tl	0.002	0.007	0.069	0.040	0.080	0.065	0.077
208Pb	0.003	0.010	0.489	0.285	0.374	0.290	0.465
238U	0.001	0.003	0.457	0.079	0.106	0.097	0.149

Notes:

ppm = parts per million

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g = grams

% = percent

Teck Coal Limited: Project 20-15

Tissue Analysis Results

		Client ID	RG_LIDCOM_INV-6_2020-04-30	RG_LIDCOM_INV-7_2020-04-30	RG_LIDCOM_INV-8_2020-04-30	RG_LIDCOM_INV-9_2020-04-30	RG_LIDCOM_INV-10_2020-04-30
		Lab ID	056	057	058	059	060
		Wet Weight (g)	1.9552	1.9288	1.8796	2.2203	1.7404
		Dry Weight (g)	0.4202	0.3515	0.4073	0.3986	0.3316
		Moisture (%)	78.5	81.8	78.3	82.0	80.9
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.807	0.497	0.779	0.772	1.1
11B	0.090	0.300	1.6	2.0	2.9	2.7	4.5
23Na	5.4	18	5,555	4,609	3,730	5,346	5,159
24Mg	0.038	0.127	1,161	1,498	1,072	1,644	1,821
27Al	0.585	1.9	577	935	1,685	1,393	3,065
31P	39	130	11,549	10,229	10,193	14,541	15,690
39K	2.9	9.7	10,393	6,156	9,207	12,845	12,251
44Ca	196	653	2,989	4,059	4,714	6,434	6,117
49Ti	0.225	0.750	35	42	105	81	160
51V	0.021	0.070	1.1	1.3	2.5	2.1	4.3
52Cr	0.496	1.7	4.7	4.6	4.8	6.6	5.4
55Mn	0.017	0.057	201	150	275	286	327
57Fe	1.5	5.0	427	461	668	764	1,048
59Co	0.002	0.007	2.1	1.3	2.8	2.6	3.2
60Ni	0.014	0.047	26	14	30	35	28
63Cu	0.010	0.033	18	15	16	23	22
66Zn	0.372	1.2	289	299	284	361	383
75As	0.387	1.3	0.653	0.516	0.768	0.909	1.4
77Se	0.373	1.2	5.9	5.1	6.3	8.7	8.4
88Sr	0.001	0.003	4.0	5.9	6.6	8.5	9.5
95Mo	0.007	0.023	0.509	0.389	0.386	0.601	0.711
107Ag	0.001	0.003	0.040	0.040	0.040	0.060	0.053
111Cd	0.085	0.283	5.8	8.9	4.6	4.7	5.6
118Sn	0.017	0.057	0.320	0.429	0.267	0.450	1.2
121Sb	0.004	0.013	0.064	0.044	0.072	0.099	0.147
137Ba	0.001	0.003	32	33	52	56	84
202Hg	0.027	0.090	0.092	0.090	0.099	0.107	0.103
205Tl	0.002	0.007	0.046	0.034	0.057	0.056	0.072
208Pb	0.003	0.010	0.258	0.228	0.437	0.411	0.707
238U	0.001	0.003	0.096	0.079	0.131	0.136	0.218

Notes:

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g = grams

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Teck Coal Limited: Project 20-15

Tissue Analysis Results

		Client ID	RG_LIDSL_INV-1_2020-04-29	RG_LIDSL_INV-2_2020-04-29	RG_LIDSL_INV-3_2020-04-29	RG_LIDSL_INV-4_2020-04-29	RG_LIDSL_INV-5_2020-04-29
		Lab ID	061	062	063	064	065
		Wet Weight (g)	1.4136	1.9009	1.3387	1.4464	1.4923
		Dry Weight (g)	0.2682	0.3546	0.2472	0.3229	0.3429
		Moisture (%)	81.0	81.3	81.5	77.7	77.0
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.531	0.383	0.201	0.334	0.367
11B	0.090	0.300	2.0	2.0	0.995	1.0	1.3
23Na	5.4	18	3,695	3,252	1,450	3,582	2,593
24Mg	0.038	0.127	1,156	1,161	827	1,176	1,150
27Al	0.585	1.9	898	686	335	296	573
31P	39	130	9,103	9,862	6,586	10,438	8,864
39K	2.9	9.7	6,561	7,956	3,434	8,481	6,573
44Ca	196	653	3,559	2,815	2,456	2,206	2,879
49Ti	0.225	0.750	53	25	14	19	45
51V	0.021	0.070	1.9	1.3	0.649	0.635	1.3
52Cr	0.496	1.7	5.5	3.7	2.7	2.9	3.6
55Mn	0.017	0.057	398	507	172	256	257
57Fe	1.5	5.0	938	644	331	337	758
59Co	0.002	0.007	3.0	3.2	1.2	3.6	2.2
60Ni	0.014	0.047	24	26	7.5	16	16
63Cu	0.010	0.033	24	22	16	21	19
66Zn	0.372	1.2	374	264	300	362	353
75As	0.387	1.3	0.675	0.635	0.450	0.644	0.591
77Se	0.373	1.2	6.5	7.3	4.7	5.4	5.5
88Sr	0.001	0.003	5.7	5.5	4.3	4.5	4.4
95Mo	0.007	0.023	0.539	0.555	0.227	0.349	0.404
107Ag	0.001	0.003	0.048	0.040	0.022	0.033	0.034
111Cd	0.085	0.283	7.9	3.8	5.9	9.1	8.8
118Sn	0.017	0.057	0.719	0.557	0.350	0.365	0.382
121Sb	0.004	0.013	0.081	0.092	0.040	0.066	0.081
137Ba	0.001	0.003	41	55	18	18	27
202Hg	0.027	0.090	0.107	0.062	0.060	0.060	0.064
205Tl	0.002	0.007	0.043	0.030	0.023	0.037	0.027
208Pb	0.003	0.010	0.324	0.242	0.123	0.112	0.166
238U	0.001	0.003	0.092	0.107	0.038	0.059	0.077

Notes:

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Teck Coal Limited: Project 20-15

Tissue Analysis Results

		Client ID	RG_LIDSL_INV-6_2020-04-29	RG_LIDSL_INV-7_2020-04-29	RG_LIDSL_INV-8_2020-04-29	RG_LIDSL_INV-9_2020-04-29	RG_LIDSL_INV-10_2020-04-29
		Lab ID	066	067	068	069	070
		Wet Weight (g)	0.9623	0.8544	1.4356	1.2642	1.2747
		Dry Weight (g)	0.2614	0.1861	0.2511	0.2357	0.2599
		Moisture (%)	72.8	78.2	82.5	81.4	79.6
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.310	0.509	0.376	0.421	0.478
11B	0.090	0.300	1.2	1.6	1.4	1.1	1.1
23Na	5.4	18	3,483	3,626	674	2,238	3,676
24Mg	0.038	0.127	1,604	1,204	960	1,071	1,598
27Al	0.585	1.9	431	843	651	645	278
31P	39	130	10,573	10,998	6,139	8,506	10,160
39K	2.9	9.7	9,483	9,572	2,908	6,956	8,083
44Ca	196	653	2,757	2,837	7,494	2,335	4,386
49Ti	0.225	0.750	18	42	57	42	15
51V	0.021	0.070	0.914	1.5	1.2	1.2	0.693
52Cr	0.496	1.7	2.9	3.8	5.3	4.9	2.8
55Mn	0.017	0.057	234	600	209	184	135
57Fe	1.5	5.0	460	718	521	537	341
59Co	0.002	0.007	6.9	4.9	1.9	1.9	2.4
60Ni	0.014	0.047	16	29	14	13	16
63Cu	0.010	0.033	20	15	19	17	19
66Zn	0.372	1.2	520	378	456	357	396
75As	0.387	1.3	0.733	0.843	0.497	0.547	0.575
77Se	0.373	1.2	5.5	6.1	5.4	6.4	6.4
88Sr	0.001	0.003	6.4	5.3	8.1	3.6	6.1
95Mo	0.007	0.023	0.368	0.591	0.560	0.457	0.485
107Ag	0.001	0.003	0.024	0.027	0.047	0.030	0.046
111Cd	0.085	0.283	15	13	4.4	5.2	6.8
118Sn	0.017	0.057	0.501	0.983	0.469	0.308	0.321
121Sb	0.004	0.013	0.051	0.092	0.063	0.050	0.049
137Ba	0.001	0.003	18	45	34	28	22
202Hg	0.027	0.090	0.071	0.090	0.071	0.075	0.148
205Tl	0.002	0.007	0.040	0.054	0.015	0.020	0.016
208Pb	0.003	0.010	0.131	0.266	0.118	0.153	0.092
238U	0.001	0.003	0.045	0.089	0.105	0.064	0.088

Notes:

ppm = parts per million

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< = less than detection limit

g = grams

% = percent

Teck Coal Limited: Project 20-15

Tissue Analysis Results

		Client ID	RG_LILC3_INV-1_2020-04-27	RG_LILC3_INV-2_2020-04-27	RG_LILC3_INV-3_2020-04-27	RG_LILC3_INV-4_2020-04-27	RG_LILC3_INV-5_2020-04-27
		Lab ID	071	072	073	074	075
		Wet Weight (g)	1.1821	1.4876	0.8656	1.8677	1.8019
		Dry Weight (g)	0.2026	0.3417	0.1711	0.3130	0.3797
		Moisture (%)	82.9	77.0	80.2	83.2	78.9
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.756	0.711	0.787	0.592	0.786
11B	0.090	0.300	2.1	1.4	1.5	0.939	1.3
23Na	5.4	18	2,030	3,558	3,112	2,896	3,243
24Mg	0.038	0.127	1,572	1,381	1,339	988	1,501
27Al	0.585	1.9	697	736	788	330	580
31P	39	130	7,770	9,974	10,912	7,681	10,958
39K	2.9	9.7	7,607	10,608	10,896	9,073	9,746
44Ca	196	653	3,738	2,714	2,607	2,257	3,720
49Ti	0.225	0.750	45	56	59	22	36
51V	0.021	0.070	1.8	1.8	1.6	0.873	1.5
52Cr	0.496	1.7	3.5	3.7	8.8	5.0	3.5
55Mn	0.017	0.057	385	571	307	219	327
57Fe	1.5	5.0	936	1,158	1,259	651	1,109
59Co	0.002	0.007	3.1	6.9	3.1	2.5	3.4
60Ni	0.014	0.047	17	27	31	16	21
63Cu	0.010	0.033	25	31	22	18	22
66Zn	0.372	1.2	260	275	293	180	313
75As	0.387	1.3	0.854	0.986	0.916	0.645	0.901
77Se	0.373	1.2	11	14	12	15	15
88Sr	0.001	0.003	5.9	4.8	4.5	2.9	5.8
95Mo	0.007	0.023	0.839	0.905	0.795	0.495	0.588
107Ag	0.001	0.003	0.039	0.040	0.034	0.035	0.045
111Cd	0.085	0.283	3.4	4.6	4.1	1.5	2.5
118Sn	0.017	0.057	0.599	0.553	0.540	0.383	0.620
121Sb	0.004	0.013	0.095	0.185	0.135	0.103	0.152
137Ba	0.001	0.003	32	47	38	17	41
202Hg	0.027	0.090	0.073	0.098	0.104	0.092	0.071
205Tl	0.002	0.007	0.028	0.038	0.039	0.026	0.036
208Pb	0.003	0.010	0.178	0.204	0.189	0.094	0.179
238U	0.001	0.003	0.113	0.164	0.126	0.064	0.121

Notes:

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Teck Coal Limited: Project 20-15

Tissue Analysis Results

		Client ID	RG_LILC3_INV-6_2020-04-27	RG_LILC3_INV-7_2020-04-27	RG_LILC3_INV-8_2020-04-27	RG_LILC3_INV-9_2020-04-27	RG_LILC3_INV-10_2020-04-27
		Lab ID	076	077	078	079	080
		Wet Weight (g)	1.2237	1.5365	1.6918	0.8626	1.3744
		Dry Weight (g)	0.2188	0.3321	0.3640	0.1783	0.2349
		Moisture (%)	82.1	78.4	78.5	79.3	82.9
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.726	0.987	0.672	1.3	0.745
11B	0.090	0.300	1.1	2.9	1.5	3.7	1.3
23Na	5.4	18	3,294	2,505	3,321	3,890	2,829
24Mg	0.038	0.127	1,135	2,012	1,210	1,653	1,200
27Al	0.585	1.9	755	1,821	696	1,890	658
31P	39	130	9,932	8,657	10,492	9,138	8,320
39K	2.9	9.7	10,492	8,469	9,939	10,277	8,031
44Ca	196	653	1,926	9,225	2,869	5,890	1,967
49Ti	0.225	0.750	55	127	42	133	37
51V	0.021	0.070	1.5	3.5	1.6	4.1	1.5
52Cr	0.496	1.7	3.0	4.4	3.4	15	4.0
55Mn	0.017	0.057	291	536	365	601	467
57Fe	1.5	5.0	1,293	2,103	1,002	2,084	1,173
59Co	0.002	0.007	2.9	4.3	2.2	7.1	3.7
60Ni	0.014	0.047	19	27	15	58	29
63Cu	0.010	0.033	21	31	18	28	19
66Zn	0.372	1.2	331	353	208	376	259
75As	0.387	1.3	0.998	1.6	0.926	1.7	1.2
77Se	0.373	1.2	17	11	15	14	14
88Sr	0.001	0.003	3.2	12	5.1	13	3.7
95Mo	0.007	0.023	0.646	0.847	0.712	1.0	0.768
107Ag	0.001	0.003	0.082	0.077	0.030	0.065	0.035
111Cd	0.085	0.283	6.1	6.5	1.3	5.4	3.5
118Sn	0.017	0.057	0.632	0.981	0.511	0.915	0.733
121Sb	0.004	0.013	0.142	0.206	0.175	0.253	0.185
137Ba	0.001	0.003	32	81	37	102	39
202Hg	0.027	0.090	0.100	0.081	0.076	0.119	0.116
205Tl	0.002	0.007	0.034	0.058	0.032	0.064	0.047
208Pb	0.003	0.010	0.198	0.376	0.145	0.417	0.158
238U	0.001	0.003	0.235	0.270	0.097	0.325	0.136

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited: Project 20-15

Tissue Analysis Results

		Client ID	RG_LISP24_INV-1_2020-04-29	RG_LISP24_INV-2_2020-04-29	RG_LISP24_INV-3_2020-04-29	RG_LISP24_INV-4_2020-04-29	RG_LISP24_INV-5_2020-04-29
		Lab ID	081	082	083	084	085
		Wet Weight (g)	1.0596	1.0949	1.2211	1.8905	1.5393
		Dry Weight (g)	0.1878	0.4512	0.2211	0.3642	0.2723
		Moisture (%)	82.3	58.8	81.9	80.7	82.3
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.711	0.671	0.393	0.443	0.397
11B	0.090	0.300	2.4	0.904	0.723	0.439	1.0
23Na	5.4	18	2,687	3,233	2,155	2,102	1,857
24Mg	0.038	0.127	1,216	1,101	798	641	862
27Al	0.585	1.9	1,159	509	255	166	738
31P	39	130	7,590	8,628	6,019	5,254	6,007
39K	2.9	9.7	5,749	7,597	4,843	5,321	4,408
44Ca	196	653	4,877	1,852	1,751	1,525	2,279
49Ti	0.225	0.750	85	29	13	11	37
51V	0.021	0.070	2.4	0.976	0.584	0.440	1.5
52Cr	0.496	1.7	21	2.8	2.8	1.9	2.9
55Mn	0.017	0.057	555	435	303	289	430
57Fe	1.5	5.0	1,200	601	440	283	829
59Co	0.002	0.007	4.4	2.6	2.4	2.8	3.0
60Ni	0.014	0.047	58	19	18	15	19
63Cu	0.010	0.033	20	13	18	13	26
66Zn	0.372	1.2	376	259	271	242	335
75As	0.387	1.3	0.682	0.463	<0.387	<0.387	0.675
77Se	0.373	1.2	6.6	6.1	5.3	5.0	8.1
88Sr	0.001	0.003	7.0	3.8	2.6	2.0	3.7
95Mo	0.007	0.023	0.709	0.422	0.488	0.326	0.740
107Ag	0.001	0.003	0.031	0.024	0.024	0.017	0.040
111Cd	0.085	0.283	5.1	2.8	4.4	3.2	7.1
118Sn	0.017	0.057	0.566	0.405	0.337	0.156	0.448
121Sb	0.004	0.013	0.183	0.104	0.068	0.076	0.066
137Ba	0.001	0.003	58	31	20	14	37
202Hg	0.027	0.090	0.083	0.067	0.081	0.081	0.089
205Tl	0.002	0.007	0.029	0.020	0.017	0.012	0.029
208Pb	0.003	0.010	0.220	0.113	0.069	0.057	0.205
238U	0.001	0.003	0.262	0.071	0.054	0.027	0.096

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited: Project 20-15

Tissue Analysis Results

		Client ID	RG_LISP24_INV-6_2020-04-29	RG_LISP24_INV-7_2020-04-29	RG_LISP24_INV-8_2020-04-29	RG_LISP24_INV-9_2020-04-29	RG_LISP24_INV-10_2020-04-29
		Lab ID	086	087	088	089	090
		Wet Weight (g)	1.8658	1.4953	2.7738	1.4041	3.3899
		Dry Weight (g)	0.3740	0.3164	0.6271	0.2639	0.6906
		Moisture (%)	80.0	78.8	77.4	81.2	79.6
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.183	0.478	0.568	1.2	0.626
11B	0.090	0.300	0.370	0.740	1.4	1.3	0.936
23Na	5.4	18	1,612	5,575	2,998	4,786	4,080
24Mg	0.038	0.127	929	1,335	1,414	1,530	1,230
27Al	0.585	1.9	35	240	379	497	349
31P	39	130	6,693	11,365	11,030	12,228	11,800
39K	2.9	9.7	4,006	9,825	7,898	9,058	8,509
44Ca	196	653	1,645	3,101	2,995	4,314	2,136
49Ti	0.225	0.750	2.3	17	22	31	21
51V	0.021	0.070	0.151	0.607	1.1	1.2	0.779
52Cr	0.496	1.7	1.8	2.5	3.0	4.9	3.1
55Mn	0.017	0.057	205	339	711	822	479
57Fe	1.5	5.0	126	461	547	730	541
59Co	0.002	0.007	1.7	3.6	2.6	6.5	3.1
60Ni	0.014	0.047	8.4	18	19	36	20
63Cu	0.010	0.033	12	18	29	21	17
66Zn	0.372	1.2	342	289	269	270	282
75As	0.387	1.3	<0.387	0.562	0.698	0.846	0.489
77Se	0.373	1.2	7.6	6.7	6.0	7.2	8.9
88Sr	0.001	0.003	5.1	4.1	4.8	5.4	3.7
95Mo	0.007	0.023	0.272	0.632	0.533	0.762	0.582
107Ag	0.001	0.003	0.017	0.042	0.026	0.036	0.027
111Cd	0.085	0.283	3.8	8.5	3.1	5.1	4.2
118Sn	0.017	0.057	0.068	0.440	0.477	0.576	0.320
121Sb	0.004	0.013	0.018	0.075	0.099	0.153	0.123
137Ba	0.001	0.003	24	18	26	36	29
202Hg	0.027	0.090	0.120	0.107	0.058	0.091	0.073
205Tl	0.002	0.007	0.012	0.040	0.040	0.035	0.030
208Pb	0.003	0.010	0.046	0.085	0.125	0.140	0.132
238U	0.001	0.003	0.027	0.059	0.086	0.073	0.083

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited: Project 20-15

Tissue Analysis Results

		Client ID	RG_SLINE_INV-1_2020-04-28	RG_SLINE_INV-2_2020-04-28	RG_SLINE_INV-3_2020-04-28	RG_SLINE_INV-4_2020-04-28	RG_SLINE_INV-5_2020-04-28
		Lab ID	091	092	093	094	095
		Wet Weight (g)	1.0522	0.9771	1.0440	0.9009	1.1991
		Dry Weight (g)	0.1943	0.1878	0.1742	0.1763	0.1841
		Moisture (%)	81.5	80.8	83.3	80.4	84.6
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.691	0.476	0.426	0.209	0.520
11B	0.090	0.300	1.4	0.849	1.1	0.979	2.1
23Na	5.4	18	5,022	4,091	5,588	2,855	3,151
24Mg	0.038	0.127	1,599	1,309	1,428	1,162	1,343
27Al	0.585	1.9	717	229	281	177	730
31P	39	130	13,468	11,935	13,279	9,538	8,848
39K	2.9	9.7	10,743	9,111	10,434	7,161	6,765
44Ca	196	653	5,824	2,548	3,554	2,055	5,354
49Ti	0.225	0.750	45	11	17	7.7	44
51V	0.021	0.070	1.4	0.654	0.604	0.849	1.4
52Cr	0.496	1.7	7.9	3.3	5.2	3.6	9.7
55Mn	0.017	0.057	28	19	17	21	19
57Fe	1.5	5.0	408	179	242	139	368
59Co	0.002	0.007	0.637	0.397	0.383	0.305	0.489
60Ni	0.014	0.047	16	7.4	7.8	7.0	19
63Cu	0.010	0.033	24	16	17	13	16
66Zn	0.372	1.2	392	395	296	418	340
75As	0.387	1.3	0.853	1.0	0.634	0.818	0.780
77Se	0.373	1.2	9.2	8.4	6.1	8.9	6.7
88Sr	0.001	0.003	14	5.8	7.8	5.5	9.7
95Mo	0.007	0.023	0.508	0.476	0.331	0.363	0.314
107Ag	0.001	0.003	0.174	0.088	0.076	0.079	0.090
111Cd	0.085	0.283	3.8	3.2	1.6	2.6	1.4
118Sn	0.017	0.057	0.440	0.425	0.483	0.180	0.242
121Sb	0.004	0.013	0.032	0.015	0.024	0.021	0.024
137Ba	0.001	0.003	38	25	26	26	24
202Hg	0.027	0.090	0.107	0.135	0.081	0.361	0.107
205Tl	0.002	0.007	0.068	0.051	0.046	0.055	0.047
208Pb	0.003	0.010	0.351	0.120	0.135	0.139	0.177
238U	0.001	0.003	0.128	0.119	0.088	0.177	0.083

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited: Project 20-15

Tissue Analysis Results

		Client ID	RG_SLINE_INV-6_2020-04-28	RG_SLINE_INV-7_2020-04-28	RG_SLINE_INV-8_2020-04-28	RG_SLINE_INV-9_2020-04-28	RG_SLINE_INV-10_2020-04-28
		Lab ID	096	097	098	099	100
		Wet Weight (g)	0.4848	0.8798	0.7667	1.3438	0.7659
		Dry Weight (g)	0.0646	0.1770	0.1165	0.2147	0.1356
		Moisture (%)	86.7	79.9	84.8	84.0	82.3
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.520	0.543	0.198	0.900	0.181
11B	0.090	0.300	1.9	1.2	0.446	4.2	0.415
23Na	5.4	18	1,544	5,644	2,726	5,882	2,840
24Mg	0.038	0.127	1,118	1,918	860	1,890	1,287
27Al	0.585	1.9	748	454	122	1,465	139
31P	39	130	7,284	12,843	8,336	13,442	10,456
39K	2.9	9.7	3,635	12,929	6,779	12,254	6,391
44Ca	196	653	5,898	3,786	1,492	8,315	2,983
49Ti	0.225	0.750	46	35	6.1	90	7.3
51V	0.021	0.070	1.8	1.2	0.226	2.8	0.333
52Cr	0.496	1.7	25	7.6	3.1	19	3.0
55Mn	0.017	0.057	22	27	15	25	21
57Fe	1.5	5.0	671	321	110	793	123
59Co	0.002	0.007	1.2	0.649	0.181	1.3	0.249
60Ni	0.014	0.047	38	14	3.7	34	4.6
63Cu	0.010	0.033	18	19	9.1	25	18
66Zn	0.372	1.2	640	500	174	555	513
75As	0.387	1.3	1.1	1.2	0.400	1.6	0.567
77Se	0.373	1.2	6.7	10	5.3	9.0	7.1
88Sr	0.001	0.003	11	9.1	3.4	15	5.5
95Mo	0.007	0.023	0.421	0.552	0.283	0.432	0.290
107Ag	0.001	0.003	0.132	0.118	0.051	0.115	0.112
111Cd	0.085	0.283	4.0	4.0	0.896	4.7	4.0
118Sn	0.017	0.057	0.622	0.412	0.196	0.672	0.383
121Sb	0.004	0.013	0.024	0.027	0.009	0.045	0.009
137Ba	0.001	0.003	41	32	16	46	18
202Hg	0.027	0.090	0.183	0.142	0.051	0.124	0.152
205Tl	0.002	0.007	0.044	0.094	0.035	0.111	0.035
208Pb	0.003	0.010	0.219	0.183	0.048	0.368	0.065
238U	0.001	0.003	0.090	0.125	0.021	0.193	0.087

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited: Project 20-15

Tissue QA/QC Relative Percent Difference Results

Client ID		RG_FO23_INV-4_2020-04-27			RG_FO23_INV-7_2020-04-27			RG_FRUL_INV-2_2020-04-29		
Lab ID		004			007			012		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.005	1.7	1.5	12.5	2.9	3.2	9.8	0.861	0.732	16.2
11B	0.090	8.9	7.1	22.5	15	22	37.8	2.7	2.1	25.0
23Na	5.4	4,971	4,498	10.0	2,305	2,159	6.5	2,915	2,804	3.9
24Mg	0.038	1,971	1,615	19.9	2,111	2,162	2.4	1,865	1,578	16.7
27Al	0.585	2,919	2,293	24.0	8,865	9,580	7.8	1,560	1,069	37.4
31P	39	9,094	8,851	2.7	7,895	8,056	2.0	9,442	9,792	3.6
39K	2.9	8,979	7,248	21.3	5,229	5,779	10.0	7,992	8,218	2.8
44Ca	196	6,750	6,421	5.0	15,297	16,012	4.6	5,564	4,402	23.3
49Ti	0.225	197	160	20.7	574	638	10.6	91	73	22.0
51V	0.021	4.3	3.4	23.4	11	12	8.7	2.4	1.7	34.1
52Cr	0.496	28	25	11.3	77	83	7.5	10	7.2	32.6
55Mn	0.017	81	90	10.5	124	134	7.8	54	44	20.4
57Fe	1.5	1,344	1,114	18.7	3,455	4,469	25.6	715	492	37.0
59Co	0.002	2.5	2.0	22.2	5.1	6.3	21.1	1.2	0.962	22.0
60Ni	0.014	64	59	8.1	125	135	7.7	20	16	22.2
63Cu	0.010	17	17	0.0	21	25	17.4	19	16	17.1
66Zn	0.372	289	321	10.5	334	396	17.0	270	263	2.6
75As	0.387	0.725	0.656	-	1.2	1.3	-	0.673	0.546	-
77Se	0.373	7.8	7.3	6.6	9.6	8.7	9.8	6.5	5.8	11.4
88Sr	0.001	9.2	8.2	11.5	17	18	5.7	5.6	4.0	33.3
95Mo	0.007	0.512	0.452	12.4	0.711	0.716	0.7	0.368	0.294	22.4
107Ag	0.001	0.132	0.151	13.4	0.115	0.111	3.5	0.178	0.182	2.2
111Cd	0.085	2.0	2.3	14.0	3.3	3.5	5.9	1.7	1.7	0.0
118Sn	0.017	0.704	0.562	22.4	1.1	1.0	9.5	0.797	0.811	1.7
121Sb	0.004	0.063	0.053	17.2	0.149	0.144	3.4	0.039	0.030	-
137Ba	0.001	70	64	9.0	151	160	5.8	44	35	22.8
202Hg	0.027	0.082	0.065	-	0.080	0.086	-	0.064	0.055	-
205Tl	0.002	0.081	0.070	14.6	0.173	0.160	7.8	0.027	0.021	25.0
208Pb	0.003	0.615	0.533	14.3	1.6	1.6	0.0	0.327	0.245	28.7
238U	0.001	0.172	0.140	20.5	0.297	0.319	7.1	0.069	0.056	20.8

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: Project 20-15

Tissue QA/QC Relative Percent Difference Results

Client ID		RG_LCUT_INV-2_2020-04-27			RG_LCUT_INV-6_2020-04-27			RG_LI24_INV-10_2020-04-28		
Lab ID		022			026			050		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.005	0.876	1.1	22.7	1.5	2.2	37.8	1.3	1.0	26.1
11B	0.090	3.2	3.8	17.1	7.1	8.5	17.9	2.1	2.0	4.9
23Na	5.4	2,645	3,160	17.7	2,633	2,471	6.3	4,434	4,382	1.2
24Mg	0.038	1,296	1,870	36.3	2,056	2,429	16.6	1,630	1,648	1.1
27Al	0.585	2,010	2,223	10.1	4,014	5,127	24.4	1,053	1,010	4.2
31P	39	10,553	12,046	13.2	12,693	12,550	1.1	12,030	11,913	1.0
39K	2.9	7,861	10,373	27.6	13,908	15,026	7.7	9,068	10,354	13.2
44Ca	196	5,274	7,790	38.5	9,535	8,735	8.8	6,353	5,622	12.2
49Ti	0.225	104	128	20.7	271	283	4.3	64	67	4.6
51V	0.021	2.2	3.1	34.0	6.0	8.5	34.5	3.7	3.1	17.6
52Cr	0.496	7.9	9.2	15.2	10	14	33.3	7.2	7.8	8.0
55Mn	0.017	24	31	25.5	93	102	9.2	22	19	14.6
57Fe	1.5	446	572	24.8	956	1,318	31.8	476	528	10.4
59Co	0.002	1.7	2.2	25.6	6.1	6.6	7.9	0.773	0.723	6.7
60Ni	0.014	20	28	33.3	36	42	15.4	18	22	20.0
63Cu	0.010	45	55	20.0	50	48	4.1	15	20	28.6
66Zn	0.372	238	279	15.9	335	376	11.5	255	301	16.5
75As	0.387	1.2	1.7	-	3.9	4.1	5.0	1.8	1.7	-
77Se	0.373	7.2	8.7	18.9	9.9	8.4	16.4	5.6	6.7	17.9
88Sr	0.001	6.7	8.9	28.2	12	18	40.0	13	12	8.0
95Mo	0.007	0.344	0.463	29.5	0.799	0.697	13.6	0.395	0.402	1.8
107Ag	0.001	0.071	0.091	24.7	0.136	0.123	10.0	0.084	0.087	3.5
111Cd	0.085	3.4	4.5	27.8	10	11	9.5	1.0	0.904	10.1
118Sn	0.017	0.748	0.939	22.6	1.2	0.879	30.9	0.430	0.485	12.0
121Sb	0.004	0.078	0.102	26.7	0.190	0.215	12.3	0.088	0.077	13.3
137Ba	0.001	44	62	34.0	159	194	19.8	35	34	2.9
202Hg	0.027	0.095	0.141	-	0.151	0.122	-	0.055	0.044	-
205Tl	0.002	0.060	0.076	23.5	0.106	0.116	9.0	0.056	0.059	5.2
208Pb	0.003	0.455	0.606	28.5	1.2	1.3	8.0	0.548	0.533	2.8
238U	0.001	0.116	0.148	24.2	0.236	0.248	5.0	0.148	0.136	8.5

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: Project 20-15

Tissue QA/QC Relative Percent Difference Results

Client ID		RG_LIDCOM_INV-2_2020-04-30			RG_LIDCOM_INV-6_2020-04-30			RG_SLINE_INV-1_2020-04-28		
Lab ID		052			056			091		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.005	0.474	0.404	15.9	0.807	0.710	12.8	0.691	0.594	15.1
11B	0.090	2.5	2.1	17.4	1.6	1.7	6.1	1.4	1.3	7.4
23Na	5.4	2,283	2,113	7.7	5,555	5,042	9.7	5,022	5,585	10.6
24Mg	0.038	1,076	971	10.3	1,161	1,030	12.0	1,599	1,663	3.9
27Al	0.585	1,076	790	30.7	577	676	15.8	717	536	28.9
31P	39	9,194	8,387	9.2	11,549	11,700	1.3	13,468	12,909	4.2
39K	2.9	5,481	5,345	2.5	10,393	9,415	9.9	10,743	11,275	4.8
44Ca	196	3,263	2,917	11.2	2,989	2,624	13.0	5,824	3,957	38.2
49Ti	0.225	47	46	2.2	35	30	15.4	45	36	22.2
51V	0.021	1.9	2.0	5.1	1.1	1.1	0.0	1.4	1.3	7.4
52Cr	0.496	4.3	4.4	-	4.7	5.3	12.0	7.9	11	32.8
55Mn	0.017	153	143	6.8	201	165	19.7	28	21	28.6
57Fe	1.5	535	447	17.9	427	412	3.6	408	443	8.2
59Co	0.002	1.6	1.6	0.0	2.1	1.8	15.4	0.637	0.683	7.0
60Ni	0.014	18	17	5.7	26	26	0.0	16	22	31.6
63Cu	0.010	16	13	20.7	18	16	11.8	24	22	8.7
66Zn	0.372	383	297	25.3	289	253	13.3	392	285	31.6
75As	0.387	0.755	0.662	-	0.653	0.635	-	0.853	0.675	-
77Se	0.373	4.9	5.2	5.9	5.9	5.7	3.4	9.2	7.4	21.7
88Sr	0.001	4.8	3.8	23.3	4.0	4.1	2.5	14	9.2	41.4
95Mo	0.007	0.285	0.325	13.1	0.509	0.453	11.6	0.508	0.396	24.8
107Ag	0.001	0.036	0.038	5.4	0.040	0.036	10.5	0.174	0.118	38.4
111Cd	0.085	6.3	5.0	23.0	5.8	4.0	36.7	3.8	2.5	**41.3**
118Sn	0.017	0.361	0.369	2.2	0.320	0.279	13.7	0.440	0.332	28.0
121Sb	0.004	0.048	0.051	6.1	0.064	0.059	8.1	0.032	0.026	-
137Ba	0.001	33	28	16.4	32	24	28.6	38	31	20.3
202Hg	0.027	0.103	0.096	-	0.092	0.084	-	0.107	0.062	-
205Tl	0.002	0.040	0.035	13.3	0.046	0.042	9.1	0.068	0.055	21.1
208Pb	0.003	0.285	0.226	23.1	0.258	0.198	26.3	0.141	0.199	34.1
238U	0.001	0.079	0.077	2.6	0.096	0.083	14.5	0.128	0.102	22.6

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

Bold indicates DQO exceedance, but result is accepted as it does not impact the reportable results.

Teck Coal Limited: Project 20-15

Tissue QA/QC Relative Percent Difference Results

Client ID	RG_SLINE_INV-9_2020-04-28
Lab ID	099

Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.005	0.900	0.802	11.5
11B	0.090	4.2	4.0	4.9
23Na	5.4	5,882	4,981	16.6
24Mg	0.038	1,890	1,609	16.1
27Al	0.585	1,465	1,049	33.1
31P	39	13,442	11,830	12.8
39K	2.9	12,254	10,472	15.7
44Ca	196	8,315	6,467	25.0
49Ti	0.225	90	76	16.9
51V	0.021	2.8	2.7	3.6
52Cr	0.496	19	17	11.1
55Mn	0.017	25	22	12.8
57Fe	1.5	793	582	30.7
59Co	0.002	1.3	1.1	16.7
60Ni	0.014	34	29	15.9
63Cu	0.010	25	21	17.4
66Zn	0.372	555	478	14.9
75As	0.387	1.6	1.4	-
77Se	0.373	9.0	7.8	14.3
88Sr	0.001	15	12	22.2
95Mo	0.007	0.432	0.366	16.5
107Ag	0.001	0.115	0.100	14.0
111Cd	0.085	4.7	4.1	13.6
118Sn	0.017	0.672	0.559	18.4
121Sb	0.004	0.045	0.036	22.2
137Ba	0.001	46	33	32.9
202Hg	0.027	0.124	0.112	-
205Tl	0.002	0.111	0.079	33.7
208Pb	0.003	0.368	0.317	14.9
238U	0.001	0.193	0.164	16.2

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: Project 20-15

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	0.005	1.21	1.3	110	2.2	1.2	98	3.6
11B	0.090	4.5	5.3	117	2.8	5.0	111	2.2
23Na	5.4	14000	15,824	113	7.9	14,122	101	2.8
24Mg	0.038	910	1,006	111	4.5	883	97	4.8
27Al	0.585	197.2	204	103	4.5	217	110	7.8
31P	39	8000	8,595	107	3.5	7,974	100	4.2
39K	2.9	15500	18,030	116	3.2	15,867	102	7.6
44Ca	196	2360	2,631	112	4.9	2,385	101	1.3
49Ti	0.225	12.24	13	104	14.6	15	123	7.6
51V	0.021	1.57	1.7	107	8.3	1.6	99	8.4
52Cr	0.496	1.87	2.1	112	6.7	1.9	102	2.9
55Mn	0.017	3.17	3.6	112	6.5	3.0	95	4.1
57Fe	1.5	343	390	114	3.9	333	97	3.4
59Co	0.002	0.25	0.282	113	3.6	0.242	97	3.2
60Ni	0.014	1.34	1.6	117	6.7	1.4	101	4.2
63Cu	0.010	15.7	19	120	5.1	16	101	3.8
66Zn	0.372	51.6	60	115	2.7	52	100	3.4
75As	0.387	6.87	7.2	105	3.0	6.8	99	3.3
77Se	0.373	3.45	3.4	99	3.9	3.5	101	3.7
88Sr	0.001	10.1	11	112	5.5	9.8	97	2.9
95Mo	0.007	0.29	0.323	112	4.3	0.280	96	8.9
107Ag	0.001	0.0252	0.029	117	7.5	0.026	103	8.7
111Cd	0.085	0.299	0.357	119	3.6	0.308	103	4.9
118Sn	0.017	0.061	0.066	108	15.4	0.064	105	9.0
121Sb	0.004	0.011	0.012	110	10.6	0.012	109	17.7
137Ba	0.001	8.6	9.2	107	1.5	9.2	107	5.4
202Hg	0.027	0.412	0.447	109	4.4	0.447	109	5.4
205Tl	0.002	-	-	-	-	-	-	-
208Pb	0.003	0.404	0.428	106	11.7	0.421	104	6.9
238U	0.001	0.05	0.055	109	7.5	0.048	97	5.1

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% was established for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Teck Coal Limited: Project 20-15

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	0.005	1.21	1.4	115	7.9	1.3	107	6.7
11B	0.090	4.5	6.0	132	1.5	5.6	125	6.3
23Na	5.4	14000	15,894	114	1.2	16,021	114	5.0
24Mg	0.038	910	1,016	112	3.4	1,048	115	3.9
27Al	0.585	197.2	231	117	5.1	220	112	7.6
31P	39	8000	8,593	107	2.4	8,188	102	2.0
39K	2.9	15500	17,962	116	4.8	16,744	108	3.7
44Ca	196	2360	2,677	114	2.0	2,734	116	4.2
49Ti	0.225	12.24	14	117	9.2	13	106	9.3
51V	0.021	1.57	1.6	101	11.1	1.6	100	7.3
52Cr	0.496	1.87	2.1	111	2.7	2.0	107	3.7
55Mn	0.017	3.17	3.6	114	2.7	3.6	114	3.3
57Fe	1.5	343	396	116	2.3	400	117	3.0
59Co	0.002	0.25	0.297	119	3.8	0.277	111	6.6
60Ni	0.014	1.34	1.6	117	1.2	1.5	114	6.1
63Cu	0.010	15.7	18	117	5.3	19	118	6.7
66Zn	0.372	51.6	56	108	3.4	58	113	3.7
75As	0.387	6.87	7.2	105	1.1	7.0	102	2.5
77Se	0.373	3.45	3.7	107	2.6	3.4	97	3.7
88Sr	0.001	10.1	11	111	1.6	12	117	3.5
95Mo	0.007	0.29	0.316	109	5.4	0.326	112	3.3
107Ag	0.001	0.0252	0.029	114	7.8	0.030	118	10.5
111Cd	0.085	0.299	0.356	119	5.3	0.338	113	6.3
118Sn	0.017	0.061	0.069	113	7.8	0.060	99	15.0
121Sb	0.004	0.011	0.013	115	11.9	0.013	120	10.6
137Ba	0.001	8.6	10	121	1.9	10	118	4.2
202Hg	0.027	0.412	0.440	107	6.9	0.474	115	5.9
205Tl	0.002	-	-	-	-	-	-	-
208Pb	0.003	0.404	0.427	106	16.9	0.433	107	11.3
238U	0.001	0.05	0.055	109	9.1	0.055	110	12.3

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% was established for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Teck Coal Limited: Project 20-15

Tissue QA/QC Accuracy and Precision Results

	Sample Group ID	05				06		
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.005	1.21	1.2	97	4.7	1.4	116	8.0
11B	0.090	4.5	4.9	109	2.6	6.1	136	4.3
23Na	5.4	14000	13,364	96	5.4	16,767	120	7.6
24Mg	0.038	910	906	100	6.1	1,031	113	5.8
27Al	0.585	197.2	207	105	5.2	244	124	4.2
31P	39	8000	7,426	93	5.6	8,716	109	4.5
39K	2.9	15500	14,873	96	7.8	17,296	112	6.4
44Ca	196	2360	2,189	93	5.7	2,764	117	5.4
49Ti	0.225	12.24	12	96	5.7	14	112	11.2
51V	0.021	1.57	1.3	85	9.3	1.8	118	12.8
52Cr	0.496	1.87	1.8	97	6.7	2.1	115	1.4
55Mn	0.017	3.17	3.0	96	7.3	3.6	114	4.6
57Fe	1.5	343	335	98	7.1	409	119	5.3
59Co	0.002	0.25	0.241	96	4.2	0.295	118	6.3
60Ni	0.014	1.34	1.3	95	4.1	1.6	122	5.4
63Cu	0.010	15.7	15	95	4.9	20	124	3.6
66Zn	0.372	51.6	49	95	3.5	62	121	3.9
75As	0.387	6.87	6.3	91	4.8	7.4	108	4.7
77Se	0.373	3.45	3.1	91	1.2	3.6	104	5.0
88Sr	0.001	10.1	9.1	90	6.8	12	118	6.4
95Mo	0.007	0.29	0.274	95	6.0	0.339	117	6.5
107Ag	0.001	0.0252	0.026	102	7.5	0.032	128	6.9
111Cd	0.085	0.299	0.301	101	6.4	0.379	127	13.3
118Sn	0.017	0.061	0.056	92	18.8	0.079	130	6.6
121Sb	0.004	0.011	0.011	100	14.1	0.013	120	15.2
137Ba	0.001	8.6	8.5	99	2.1	10	119	5.0
202Hg	0.027	0.412	0.429	104	9.6	0.473	115	10.5
205Tl	0.002	-	-	-	-	-	-	-
208Pb	0.003	0.404	0.350	87	15.3	0.575	**142**	11.1
238U	0.001	0.05	0.044	88	9.3	0.067	134	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% was established for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Bold indicates DQO exceedance, but result is accepted as it does not impact the reportable results.

Teck Coal Limited: Project 20-15

Tissue QA/QC Accuracy and Precision Results

		Sample Group ID	07			08		
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.005	1.21	1.5	128	11.0	1.3	104	5.8
11B	0.090	4.5	5.8	129	3.8	4.5	101	2.0
23Na	5.4	14000	16,929	121	1.3	14,330	102	3.4
24Mg	0.038	910	1,101	121	3.7	863	95	3.4
27Al	0.585	197.2	192	98	3.1	166	84	9.1
31P	39	8000	8,818	110	1.4	7,718	97	1.8
39K	2.9	15500	18,953	122	4.4	14,785	95	8.9
44Ca	196	2360	2,865	121	5.9	2,338	99	3.4
49Ti	0.225	12.24	14	115	4.7	12	102	16
51V	0.021	1.57	1.7	109	13.3	1.4	92	8.1
52Cr	0.496	1.87	2.1	113	6.1	1.9	100	2.6
55Mn	0.017	3.17	3.7	117	6.1	3.0	94	4.4
57Fe	1.5	343	424	124	6.1	336	98	5.5
59Co	0.002	0.25	0.298	119	2.3	0.244	98	6.8
60Ni	0.014	1.34	1.6	118	5.4	1.3	98	3.8
63Cu	0.010	15.7	20	126	7.0	15	95	5.8
66Zn	0.372	51.6	62	120	5.5	50	98	4.5
75As	0.387	6.87	7.5	110	2.0	6.6	96	3.5
77Se	0.373	3.45	3.6	104	4.7	3.4	99	4.8
88Sr	0.001	10.1	12	117	3.1	9.7	96	2.8
95Mo	0.007	0.29	0.338	117	5.4	0.279	96	5.3
107Ag	0.001	0.0252	0.032	127	9.8	0.023	92	4.4
111Cd	0.085	0.299	0.394	**132**	6.9	0.301	101	8.5
118Sn	0.017	0.061	0.074	122	8.4	0.059	96	16.0
121Sb	0.004	0.011	0.012	110	19.4	0.011	96	14.0
137Ba	0.001	8.6	9.7	113	1.9	8.3	96	4.4
202Hg	0.027	0.412	0.465	113	6.2	0.403	98	3.4
205Tl	0.002	-	-	-	-	-	-	-
208Pb	0.003	0.404	0.516	128	17.7	0.378	94	13.0
238U	0.001	0.05	0.056	112	12.1	0.047	94	7.0

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% was established for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Bold indicates DQO exceedance, but result is accepted as it does not impact the reportable results.

Teck Coal Limited: Project 20-15

Tissue QA/QC Accuracy and Precision Results

			Sample Group ID	09			10	
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.005	1.21	1.4	113	5.7	1.3	105	6.2
11B	0.090	4.5	4.7	104	4.1	4.4	97	3.6
23Na	5.4	14000	16,271	116	5.0	14,527	104	4.5
24Mg	0.038	910	1,066	117	5.3	929	102	3.3
27Al	0.585	197.2	187	95	8.7	180	91	8.8
31P	39	8000	9,421	118	5.5	8,383	105	2.4
39K	2.9	15500	16,839	109	10.3	16,102	104	7.8
44Ca	196	2360	2,627	111	5.8	2,496	106	6.5
49Ti	0.225	12.24	12	99	11.8	11	89	12.4
51V	0.021	1.57	1.9	122	14.7	1.5	98	6.7
52Cr	0.496	1.87	2.2	115	7.3	1.9	102	3.4
55Mn	0.017	3.17	3.6	115	6.3	3.3	104	2.6
57Fe	1.5	343	393	115	6.5	356	104	3.5
59Co	0.002	0.25	0.286	114	5.9	0.265	106	4.9
60Ni	0.014	1.34	1.5	114	6.2	1.4	103	2.8
63Cu	0.010	15.7	18	113	7.3	17	108	4.1
66Zn	0.372	51.6	60	116	6.6	56	108	6.7
75As	0.387	6.87	7.6	111	5.3	7.1	103	5.3
77Se	0.373	3.45	3.7	109	4.5	3.6	106	4.9
88Sr	0.001	10.1	11	111	3.5	10	103	6.0
95Mo	0.007	0.29	0.315	109	6.9	0.307	106	6.8
107Ag	0.001	0.0252	0.031	124	6.8	0.026	104	7.9
111Cd	0.085	0.299	0.373	125	6.9	0.313	105	5.1
118Sn	0.017	0.061	0.068	112	7.7	0.054	89	9.3
121Sb	0.004	0.011	0.012	106	12.4	0.010	87	14.0
137Ba	0.001	8.6	8.5	99	5.2	7.8	91	4.9
202Hg	0.027	0.412	0.437	106	5.4	0.436	106	7.3
205Tl	0.002	-	-	-	-	-	-	-
208Pb	0.003	0.404	0.454	112	11.6	0.418	104	8.5
238U	0.001	0.05	0.055	110	9.7	0.049	97	5.1

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% was established for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Teck Coal Limited: Project 20-15
Sample Group Information

Sample Group ID	Client ID	Lab ID	Date of Analysis
01	RG_FO23_INV-1_2020-04-27	001	14 Jul 2020
	RG_FO23_INV-2_2020-04-27	002	
	RG_FO23_INV-3_2020-04-27	003	
	RG_FO23_INV-4_2020-04-27	004	
	RG_FO23_INV-5_2020-04-27	005	
	RG_FO23_INV-6_2020-04-27	006	
	RG_FO23_INV-7_2020-04-27	007	
	RG_FO23_INV-8_2020-04-27	008	
02	RG_FO23_INV-9_2020-04-27	009	14 Jul 2020
	RG_FO23_INV-10_2020-04-27	010	
	RG_FRUL_INV-1_2020-04-29	011	
	RG_FRUL_INV-2_2020-04-29	012	
	RG_FRUL_INV-3_2020-04-29	013	
	RG_FRUL_INV-4_2020-04-29	014	
	RG_FRUL_INV-5_2020-04-29	015	
	RG_FRUL_INV-6_2020-04-29	016	
	RG_FRUL_INV-7_2020-04-29	017	
03	RG_FRUL_INV-8_2020-04-29	018	09 Jul 2020
	RG_FRUL_INV-9_2020-04-29	019	
	RG_FRUL_INV-10_2020-04-29	020	
	RG_LCUT_INV-1_2020-04-27	021	
	RG_LCUT_INV-2_2020-04-27	022	
	RG_LCUT_INV-3_2020-04-27	023	
	RG_LCUT_INV-4_2020-04-27	024	
	RG_LCUT_INV-5_2020-04-27	025	
	RG_LCUT_INV-6_2020-04-27	026	
	RG_LCUT_INV-7_2020-04-27	027	
	RG_LCUT_INV-8_2020-04-27	028	
	RG_LCUT_INV-9_2020-04-27	029	
	RG_LCUT_INV-10_2020-04-27	030	
	RG_LI8_INV-1_2020-04-30	031	
	RG_LI8_INV-2_2020-04-30	032	
	RG_LI8_INV-3_2020-04-30	033	
	RG_LI8_INV-4_2020-04-30	034	
04	RG_LI8_INV-5_2020-04-30	035	13 Jul 2020
	RG_LI8_INV-6_2020-04-30	036	
	RG_LI8_INV-7_2020-04-30	037	
	RG_LI8_INV-8_2020-04-30	038	
	RG_LI8_INV-9_2020-04-30	039	
	RG_LI8_INV-10_2020-04-30	040	

Sample Group ID	Client ID	Lab ID	Date of Analysis
04	RG_LI24_INV-1_2020-04-28	041	13 Jul 2020
	RG_LI24_INV-2_2020-04-28	042	
05	RG_LI24_INV-3_2020-04-28	043	14 Jul 2020
	RG_LI24_INV-4_2020-04-28	044	
	RG_LI24_INV-5_2020-04-28	045	
	RG_LI24_INV-6_2020-04-28	046	
	RG_LI24_INV-7_2020-04-28	047	
	RG_LI24_INV-8_2020-04-28	048	
	RG_LI24_INV-9_2020-04-28	049	
	RG_LI24_INV-10_2020-04-28	050	
06	RG_LIDCOM_INV-1_2020-04-30	051	09 Jul 2020
	RG_LIDCOM_INV-2_2020-04-30	052	
	RG_LIDCOM_INV-3_2020-04-30	053	
	RG_LIDCOM_INV-4_2020-04-30	054	
	RG_LIDCOM_INV-5_2020-04-30	055	
	RG_LIDCOM_INV-6_2020-04-30	056	
	RG_LIDCOM_INV-7_2020-04-30	057	
	RG_LIDCOM_INV-8_2020-04-30	058	
	RG_LIDCOM_INV-9_2020-04-30	059	
	RG_LIDCOM_INV-10_2020-04-30	060	
	RG_LIDSL_INV-1_2020-04-29	061	
	RG_LIDSL_INV-2_2020-04-29	062	
	RG_LIDSL_INV-3_2020-04-29	063	
	RG_LIDSL_INV-4_2020-04-29	064	
	RG_LIDSL_INV-5_2020-04-29	065	
	RG_LIDSL_INV-6_2020-04-29	066	
	RG_LIDSL_INV-7_2020-04-29	067	
07	RG_LIDSL_INV-8_2020-04-29	068	13 Jul 2020
	RG_LIDSL_INV-9_2020-04-29	069	
	RG_LIDSL_INV-10_2020-04-29	070	
	RG_LILC3_INV-1_2020-04-27	071	
	RG_LILC3_INV-2_2020-04-27	072	
	RG_LILC3_INV-3_2020-04-27	073	
	RG_LILC3_INV-4_2020-04-27	074	
	RG_LILC3_INV-5_2020-04-27	075	
08	RG_LILC3_INV-6_2020-04-27	076	13 Jul 2020
	RG_LILC3_INV-7_2020-04-27	077	
	RG_LILC3_INV-8_2020-04-27	078	
	RG_LILC3_INV-9_2020-04-27	079	
	RG_LILC3_INV-10_2020-04-27	080	

Teck Coal Limited: Project 20-15
Sample Group Information

Sample Group ID	Client ID	Lab ID	Date of Analysis
08	RG_LISP24_INV-1_2020-04-29	081	13 Jul 2020
	RG_LISP24_INV-2_2020-04-29	082	
	RG_LISP24_INV-3_2020-04-29	083	
	RG_LISP24_INV-4_2020-04-29	084	
09	RG_LISP24_INV-5_2020-04-29	085	13 Jul 2020
	RG_LISP24_INV-6_2020-04-29	086	
	RG_LISP24_INV-7_2020-04-29	087	
	RG_LISP24_INV-8_2020-04-29	088	
	RG_LISP24_INV-9_2020-04-29	089	
	RG_LISP24_INV-10_2020-04-29	090	
	RG_SLINE_INV-1_2020-04-28	091	
10	RG_SLINE_INV-2_2020-04-28	092	13 Jul 2020
	RG_SLINE_INV-3_2020-04-28	093	
	RG_SLINE_INV-4_2020-04-28	094	
	RG_SLINE_INV-5_2020-04-28	095	
	RG_SLINE_INV-6_2020-04-28	096	
	RG_SLINE_INV-7_2020-04-28	097	
	RG_SLINE_INV-8_2020-04-28	098	
	RG_SLINE_INV-9_2020-04-28	099	
	RG_SLINE_INV-10_2020-04-28	100	

MINNOW ENVIRONMENTAL INCORPORATED

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Telephone:(250) 595-1627
Facsmile:(250) 595-1625

CHAIN OF CUSTODY RECORD

Laboratory: Trich Analytics

Contact: Mia Otto
Phone: 250-464-9531 Fax:

Minnow Contact: Katharina Batchelar
Contact Email: kbatchelar@minnow.ca
Minnow Project #: 20-15
Date Results Required By: 31-Jul-2020 GOL

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	Number of Containers	Comments
001	1	RG_FO23_INV-1_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	The sample site description on the COC is different from the sample ID on the bottles. The bottles just have a site name (e.g. LCUT, sample type, and number), while the sample ID on the COC includes the site name and additional information such as date (e.g. RG_LCUT_INV1_2020-04-27). Please use the full sample name from the COC to report results. The site name (e.g. LCUT) can be used to correlate between the COC and sample bottles. Any questions regarding challenges with COC or deciphering labels (etc.) should be directed to Minnow.
002	2	RG_FO23_INV-2_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	
003	3	RG_FO23_INV-3_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	
004	4	RG_FO23_INV-4_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	
005	5	RG_FO23_INV-5_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	
006	6	RG_FO23_INV-6_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	
007	7	RG_FO23_INV-7_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	
008	8	RG_FO23_INV-8_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	
009	9	RG_FO23_INV-9_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	
010	10	RG_FO23_INV-10_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	
	11									
	12									
	13									
	14									
	15									

Samples Relinquished to Lab By: Rick Smit (Minnow Employee Signature) Date: 23/6/20 Time: 12:00 Shipment Method: Regular shipping in iced cooler

Samples Received in Lab By: (Lab Employee Signature) Date: 26 JUN 2020 Time: 15:00 Sample Condition upon Receipt: Thawed (cooler)

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

MINNOW ENVIRONMENTAL INCORPORATED
204-1006 Fort Street
Victoria, British Columbia V8V 3K4
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CHAIN OF CUSTODY RECORD

Laboratory: Trich Analytics

Contact: Mia Otto
Phone: 250-464-9531 Fax:

Minnow Contact: Katharina Batchelar
Contact Email: kbatchelar@minnow.ca
Minnow Project #: 20-15
Date Results Required By: 31-Jul-2020

TRICH ID:	Sample Number	Minnow Sample ID	Date Sampled	Matrix	Analysis Required: Moisture (Freeze	Analysis Required: Full Metals	Analysis Required	Analysis Required	Number of Containers	Comments
011	1	RG_FRUL_INV-1_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	The sample site description on the COC is different from the sample ID on the bottles. The bottles just have a site name (e.g. LCUT, sample type, and number), while the sample ID on the COC includes the site name and additional information such as date (e.g. RG_LCUT_INV1_2020-04-27). Please use the full sample name from the COC to report results. The site name (e.g. LCUT) can be used to correlate between the COC and sample bottles. Any questions regarding challenges
012	2	RG_FRUL_INV-2_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	
013	3	RG_FRUL_INV-3_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	
014	4	RG_FRUL_INV-4_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	
015	5	RG_FRUL_INV-5_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	
016	6	RG_FRUL_INV-6_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	
017	7	RG_FRUL_INV-7_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	
018	8	RG_FRUL_INV-8_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	
019	9	RG_FRUL_INV-9_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	
020	10	RG_FRUL_INV-10_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	
	11									
	15									

Samples Relinquished to Lab By: (Minnow Employee Signature)	Rick Smit	Date: 23/6/20	Time: 12:00	Shipment Method: Regular shipping in iced cooler
Samples Received in Lab By: (Lab Employee Signature)	26 JUN 2020	Date:	Time: 15:00	Sample Condition upon Receipt: Thawed

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

MINNOW ENVIRONMENTAL INCORPORATED
204-1006 Fort Street
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CHAIN OF CUSTODY RECORD

Laboratory: Trich Analytics

Contact: Mia Otto
Phone: 250-464-9531 Fax:

Minnow Contact: Katharina Batchelar
Contact Email: kbatchelar@minnow.ca
Minnow Project #: 20-15
Date Results Required By: 31-Jul-2020

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	Number of Containers	Comments
021	1	RG_LCUT_INV-1_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	The sample site description on the COC is different from the sample ID on the bottles. The bottles just have a site name (e.g. LCUT, sample type, and number), while the sample ID on the COC includes the site name and additional information such as date (e.g. RG_LCUT_INV1_2020-04-27). Please use the full sample name from the COC to report results. The site name (e.g. LCUT) can be used to correlate between the COC and sample bottles. Any questions regarding challenges with COC or deciphering labels (etc.) should be directed to Minnow.
022	2	RG_LCUT_INV-2_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	
023	3	RG_LCUT_INV-3_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	
024	4	RG_LCUT_INV-4_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	
025	5	RG_LCUT_INV-5_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	
026	6	RG_LCUT_INV-6_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	
027	7	RG_LCUT_INV-7_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	
028	8	RG_LCUT_INV-8_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	
029	9	RG_LCUT_INV-9_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	
030	10	RG_LCUT_INV-10_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	
	11									
	12									
	13									
	14									
	15									

Samples Relinquished to Lab By: Rick Smit (Minnow Employee Signature) Date: 23/6/20 Time: 12:00 Shipment Method: Regular shipping in iced cooler

Samples Received in Lab By: (Lab Employee Signature) 26 JUN 2020 Date: Time: 15:00 Sample Condition upon Receipt: Thawed

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

MINNOW ENVIRONMENTAL INCORPORATED

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CHAIN OF CUSTODY RECORD

Laboratory: Trich Analytics

Contact: Mia Otto
Phone: 250-464-9531 Fax:

Minnow Contact: Katharina Batchelar
Contact Email: kbatchelar@minnow.ca
Minnow Project #: 20-15
Date Results Required By: 31-Jul-2020

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	Number of Containers	Comments
031	1	RG_LI8_INV-1_2020-04-30	30-Apr-20	Invertebrate tissue	x	x			1	The sample site description on the COC is different from the sample ID on the bottles. The bottles just have a site name (e.g. LCUT, sample type, and number), while the sample ID on the COC includes the site name and additional information such as date (e.g. RG_LCUT_INV1_2020-04-27). Please use the full sample name from the COC to report results. The site name (e.g. LCUT) can be used to correlate between the COC and sample bottles. Any questions regarding challenges with COC or deciphering labels (etc.) should be directed to Minnow.
032	2	RG_LI8_INV-2_2020-04-30	30-Apr-20	Invertebrate tissue	x	x			1	
033	3	RG_LI8_INV-3_2020-04-30	30-Apr-20	Invertebrate tissue	x	x			1	
034	4	RG_LI8_INV-4_2020-04-30	30-Apr-20	Invertebrate tissue	x	x			1	
035	5	RG_LI8_INV-5_2020-04-30	30-Apr-20	Invertebrate tissue	x	x			1	
036	6	RG_LI8_INV-6_2020-04-30	30-Apr-20	Invertebrate tissue	x	x			1	
037	7	RG_LI8_INV-7_2020-04-30	30-Apr-20	Invertebrate tissue	x	x			1	
038	8	RG_LI8_INV-8_2020-04-30	30-Apr-20	Invertebrate tissue	x	x			1	
039	9	RG_LI8_INV-9_2020-04-30	30-Apr-20	Invertebrate tissue	x	x			1	
040	10	RG_LI8_INV-10_2020-04-30	30-Apr-20	Invertebrate tissue	x	x			1	
	11									
	12									
	13									
	14									
	15									

Samples Relinquished to Lab By: (Minnow Employee Signature) Rick Smit — Date: 23/6/20 — Time: 12:00 — Shipment Method: Regular shipping in iced cooler

Samples Received in Lab By: (Lab Employee Signature) [signature] — Date: 26 Jun 2020 — Time: 15:00 — Sample Condition upon Receipt: Thawed

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

MINNOW ENVIRONMENTAL INCORPORATED

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Telephone:(250) 595-1627
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CHAIN OF CUSTODY RECORD

Laboratory: Trich Analytics

Contact: Mia Otto
Phone: 250-464-9531 Fax:

Minnow Contact: Katharina Batchelar
Contact Email: kbatchelar@minnow.ca
Minnow Project #: 20-15
Date Results Required By: 31-Jul-2020

Sample Number	Minnow Sample ID	Date Sampled	Matrix	Analysis Required: Moisture (Freeze Drying)	Analysis Required: Full Metals including Hg	Analysis Required	Analysis Required	Number of Containers	Comments
TRICH ID#:									
041 1	RG_LI24_INV-1_2020-04-28	28-Apr-20	Invertebrate tissue	x	x			1	The sample site description on the COC is different from the sample ID on the bottles. The bottles just have a site name (e.g. LCUT, sample type, and number), while the sample ID on the COC includes the site name and additional information such as date (e.g. RG_LCUT_INV1_2020-04-27). Please use the full sample name from the COC to report results. The site name (e.g. LCUT) can be used to correlate between the COC and sample bottles. Any questions regarding challenges with COC or deciphering labels (etc.) should be directed to Minnow.
042 2	RG_LI24_INV-2_2020-04-28	28-Apr-20	Invertebrate tissue	x	x			1	
043 3	RG_LI24_INV-3_2020-04-28	28-Apr-20	Invertebrate tissue	x	x			1	
044 4	RG_LI24_INV-4_2020-04-28	28-Apr-20	Invertebrate tissue	x	x			1	
045 5	RG_LI24_INV-5_2020-04-28	28-Apr-20	Invertebrate tissue	x	x			1	
046 6	RG_LI24_INV-6_2020-04-28	28-Apr-20	Invertebrate tissue	x	x			1	
047 7	RG_LI24_INV-7_2020-04-28	28-Apr-20	Invertebrate tissue	x	x			1	
048 8	RG_LI24_INV-8_2020-04-28	28-Apr-20	Invertebrate tissue	x	x			1	
049 9	RG_LI24_INV-9_2020-04-28	28-Apr-20	Invertebrate tissue	x	x			1	
050 10	RG_LI24_INV-10_2020-04-28	28-Apr-20	Invertebrate tissue	x	x			1	
11									
12									
13									
14									
15									

Samples Relinquished to Lab By: Rick Smit (Minnow Employee Signature) Date: 23/6/20 Time: 12:00 Shipment Method: Regular shipping in iced cooler

Samples Received in Lab By: (Lab Employee Signature) 26 JUN 2020 Time: 15:00 Sample Condition upon Receipt: Thawed,

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

MINNOW ENVIRONMENTAL INCORPORATED

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CHAIN OF CUSTODY RECORD

Laboratory: Trich Analytics

Contact: Mia Otto
Phone: 250-464-9531 Fax:

Minnow Contact: Katharina Batchelar
Contact Email: kbatchelar@minnow.ca
Minnow Project #: 20-15
Date Results Required By: 31-Jul-2020

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	Number of Containers	Comments
051	1	RG_LIDCOM_INV-1_2020-04-30	30-Apr-20	Invertebrate tissue	x	x			1	The sample site description on the COC is different from the sample ID on the bottles. The bottles just have a site name (e.g. LCUT, sample type, and number), while the sample ID on the COC includes the site name and additional information such as date (e.g. RG_LCUT_INV1_2020-04-27). Please use the full sample name from the COC to report results. The site name (e.g. LCUT) can be used to correlate between the COC and sample bottles. Any questions regarding challenges with COC or deciphering labels (etc.) should be directed to Minnow.
052	2	RG_LIDCOM_INV-2_2020-04-30	30-Apr-20	Invertebrate tissue	x	x			1	
053	3	RG_LIDCOM_INV-3_2020-04-30	30-Apr-20	Invertebrate tissue	x	x			1	
054	4	RG_LIDCOM_INV-4_2020-04-30	30-Apr-20	Invertebrate tissue	x	x			1	
055	5	RG_LIDCOM_INV-5_2020-04-30	30-Apr-20	Invertebrate tissue	x	x			1	
056	6	RG_LIDCOM_INV-6_2020-04-30	30-Apr-20	Invertebrate tissue	x	x			1	
057	7	RG_LIDCOM_INV-7_2020-04-30	30-Apr-20	Invertebrate tissue	x	x			1	
058	8	RG_LIDCOM_INV-8_2020-04-30	30-Apr-20	Invertebrate tissue	x	x			1	
059	9	RG_LIDCOM_INV-9_2020-04-30	30-Apr-20	Invertebrate tissue	x	x			1	
060	10	RG_LIDCOM_INV-10_2020-04-30	30-Apr-20	Invertebrate tissue	x	x			1	
	11									
	12									
	13									
	14									
	15									

Samples Relinquished to Lab By: Rick Smit (Minnow Employee Signature) Date: 23/6/20 Time: 12:00

Shipment Method: Regular shipping in iced cooler

Samples Received in Lab By: (Lab Employee Signature) 26 06 JUN 2020 Date: EE 60 26 JUN 2020 Time: 15:00

Sample Condition upon Receipt: Thawed

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
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CHAIN OF CUSTODY RECORD

Laboratory: Trich Analytics

Contact: Mia Otto
Phone: 250-464-9531 Fax:

Minnow Contact: Katharina Batchelar
Contact Email: kbatchelar@minnow.ca
Minnow Project #: 20-15
Date Results Required By: 31-Jul-2020

TRICH ID:	Sample Number	Minnow Sample ID	Date Sampled	Matrix	Analysis Required: Moisture (Freeze Drying)	Full Metals including Hg			Number of Containers	Comments
061	1	RG_LIDSL_INV-1_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	The sample site description on the COC is different from the sample ID on the bottles. The bottles just have a site name (e.g. LCUT, sample type, and number), while the sample ID on the COC includes the site name and additional information such as date (e.g. RG_LCUT_INV1_2020-04-27). Please use the full sample name from the COC to report results. The site name (e.g. LCUT) can be used to correlate between the COC and sample bottles. Any questions regarding challenges with COC or deciphering labels (etc.) should be directed to Minnow.
062	2	RG_LIDSL_INV-2_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	
063	3	RG_LIDSL_INV-3_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	
064	4	RG_LIDSL_INV-4_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	
065	5	RG_LIDSL_INV-5_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	
066	6	RG_LIDSL_INV-6_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	
067	7	RG_LIDSL_INV-7_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	
068	8	RG_LIDSL_INV-8_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	
069	9	RG_LIDSL_INV-9_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	
070	10	RG_LIDSL_INV-10_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	
~~071~~ 06JUL2020	11									
	12									
	13									
	14									
	15									

Samples Relinquished to Lab By: (Minnow Employee Signature) Rick Smit — Date: 23/6/20 — Time: 12:00 — Shipment Method: Regular shipping in iced cooler

Samples Received in Lab By: (Lab Employee Signature) Gurmin HB 26JUN2020 — Date: — Time: 15:00 — Sample Condition upon Receipt: Thawed.

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

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CHAIN OF CUSTODY RECORD

Laboratory: Trich Analytics

Contact: Mia Otto
Phone: 250-464-9531 Fax:

Minnow Contact: Katharina Batchelar
Contact Email: kbatchelar@minnow.ca
Minnow Project #: 20-15
Date Results Required By: 31-Jul-2020

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	Number of Containers	Comments
071	1	RG_LILC3_INV-1_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	The sample site description on the COC is different from the sample ID on the bottles. The bottles just have a site name (e.g. LCUT, sample type, and number), while the sample ID on the COC includes the site name and additional information such as date (e.g. RG_LCUT_INV1_2020-04-27). Please use the full sample name from the COC to report results. The site name (e.g. LCUT) can be used to correlate between the COC and sample bottles. Any questions regarding challenges with COC or deciphering labels (etc.) should be directed to Minnow.
072	2	RG_LILC3_INV-2_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	
073	3	RG_LILC3_INV-3_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	
074	4	RG_LILC3_INV-4_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	
075	5	RG_LILC3_INV-5_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	
076	6	RG_LILC3_INV-6_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	
077	7	RG_LILC3_INV-7_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	
078	8	RG_LILC3_INV-8_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	
079	9	RG_LILC3_INV-9_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	
080	10	RG_LILC3_INV-10_2020-04-27	27-Apr-20	Invertebrate tissue	x	x			1	
	11									
	12									
	13									
	14									
	15									

Samples Relinquished to Lab By: (Minnow Employee Signature) Rick Smit	Date: 23/6/20	Time: 12:00	Shipment Method: Regular shipping in iced cooler
Samples Received in Lab By: (Lab Employee Signature) 26 JUN	Date: 2020	Time: 15:00	Sample Condition upon Receipt: Thawed

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: Mia Otto
Phone: 250-464-9531 Fax:

Minnow Contact: Katharina Batchelar
Contact Email: kbatchelar@minnow.ca
Minnow Project #: 20-15
Date Results Required By: 31-Jul-2020

TRICH ID:	Sample Number	Minnow Sample ID	Date Sampled	Matrix	Analysis Required: Moisture (Freeze Drying)	Full Metals including Hg			Number of Containers	Comments
081	1	RG_LISP24_INV-1_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	The sample site description on the COC is different from the sample ID on the bottles. The bottles just have a site name (e.g. LCUT, sample type, and number), while the sample ID on the COC includes the site name and additional information such as date (e.g. RG_LCUT_INV1_2020-04-27). Please use the full sample name from the COC to report results. The site name (e.g. LCUT) can be used to correlate between the COC and sample bottles. Any questions regarding challenges with COC or deciphering labels (etc.) should be directed to Minnow.
082	2	RG_LISP24_INV-2_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	
083	3	RG_LISP24_INV-3_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	
084	4	RG_LISP24_INV-4_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	
085	5	RG_LISP24_INV-5_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	
086	6	RG_LISP24_INV-6_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	
087	7	RG_LISP24_INV-7_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	
088	8	RG_LISP24_INV-8_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	
089	9	RG_LISP24_INV-9_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	
090	10	RG_LISP24_INV-10_2020-04-29	29-Apr-20	Invertebrate tissue	x	x			1	
	11									
	12									
	13									
	14									
	15									

Samples Relinquished to Lab By: Rick Smit (Minnow Employee Signature) Date: 23/6/20 Time: 12:00 Shipment Method: Regular shipping in iced cooler

Samples Received in Lab By: (Lab Employee Signature) 26 JUN 2020 Date: Time: 15:00 Sample Condition upon Receipt: Thawed.

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
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CHAIN OF CUSTODY RECORD

Laboratory: Trich Analytics

Contact: Mia Otto
Phone: 250-464-9531 Fax:

Minnow Contact: Katharina Batchelar
Contact Email: kbatchelar@minnow.ca
Minnow Project #: 20-15
Date Results Required By: 31-Jul-2020

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	Number of Containers	Comments
091	1	RG_SLINE_INV-1_2020-04-28	28-Apr-20	Invertebrate tissue	x	x			1	The sample site description on the COC is different from the sample ID on the bottles. The bottles just have a site name (e.g. LCUT, sample type, and number), while the sample ID on the COC includes the site name and additional information such as date (e.g. RG_LCUT_INV1_2020-04-27). Please use the full sample name from the COC to report results. The site name (e.g. LCUT) can be used to correlate between the COC and sample bottles. Any questions regarding challenges with COC or deciphering labels (etc.) should be directed to Minnow.
092	2	RG_SLINE_INV-2_2020-04-28	28-Apr-20	Invertebrate tissue	x	x			1	
093	3	RG_SLINE_INV-3_2020-04-28	28-Apr-20	Invertebrate tissue	x	x			1	
094	4	RG_SLINE_INV-4_2020-04-28	28-Apr-20	Invertebrate tissue	x	x			1	
095	5	RG_SLINE_INV-5_2020-04-28	28-Apr-20	Invertebrate tissue	x	x			1	
096	6	RG_SLINE_INV-6_2020-04-28	28-Apr-20	Invertebrate tissue	x	x			1	
097	7	RG_SLINE_INV-7_2020-04-28	28-Apr-20	Invertebrate tissue	x	x			1	
098	8	RG_SLINE_INV-8_2020-04-28	28-Apr-20	Invertebrate tissue	x	x			1	
099	9	RG_SLINE_INV-9_2020-04-28	28-Apr-20	Invertebrate tissue	x	x			1	
100	10	RG_SLINE_INV-10_2020-04-28	28-Apr-20	Invertebrate tissue	x	x			1	
	11									
	12									
	13									
	14									
	15									

Samples Relinquished to Lab By: (Minnow Employee Signature) Rick Smit	Date: 23/6/20	Time: 12:00	Shipment Method: Regular shipping in iced cooler
Samples Received in Lab By: (Lab Employee Signature) 26 JAN 2020	Date:	Time: 15:00	Sample Condition upon Receipt: Thawed.

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

BENTHIC TISSUE CHEMISTRY

TrichAnalytics Laboratory Report 2020-130

(Finalized August 6, 2020)

TrichAnalytics Inc.

Tissue Microchemistry Analysis Report

Client: Katharina Batchelar
Aquatic Scientist
Minnow Environmental
Phone: (250) 595-1627 ext. 22
Email: kbatchelar@minnow.ca

Date Received: 30 Jul 2020
Date of Analysis: 03 Aug 2020
04 Aug 2020
05 Aug 2020
Final Report Date: 06 Aug 2020
Project No.: 2020-130
Method No.: MET-002.04

Client Project: LCO LAEMP/Minnow Project 207202.0015

Analytical Request: Benthic Invertebrate Tissue Microchemistry (total metals and moisture) – 100 samples.
See chain of custody form provided for sample identification numbers.

Notes:
Analytical results are expressed in part per million (ppm) dry weight.
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; (average achieved 102%; range 92 - 108%).
RPD values calculated according to the British Columbia Environmental Laboratory Manual (2020) criteria.

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 — 06 Aug 2020 Date

TrichAnalytics Inc.
207-1753 Sean Heights
Saanichton, BC V8M 0B3
www.trichanalytics.com

CALA Testing Accreditation No. A4196

Tissue Analysis Results

		Client ID	RG_FO23_INV-1_2020-07-16	RG_FO23_INV-2_2020-07-16	RG_FO23_INV-3_2020-07-16	RG_FO23_INV-4_2020-07-16	RG_FO23_INV-5_2020-07-16
		Lab ID	001	002	003	004	005
		Wet Weight (g)	0.7012	0.3754	0.7863	0.4611	0.7942
		Dry Weight (g)	0.1584	0.0956	0.1753	0.1047	0.2182
		Moisture (%)	77.4	74.5	77.7	77.3	72.5
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	1.0	3.3	0.846	1.5	1.5
11B	0.102	0.340	2.3	3.9	2.1	1.6	4.0
23Na	6.7	22	3,509	5,330	2,851	3,069	3,363
24Mg	0.071	0.237	1,850	2,512	1,484	1,696	2,516
27Al	0.189	0.630	1,445	2,846	1,262	1,061	2,911
31P	67	223	11,595	11,852	9,256	9,958	11,272
39K	8.7	29	11,293	13,438	9,581	8,522	10,780
44Ca	39	130	4,621	5,251	3,711	2,971	4,427
49Ti	0.213	0.710	116	178	103	76	220
51V	0.025	0.083	2.5	4.7	2.0	1.9	4.7
52Cr	0.331	1.1	8.9	12	9.7	15	29
55Mn	0.019	0.063	64	62	52	41	61
57Fe	4.4	15	775	1,103	635	642	1,439
59Co	0.003	0.010	5.0	3.0	4.2	2.7	3.3
60Ni	0.019	0.063	24	26	25	26	41
63Cu	0.006	0.020	22	20	19	14	24
66Zn	0.527	1.8	488	344	365	256	366
75As	0.435	1.4	2.1	1.3	1.8	1.2	1.1
77Se	0.287	0.957	9.7	8.6	8.9	5.9	8.8
88Sr	0.001	0.003	7.0	8.0	4.5	3.7	6.2
95Mo	0.006	0.020	0.543	0.514	0.519	0.380	0.372
107Ag	0.001	0.003	0.124	0.135	0.114	0.060	0.221
111Cd	0.185	0.617	6.5	3.3	4.9	3.2	2.6
118Sn	0.022	0.073	0.437	0.365	0.360	0.325	0.348
121Sb	0.004	0.013	0.041	0.064	0.029	0.023	0.062
137Ba	0.001	0.003	52	67	32	26	57
202Hg	0.049	0.163	0.098	0.792	0.058	0.060	0.103
205Tl	0.001	0.003	0.033	0.046	0.025	0.022	0.036
208Pb	0.002	0.007	0.322	0.689	0.216	0.202	0.693
238U	0.001	0.003	0.086	0.137	0.070	0.046	0.098

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Tissue Analysis Results

		Client ID	RG_FO23_INV-6_2020-07-16	RG_FO23_INV-7_2020-07-16	RG_FO23_INV-8_2020-07-16	RG_FO23_INV-9_2020-07-16	RG_FO23_INV-10_2020-07-16
		Lab ID	006	007	008	009	010
		Wet Weight (g)	0.8001	0.9785	0.7823	0.8339	0.9572
		Dry Weight (g)	0.1625	0.2039	0.1755	0.1937	0.2418
		Moisture (%)	79.7	79.2	77.6	76.8	74.7
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	1.9	0.874	1.4	0.794	0.789
11B	0.102	0.340	2.5	1.2	1.9	0.467	1.8
23Na	6.7	22	5,473	2,831	5,365	3,180	4,015
24Mg	0.071	0.237	2,175	1,237	1,684	1,364	1,866
27Al	0.189	0.630	1,040	457	737	169	1,013
31P	67	223	12,738	9,123	9,736	6,744	12,392
39K	8.7	29	11,493	7,290	8,936	6,472	10,690
44Ca	39	130	4,270	1,924	4,076	2,015	3,155
49Ti	0.213	0.710	80	26	46	8.7	79
51V	0.025	0.083	1.9	0.882	1.5	0.331	2.1
52Cr	0.331	1.1	7.9	5.2	9.0	3.1	7.6
55Mn	0.019	0.063	59	34	43	27	40
57Fe	4.4	15	614	324	500	142	631
59Co	0.003	0.010	3.3	1.5	1.1	0.732	2.9
60Ni	0.019	0.063	22	14	19	6.6	18
63Cu	0.006	0.020	19	19	15	6.6	22
66Zn	0.527	1.8	430	296	246	189	338
75As	0.435	1.4	1.5	0.573	0.467	<0.435	1.4
77Se	0.287	0.957	9.8	6.8	6.2	4.3	9.3
88Sr	0.001	0.003	6.0	2.6	4.6	3.3	5.1
95Mo	0.006	0.020	0.566	0.220	0.304	0.238	0.344
107Ag	0.001	0.003	0.132	0.124	0.120	0.058	0.125
111Cd	0.185	0.617	3.9	1.6	1.2	0.912	3.9
118Sn	0.022	0.073	0.313	0.143	0.144	0.130	0.401
121Sb	0.004	0.013	0.035	0.021	0.031	0.013	0.044
137Ba	0.001	0.003	35	15	28	23	35
202Hg	0.049	0.163	0.107	0.107	0.068	<0.049	0.071
205Tl	0.001	0.003	0.034	0.014	0.020	0.012	0.036
208Pb	0.002	0.007	0.238	0.132	0.221	0.051	0.246
238U	0.001	0.003	0.070	0.035	0.098	0.018	0.117

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Tissue Analysis Results

		Client ID	RG_FRUL_INV-1_2020-07-16	RG_FRUL_INV-2_2020-07-16	RG_FRUL_INV-3_2020-07-16	RG_FRUL_INV-4_2020-07-16	RG_FRUL_INV-5_2020-07-16
		Lab ID	011	012	013	014	015
		Wet Weight (g)	0.7119	0.6517	0.9303	0.8427	1.0198
		Dry Weight (g)	0.1442	0.1374	0.1877	0.1826	0.2019
		Moisture (%)	79.7	78.9	79.8	78.3	80.2
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.722	0.804	0.733	4.4	0.738
11B	0.102	0.340	1.1	1.1	0.837	0.830	0.493
23Na	6.7	22	3,518	4,400	3,938	5,936	4,300
24Mg	0.071	0.237	1,885	2,113	1,489	2,047	1,897
27Al	0.189	0.630	661	793	596	553	366
31P	67	223	12,927	12,803	10,852	10,783	11,725
39K	8.7	29	9,402	10,379	8,897	11,191	9,702
44Ca	39	130	3,661	3,959	2,452	3,028	2,634
49Ti	0.213	0.710	48	46	35	46	25
51V	0.025	0.083	1.7	1.5	1.1	1.2	0.793
52Cr	0.331	1.1	13	9.2	6.6	8.9	5.3
55Mn	0.019	0.063	56	64	51	44	46
57Fe	4.4	15	619	576	465	438	411
59Co	0.003	0.010	4.2	3.0	2.8	2.1	2.7
60Ni	0.019	0.063	29	18	16	18	14
63Cu	0.006	0.020	25	25	25	19	21
66Zn	0.527	1.8	312	325	231	273	298
75As	0.435	1.4	1.4	1.3	1.0	0.969	0.934
77Se	0.287	0.957	13	12	9.1	9.5	9.4
88Sr	0.001	0.003	3.7	4.7	3.4	3.4	3.5
95Mo	0.006	0.020	0.583	0.433	0.424	0.371	0.331
107Ag	0.001	0.003	0.210	0.237	0.214	0.197	0.223
111Cd	0.185	0.617	4.1	4.4	2.9	2.6	3.5
118Sn	0.022	0.073	0.373	0.399	0.283	0.232	0.255
121Sb	0.004	0.013	0.033	0.029	0.029	0.026	0.022
137Ba	0.001	0.003	25	29	22	25	24
202Hg	0.049	0.163	0.080	0.052	0.068	0.089	0.062
205Tl	0.001	0.003	0.033	0.022	0.018	0.023	0.020
208Pb	0.002	0.007	0.199	0.160	0.157	0.181	0.100
238U	0.001	0.003	0.068	0.062	0.049	0.054	0.041

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Tissue Analysis Results

		Client ID	RG_FRUL_INV-6_2020-07-16	RG_FRUL_INV-7_2020-07-16	RG_FRUL_INV-8_2020-07-16	RG_FRUL_INV-9_2020-07-16	RG_FRUL_INV-10_2020-07-16
		Lab ID	016	017	018	019	020
		Wet Weight (g)	0.6764	0.6649	0.4726	1.2339	1.0120
		Dry Weight (g)	0.1466	0.1449	0.1089	0.2461	0.2026
		Moisture (%)	78.3	78.2	77.0	80.1	80.0
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.716	1.7	2.2	0.583	1.1
11B	0.102	0.340	0.662	1.1	0.947	0.662	0.908
23Na	6.7	22	3,023	3,642	4,227	3,155	4,764
24Mg	0.071	0.237	1,383	2,290	1,898	1,628	1,757
27Al	0.189	0.630	464	879	637	411	529
31P	67	223	9,478	13,070	13,759	10,182	12,019
39K	8.7	29	8,329	10,192	11,996	8,013	9,787
44Ca	39	130	2,452	4,867	4,233	2,570	2,910
49Ti	0.213	0.710	38	67	42	20	40
51V	0.025	0.083	1.1	1.6	1.7	0.799	0.897
52Cr	0.331	1.1	6.8	9.3	23	3.6	4.8
55Mn	0.019	0.063	39	68	74	36	79
57Fe	4.4	15	443	676	848	270	512
59Co	0.003	0.010	1.8	3.2	4.1	2.0	4.1
60Ni	0.019	0.063	12	21	43	9.0	15
63Cu	0.006	0.020	23	21	22	18	24
66Zn	0.527	1.8	282	296	359	199	290
75As	0.435	1.4	0.693	0.954	1.3	0.985	1.4
77Se	0.287	0.957	9.1	10	12	11	13
88Sr	0.001	0.003	3.1	6.0	5.4	3.1	4.9
95Mo	0.006	0.020	0.309	0.530	0.568	0.275	0.453
107Ag	0.001	0.003	0.213	0.237	0.202	0.161	0.208
111Cd	0.185	0.617	2.9	4.3	4.8	2.4	6.0
118Sn	0.022	0.073	0.148	0.427	0.269	0.175	0.463
121Sb	0.004	0.013	0.022	0.029	0.033	0.023	0.020
137Ba	0.001	0.003	21	41	31	15	26
202Hg	0.049	0.163	0.056	0.086	0.093	0.087	0.068
205Tl	0.001	0.003	0.016	0.030	0.031	0.018	0.023
208Pb	0.002	0.007	0.133	0.261	0.244	0.111	0.139
238U	0.001	0.003	0.040	0.061	0.064	0.041	0.063

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Tissue Analysis Results

		Client ID	RG_LCUT_INV-1_2020-07-13	RG_LCUT_INV-2_2020-07-13	RG_LCUT_INV-3_2020-07-13	RG_LCUT_INV-4_2020-07-13	RG_LCUT_INV-5_2020-07-13
		Lab ID	021	022	023	024	025
		Wet Weight (g)	1.0589	1.0210	0.9763	1.3093	0.5265
		Dry Weight (g)	0.2074	0.2199	0.1885	0.2920	0.0706
		Moisture (%)	80.4	78.5	80.7	77.7	86.6
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.542	0.672	1.1	0.339	0.773
11B	0.102	0.340	0.610	1.4	2.9	0.480	0.895
23Na	6.7	22	3,890	2,979	1,926	2,003	2,348
24Mg	0.071	0.237	2,066	1,832	1,691	1,009	1,487
27Al	0.189	0.630	248	594	1,830	87	288
31P	67	223	16,354	11,790	8,681	6,510	11,386
39K	8.7	29	10,650	11,988	8,723	7,133	6,960
44Ca	39	130	4,466	2,780	5,623	1,137	3,633
49Ti	0.213	0.710	14	42	144	3.4	18
51V	0.025	0.083	0.462	1.1	3.6	0.240	0.668
52Cr	0.331	1.1	3.3	5.0	10	1.2	4.8
55Mn	0.019	0.063	46	44	39	23	21
57Fe	4.4	15	187	295	1,048	70	210
59Co	0.003	0.010	2.3	2.0	2.8	0.424	1.4
60Ni	0.019	0.063	9.4	19	25	5.4	12
63Cu	0.006	0.020	28	38	43	32	22
66Zn	0.527	1.8	283	301	272	131	150
75As	0.435	1.4	1.6	3.2	2.9	1.4	1.1
77Se	0.287	0.957	4.0	4.4	3.6	3.3	3.0
88Sr	0.001	0.003	8.1	5.3	8.5	1.7	6.3
95Mo	0.006	0.020	0.403	0.540	0.568	0.238	0.266
107Ag	0.001	0.003	0.048	0.030	0.043	0.083	0.023
111Cd	0.185	0.617	3.6	4.9	5.3	1.6	2.1
118Sn	0.022	0.073	0.269	0.340	0.413	0.061	0.831
121Sb	0.004	0.013	0.023	0.046	0.074	0.020	0.020
137Ba	0.001	0.003	18	34	43	8.1	12
202Hg	0.049	0.163	0.093	0.056	0.087	0.081	0.056
205Tl	0.001	0.003	0.027	0.034	0.075	0.013	0.021
208Pb	0.002	0.007	0.129	0.266	0.680	0.067	0.143
238U	0.001	0.003	0.045	0.085	0.198	0.029	0.068

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Tissue Analysis Results

		Client ID	RG_LCUT_INV-6_2020-07-13	RG_LCUT_INV-7_2020-07-13	RG_LCUT_INV-8_2020-07-13	RG_LCUT_INV-9_2020-07-13	RG_LCUT_INV-10_2020-07-13
		Lab ID	026	027	028	029	030
		Wet Weight (g)	0.7256	1.4581	0.9176	1.1144	0.7883
		Dry Weight (g)	0.1468	0.3019	0.1897	0.2286	0.1630
		Moisture (%)	79.8	79.3	79.3	79.5	79.3
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.545	1.6	0.467	0.792	0.488
11B	0.102	0.340	1.1	3.9	1.2	2.7	2.3
23Na	6.7	22	3,429	2,675	2,658	3,680	3,031
24Mg	0.071	0.237	2,182	2,922	1,675	1,148	2,067
27Al	0.189	0.630	361	2,702	271	1,981	580
31P	67	223	14,189	12,538	11,882	9,045	13,394
39K	8.7	29	13,810	14,931	9,618	11,785	12,050
44Ca	39	130	2,632	6,802	2,222	2,530	4,840
49Ti	0.213	0.710	18	280	17	159	42
51V	0.025	0.083	0.597	3.4	0.527	3.0	1.0
52Cr	0.331	1.1	3.1	8.8	2.6	3.8	5.0
55Mn	0.019	0.063	44	70	26	23	38
57Fe	4.4	15	197	714	164	490	298
59Co	0.003	0.010	1.3	4.4	1.3	0.928	4.7
60Ni	0.019	0.063	12	37	11	9.4	20
63Cu	0.006	0.020	36	43	31	18	33
66Zn	0.527	1.8	357	448	266	113	389
75As	0.435	1.4	3.1	4.8	2.5	1.4	3.1
77Se	0.287	0.957	4.4	5.1	4.2	2.2	4.3
88Sr	0.001	0.003	4.9	9.1	3.5	4.5	8.0
95Mo	0.006	0.020	0.448	0.714	0.304	0.319	0.418
107Ag	0.001	0.003	0.025	0.039	0.019	0.024	0.032
111Cd	0.185	0.617	4.5	6.8	3.1	1.4	7.0
118Sn	0.022	0.073	0.260	0.388	0.150	0.439	0.340
121Sb	0.004	0.013	0.050	0.105	0.031	0.052	0.066
137Ba	0.001	0.003	27	105	15	34	45
202Hg	0.049	0.163	0.092	0.089	0.083	0.059	0.106
205Tl	0.001	0.003	0.034	0.056	0.023	0.055	0.031
208Pb	0.002	0.007	0.199	0.551	0.125	0.651	0.269
238U	0.001	0.003	0.098	0.196	0.075	0.147	0.113

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

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g = grams

% = percent

Tissue Analysis Results

		Client ID	RG_LI8_INV-1_2020-07-15	RG_LI8_INV-2_2020-07-15	RG_LI8_INV-3_2020-07-15	RG_LI8_INV-4_2020-07-15	RG_LI8_INV-5_2020-07-15
		Lab ID	031	032	033	034	035
		Wet Weight (g)	0.5611	0.9599	0.8016	1.3681	0.6399
		Dry Weight (g)	0.1266	0.1845	0.1718	0.2850	0.1308
		Moisture (%)	77.4	80.8	78.6	79.2	79.6
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.474	0.409	0.305	0.320	0.576
11B	0.102	0.340	0.997	1.1	0.540	0.544	1.3
23Na	6.7	22	2,754	3,803	2,685	3,632	2,983
24Mg	0.071	0.237	1,708	1,749	1,457	1,773	2,039
27Al	0.189	0.630	408	449	174	183	717
31P	67	223	11,790	10,943	8,841	11,267	12,338
39K	8.7	29	10,482	10,520	7,590	9,945	10,823
44Ca	39	130	3,545	2,958	2,283	2,464	3,470
49Ti	0.213	0.710	31	30	10	8.8	53
51V	0.025	0.083	0.759	0.754	0.281	0.399	0.971
52Cr	0.331	1.1	6.8	3.1	2.2	2.6	4.4
55Mn	0.019	0.063	61	64	40	34	68
57Fe	4.4	15	497	383	204	259	432
59Co	0.003	0.010	4.3	4.6	2.9	2.8	6.1
60Ni	0.019	0.063	43	36	22	20	30
63Cu	0.006	0.020	23	16	11	18	19
66Zn	0.527	1.8	643	1,024	740	932	1,249
75As	0.435	1.4	2.9	3.5	3.1	2.1	3.6
77Se	0.287	0.957	5.3	5.8	4.2	5.1	5.5
88Sr	0.001	0.003	5.9	5.8	3.5	3.3	6.5
95Mo	0.006	0.020	0.376	0.388	0.319	0.335	0.495
107Ag	0.001	0.003	0.039	0.022	0.023	0.029	0.033
111Cd	0.185	0.617	13	20	17	19	25
118Sn	0.022	0.073	0.362	0.614	0.344	0.246	0.698
121Sb	0.004	0.013	0.035	0.031	0.016	0.017	0.033
137Ba	0.001	0.003	71	17	16	12	25
202Hg	0.049	0.163	0.124	0.121	0.101	0.106	0.215
205Tl	0.001	0.003	0.033	0.044	0.036	0.066	0.042
208Pb	0.002	0.007	0.159	0.132	0.081	0.080	0.176
238U	0.001	0.003	0.066	0.114	0.049	0.061	0.083

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Tissue Analysis Results

		Client ID	RG_LI8_INV-6_2020-07-15	RG_LI8_INV-7_2020-07-15	RG_LI8_INV-8_2020-07-15	RG_LI8_INV-9_2020-07-15	RG_LI8_INV-10_2020-07-15
		Lab ID	036	037	038	039	040
		Wet Weight (g)	1.0303	0.9196	1.4347	1.4406	1.5801
		Dry Weight (g)	0.2221	0.2065	0.2811	0.2838	0.3431
		Moisture (%)	78.4	77.5	80.4	80.3	78.3
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.445	0.296	0.390	0.618	0.334
11B	0.102	0.340	0.550	0.759	0.632	0.740	0.544
23Na	6.7	22	3,678	2,884	3,670	4,596	2,985
24Mg	0.071	0.237	2,233	1,808	2,276	2,251	2,245
27Al	0.189	0.630	175	73	207	173	189
31P	67	223	11,891	9,945	10,910	15,061	10,963
39K	8.7	29	9,670	9,204	9,538	13,376	9,044
44Ca	39	130	3,296	2,305	3,604	2,589	2,430
49Ti	0.213	0.710	12	4.5	11	12	13
51V	0.025	0.083	0.350	0.218	0.330	0.343	0.354
52Cr	0.331	1.1	2.1	1.6	2.2	2.2	2.3
55Mn	0.019	0.063	45	29	35	57	32
57Fe	4.4	15	248	212	289	269	246
59Co	0.003	0.010	4.1	4.5	4.1	3.6	4.2
60Ni	0.019	0.063	25	30	25	26	25
63Cu	0.006	0.020	18	17	22	17	17
66Zn	0.527	1.8	1,066	776	1,523	923	1,162
75As	0.435	1.4	2.6	3.3	3.0	3.3	3.9
77Se	0.287	0.957	5.8	5.3	6.0	5.4	4.5
88Sr	0.001	0.003	5.2	3.4	5.9	3.7	3.7
95Mo	0.006	0.020	0.439	0.303	0.375	0.387	0.295
107Ag	0.001	0.003	0.028	0.020	0.037	0.026	0.022
111Cd	0.185	0.617	19	17	27	13	18
118Sn	0.022	0.073	0.194	0.337	0.274	0.242	0.149
121Sb	0.004	0.013	0.017	0.012	0.023	0.025	0.021
137Ba	0.001	0.003	22	7.4	14	21	11
202Hg	0.049	0.163	0.133	0.074	0.143	0.112	0.101
205Tl	0.001	0.003	0.075	0.049	0.091	0.078	0.069
208Pb	0.002	0.007	0.088	0.045	0.113	0.088	0.074
238U	0.001	0.003	0.058	0.040	0.079	0.053	0.041

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

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g = grams

% = percent

Tissue Analysis Results

		Client ID	RG_LI24_INV-1_2020-07-14	RG_LI24_INV-2_2020-07-14	RG_LI24_INV-3_2020-07-14	RG_LI24_INV-4_2020-07-14	RG_LI24_INV-5_2020-07-14
		Lab ID	041	042	043	044	045
		Wet Weight (g)	0.5841	0.4696	0.7432	0.7756	1.0626
		Dry Weight (g)	0.0954	0.0992	0.1357	0.1411	0.2009
		Moisture (%)	83.7	78.9	81.7	81.8	81.1
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.508	0.619	0.675	0.328	0.143
11B	0.102	0.340	0.626	0.973	0.699	0.432	0.260
23Na	6.7	22	3,488	3,092	4,118	3,047	2,306
24Mg	0.071	0.237	1,828	1,983	1,987	1,396	2,251
27Al	0.189	0.630	374	575	501	245	95
31P	67	223	12,313	13,756	14,640	11,069	14,866
39K	8.7	29	10,064	9,490	11,050	8,499	7,355
44Ca	39	130	4,724	6,902	8,096	3,446	5,431
49Ti	0.213	0.710	26	27	15	13	6.4
51V	0.025	0.083	1.2	2.2	1.7	0.998	0.469
52Cr	0.331	1.1	3.4	6.5	4.6	3.8	2.5
55Mn	0.019	0.063	27	36	28	24	14
57Fe	4.4	15	325	417	367	225	135
59Co	0.003	0.010	1.4	1.1	1.6	1.2	0.413
60Ni	0.019	0.063	12	16	15	11	4.5
63Cu	0.006	0.020	15	18	18	16	17
66Zn	0.527	1.8	755	603	551	513	384
75As	0.435	1.4	1.7	1.3	1.8	1.5	0.927
77Se	0.287	0.957	5.9	5.2	5.5	4.7	4.2
88Sr	0.001	0.003	7.5	12	13	6.5	6.5
95Mo	0.006	0.020	0.391	0.440	0.550	0.410	0.285
107Ag	0.001	0.003	0.074	0.086	0.093	0.073	0.050
111Cd	0.185	0.617	3.0	2.2	2.8	2.2	1.5
118Sn	0.022	0.073	0.736	0.366	0.769	0.419	0.289
121Sb	0.004	0.013	0.033	0.050	0.035	0.019	0.016
137Ba	0.001	0.003	24	47	29	20	13
202Hg	0.049	0.163	0.096	0.091	0.123	0.175	0.097
205Tl	0.001	0.003	0.078	0.049	0.055	0.053	0.033
208Pb	0.002	0.007	0.135	0.240	0.186	0.120	0.059
238U	0.001	0.003	0.093	0.107	0.104	0.084	0.036

Notes:

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g = grams

% = percent

Teck Coal Limited: LCO LAEMP/Minnow Project 207202.0015

Tissue Analysis Results

		Client ID	RG_LI24_INV-6_2020-07-14	RG_LI24_INV-7_2020-07-14	RG_LI24_INV-8_2020-07-14	RG_LI24_INV-9_2020-07-14	RG_LI24_INV-10_2020-07-14
		Lab ID	046	047	048	049	050
		Wet Weight (g)	1.0659	0.4463	0.9860	0.9970	0.8529
		Dry Weight (g)	0.2073	0.1061	0.2151	0.1756	0.1934
		Moisture (%)	80.6	76.2	78.2	82.4	77.3
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.209	0.383	0.443	0.234	0.157
11B	0.102	0.340	0.212	0.466	0.617	0.370	0.267
23Na	6.7	22	3,102	2,799	3,940	2,711	3,022
24Mg	0.071	0.237	1,346	1,536	1,405	1,583	1,653
27Al	0.189	0.630	148	283	489	219	97
31P	67	223	10,003	10,685	11,440	10,992	15,448
39K	8.7	29	8,161	7,955	10,520	7,509	7,940
44Ca	39	130	2,364	3,812	3,673	5,877	8,742
49Ti	0.213	0.710	6.1	11	24	8.0	4.0
51V	0.025	0.083	0.748	0.981	1.3	0.934	0.413
52Cr	0.331	1.1	2.9	3.3	3.7	2.3	2.1
55Mn	0.019	0.063	26	17	28	22	18
57Fe	4.4	15	212	253	384	199	112
59Co	0.003	0.010	1.0	0.890	1.3	0.755	0.392
60Ni	0.019	0.063	7.7	7.8	11	7.9	4.1
63Cu	0.006	0.020	17	16	14	12	11
66Zn	0.527	1.8	520	652	403	340	338
75As	0.435	1.4	1.5	1.1	1.8	1.3	0.639
77Se	0.287	0.957	5.0	6.3	4.1	3.9	3.8
88Sr	0.001	0.003	4.0	6.4	7.2	9.6	14
95Mo	0.006	0.020	0.420	0.340	0.400	0.280	0.235
107Ag	0.001	0.003	0.054	0.063	0.060	0.060	0.058
111Cd	0.185	0.617	2.2	2.1	1.7	1.5	0.889
118Sn	0.022	0.073	0.184	0.173	0.373	0.323	0.109
121Sb	0.004	0.013	0.016	0.027	0.027	0.021	0.016
137Ba	0.001	0.003	18	20	20	24	23
202Hg	0.049	0.163	0.071	0.097	0.065	0.052	0.058
205Tl	0.001	0.003	0.040	0.056	0.049	0.034	0.025
208Pb	0.002	0.007	0.057	0.147	0.170	0.101	0.079
238U	0.001	0.003	0.056	0.080	0.076	0.062	0.032

Notes:

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DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Tissue Analysis Results

		Client ID	RG_LIDCOM_INV-1_2020-07-14	RG_LIDCOM_INV-2_2020-07-14	RG_LIDCOM_INV-3_2020-07-14	RG_LIDCOM_INV-4_2020-07-14	RG_LIDCOM_INV-5_2020-07-14
		Lab ID	051	052	053	054	055
		Wet Weight (g)	0.9347	1.3872	1.5796	0.8300	1.6692
		Dry Weight (g)	0.2080	0.3043	0.3406	0.1832	0.3686
		Moisture (%)	77.7	78.1	78.4	77.9	77.9
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.745	0.313	0.362	1.1	0.573
11B	0.102	0.340	1.3	0.708	0.580	2.7	0.814
23Na	6.7	22	3,692	2,425	2,746	2,694	2,424
24Mg	0.071	0.237	1,361	1,837	1,934	2,975	1,857
27Al	0.189	0.630	472	123	172	1,527	470
31P	67	223	10,081	9,258	10,187	13,086	9,046
39K	8.7	29	12,440	8,346	7,649	12,019	7,866
44Ca	39	130	1,859	2,161	2,013	3,801	2,645
49Ti	0.213	0.710	36	7.9	8.6	58	30
51V	0.025	0.083	1.4	0.340	0.363	0.197	1.2
52Cr	0.331	1.1	9.7	2.5	3.2	11	16
55Mn	0.019	0.063	102	51	61	128	67
57Fe	4.4	15	527	350	290	1,206	836
59Co	0.003	0.010	3.0	2.5	4.2	6.3	4.4
60Ni	0.019	0.063	34	16	19	45	46
63Cu	0.006	0.020	15	14	17	21	20
66Zn	0.527	1.8	450	496	654	600	792
75As	0.435	1.4	2.0	2.0	2.1	3.3	2.8
77Se	0.287	0.957	5.7	5.2	5.2	6.9	4.0
88Sr	0.001	0.003	3.9	2.9	3.4	7.2	3.6
95Mo	0.006	0.020	0.601	0.357	0.479	0.831	0.323
107Ag	0.001	0.003	0.034	0.027	0.022	0.046	0.027
111Cd	0.185	0.617	7.1	13	13	14	12
118Sn	0.022	0.073	0.178	0.123	0.110	0.629	0.238
121Sb	0.004	0.013	0.053	0.026	0.022	0.150	0.026
137Ba	0.001	0.003	24	18	16	54	23
202Hg	0.049	0.163	0.095	0.104	0.135	0.108	0.111
205Tl	0.001	0.003	0.052	0.070	0.075	0.094	0.068
208Pb	0.002	0.007	0.171	0.072	0.060	0.796	0.194
238U	0.001	0.003	0.077	0.054	0.032	0.171	0.059

Notes:

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g = grams

% = percent

Teck Coal Limited: LCO LAEMP/Minnow Project 207202.0015

Tissue Analysis Results

		Client ID	RG_LIDCOM_INV-6_2020-07-14	RG_LIDCOM_INV-7_2020-07-14	RG_LIDCOM_INV-8_2020-07-14	RG_LIDCOM_INV-9_2020-07-14	RG_LIDCOM_INV-10_2020-07-14
		Lab ID	056	057	058	059	060
		Wet Weight (g)	1.1058	1.5236	1.5669	1.9468	0.6327
		Dry Weight (g)	0.2367	0.3485	0.3459	0.3833	0.1505
		Moisture (%)	78.6	77.1	77.9	80.3	76.2
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.152	0.307	0.501	0.397	1.3
11B	0.102	0.340	0.340	0.453	0.637	0.252	3.0
23Na	6.7	22	1,101	2,542	3,377	4,785	2,683
24Mg	0.071	0.237	803	1,607	1,907	1,834	2,236
27Al	0.189	0.630	43	152	322	25	2,164
31P	67	223	5,296	9,202	12,616	14,605	11,099
39K	8.7	29	5,310	8,538	10,576	13,286	8,871
44Ca	39	130	1,652	1,808	2,902	929	4,752
49Ti	0.213	0.710	1.8	9.9	21	1.6	203
51V	0.025	0.083	0.187	0.379	1.1	0.116	4.0
52Cr	0.331	1.1	1.8	3.6	16	1.7	20
55Mn	0.019	0.063	37	71	47	34	71
57Fe	4.4	15	138	296	561	88	1,280
59Co	0.003	0.010	3.2	5.2	4.5	3.2	7.2
60Ni	0.019	0.063	17	20	42	21	53
63Cu	0.006	0.020	16	22	15	9.2	19
66Zn	0.527	1.8	570	849	585	355	949
75As	0.435	1.4	1.1	1.9	1.7	2.9	3.1
77Se	0.287	0.957	5.9	4.8	4.3	5.2	4.9
88Sr	0.001	0.003	1.6	2.6	4.5	1.6	9.8
95Mo	0.006	0.020	0.616	0.303	0.362	0.231	0.500
107Ag	0.001	0.003	0.034	0.028	0.027	0.017	0.044
111Cd	0.185	0.617	15	15	6.7	11	24
118Sn	0.022	0.073	0.238	0.091	0.161	0.068	0.532
121Sb	0.004	0.013	0.018	0.022	0.026	0.012	0.062
137Ba	0.001	0.003	5.8	11	18	9.9	44
202Hg	0.049	0.163	0.129	0.283	0.092	0.060	0.113
205Tl	0.001	0.003	0.030	0.063	0.059	0.052	0.083
208Pb	0.002	0.007	0.075	0.064	0.105	0.024	0.496
238U	0.001	0.003	0.048	0.043	0.060	0.018	0.157

Notes:

ppm = parts per million

DL = detection limit

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g = grams

% = percent

Teck Coal Limited: LCO LAEMP/Minnow Project 207202.0015

Tissue Analysis Results

		Client ID	RG_LIDSL_INV-1_2020-07-13	RG_LIDSL_INV-2_2020-07-13	RG_LIDSL_INV-3_2020-07-13	RG_LIDSL_INV-4_2020-07-13	RG_LIDSL_INV-5_2020-07-13
		Lab ID	061	062	063	064	065
		Wet Weight (g)	1.5842	1.4146	1.2515	0.8256	1.0815
		Dry Weight (g)	0.2594	0.2769	0.2542	0.1465	0.2249
		Moisture (%)	83.6	80.4	79.7	82.3	79.2
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.453	0.284	0.329	0.423	0.314
11B	0.102	0.340	0.829	0.400	0.563	0.681	0.355
23Na	6.7	22	3,426	2,639	3,035	2,506	2,604
24Mg	0.071	0.237	1,512	1,252	1,739	1,288	1,222
27Al	0.189	0.630	292	125	203	355	115
31P	67	223	11,327	10,859	12,467	11,220	9,966
39K	8.7	29	8,939	8,778	9,564	8,766	7,586
44Ca	39	130	2,483	1,801	2,731	2,320	2,012
49Ti	0.213	0.710	26	5.3	11	20	4.3
51V	0.025	0.083	0.808	0.265	0.450	0.654	0.287
52Cr	0.331	1.1	5.0	2.2	3.4	3.6	1.9
55Mn	0.019	0.063	54	48	71	59	45
57Fe	4.4	15	376	184	377	325	179
59Co	0.003	0.010	3.2	4.7	5.8	4.0	2.5
60Ni	0.019	0.063	21	12	19	15	8.6
63Cu	0.006	0.020	21	18	23	21	18
66Zn	0.527	1.8	597	609	928	610	531
75As	0.435	1.4	2.5	1.8	2.9	2.3	1.9
77Se	0.287	0.957	5.9	4.8	6.9	5.6	5.9
88Sr	0.001	0.003	4.7	3.3	4.2	5.0	3.5
95Mo	0.006	0.020	0.472	0.426	0.324	0.361	0.352
107Ag	0.001	0.003	0.027	0.021	0.034	0.023	0.026
111Cd	0.185	0.617	11	14	20	13	10
118Sn	0.022	0.073	0.560	0.319	0.228	0.575	0.289
121Sb	0.004	0.013	0.033	0.017	0.021	0.021	0.017
137Ba	0.001	0.003	16	9.5	12	17	11
202Hg	0.049	0.163	0.101	0.089	0.125	0.101	0.084
205Tl	0.001	0.003	0.061	0.040	0.065	0.036	0.040
208Pb	0.002	0.007	0.143	0.070	0.082	0.120	0.056
238U	0.001	0.003	0.071	0.034	0.043	0.043	0.034

Notes:

ppm = parts per million

DL = detection limit

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g = grams

% = percent

Tissue Analysis Results

		Client ID	RG_LIDSL_INV-6_2020-07-13	RG_LIDSL_INV-7_2020-07-13	RG_LIDSL_INV-8_2020-07-13	RG_LIDSL_INV-9_2020-07-13	RG_LIDSL_INV-10_2020-07-13
		Lab ID	066	067	068	069	070
		Wet Weight (g)	1.4116	0.9916	0.9324	1.1422	1.0937
		Dry Weight (g)	0.2263	0.1832	0.1458	0.2292	0.1959
		Moisture (%)	84.0	81.5	84.4	79.9	82.1
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.554	0.421	0.917	0.380	0.401
11B	0.102	0.340	0.904	0.617	0.960	0.556	0.672
23Na	6.7	22	2,454	3,239	3,005	3,071	3,274
24Mg	0.071	0.237	1,593	1,365	1,606	1,476	1,382
27Al	0.189	0.630	412	188	422	170	212
31P	67	223	10,766	12,241	11,457	10,554	11,127
39K	8.7	29	8,651	10,898	9,489	10,540	10,360
44Ca	39	130	3,162	2,280	2,611	2,494	2,764
49Ti	0.213	0.710	23	9.1	30	7.2	11
51V	0.025	0.083	0.879	0.374	0.824	0.354	0.425
52Cr	0.331	1.1	2.6	2.7	4.2	2.2	3.0
55Mn	0.019	0.063	73	69	67	64	138
57Fe	4.4	15	317	272	438	212	285
59Co	0.003	0.010	2.6	4.4	4.1	4.5	5.6
60Ni	0.019	0.063	14	14	19	14	18
63Cu	0.006	0.020	21	22	24	18	22
66Zn	0.527	1.8	511	573	515	697	636
75As	0.435	1.4	2.0	2.2	2.2	2.4	2.1
77Se	0.287	0.957	5.8	6.1	5.1	5.5	6.0
88Sr	0.001	0.003	6.4	4.7	4.6	4.0	4.1
95Mo	0.006	0.020	0.315	0.505	0.468	0.384	0.486
107Ag	0.001	0.003	0.021	0.043	0.030	0.025	0.033
111Cd	0.185	0.617	12	11	8.9	13	13
118Sn	0.022	0.073	0.421	0.493	0.413	0.474	0.352
121Sb	0.004	0.013	0.029	0.017	0.037	0.021	0.021
137Ba	0.001	0.003	21	16	19	13	14
202Hg	0.049	0.163	0.084	0.122	0.102	0.141	0.113
205Tl	0.001	0.003	0.057	0.043	0.043	0.062	0.047
208Pb	0.002	0.007	0.149	0.082	0.141	0.074	0.082
238U	0.001	0.003	0.127	0.045	0.072	0.045	0.044

Notes:

ppm = parts per million

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g = grams

% = percent

Tissue Analysis Results

		Client ID	RG_LILC3_INV-1_2020-07-15	RG_LILC3_INV-2_2020-07-15	RG_LILC3_INV-3_2020-07-15	RG_LILC3_INV-4_2020-07-15	RG_LILC3_INV-5_2020-07-15
		Lab ID	071	072	073	074	075
		Wet Weight (g)	0.7261	1.1540	2.0126	1.1705	1.2748
		Dry Weight (g)	0.1805	0.2730	0.4186	0.2123	0.2776
		Moisture (%)	75.1	76.3	79.2	81.9	78.2
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.372	0.476	0.319	0.351	0.757
11B	0.102	0.340	0.700	1.0	0.851	0.617	0.486
23Na	6.7	22	3,096	3,562	2,107	2,204	3,764
24Mg	0.071	0.237	1,095	1,593	952	1,163	1,373
27Al	0.189	0.630	166	165	119	117	81
31P	67	223	10,432	14,395	9,086	9,188	13,165
39K	8.7	29	11,229	16,415	7,547	8,999	13,048
44Ca	39	130	2,166	2,220	1,747	2,839	1,233
49Ti	0.213	0.710	11	9.6	6.4	6.1	4.8
51V	0.025	0.083	0.574	0.524	0.415	0.432	0.287
52Cr	0.331	1.1	4.6	2.4	2.2	2.3	2.4
55Mn	0.019	0.063	89	142	164	77	93
57Fe	4.4	15	336	320	235	242	224
59Co	0.003	0.010	1.8	3.8	3.6	1.4	1.3
60Ni	0.019	0.063	16	17	22	8.5	10
63Cu	0.006	0.020	19	27	17	20	16
66Zn	0.527	1.8	245	385	247	233	212
75As	0.435	1.4	1.3	2.1	1.7	1.1	2.0
77Se	0.287	0.957	6.7	7.1	7.2	6.2	7.9
88Sr	0.001	0.003	3.8	3.8	3.1	4.7	2.6
95Mo	0.006	0.020	0.468	0.758	0.589	0.346	0.424
107Ag	0.001	0.003	0.023	0.015	0.009	0.023	0.013
111Cd	0.185	0.617	2.5	5.6	6.1	3.0	1.9
118Sn	0.022	0.073	0.113	0.156	0.126	0.204	0.170
121Sb	0.004	0.013	0.041	0.045	0.045	0.029	0.036
137Ba	0.001	0.003	13	14	16	13	9.0
202Hg	0.049	0.163	0.093	0.090	0.079	0.085	0.094
205Tl	0.001	0.003	0.022	0.027	0.027	0.017	0.020
208Pb	0.002	0.007	0.117	0.098	0.132	0.077	0.068
238U	0.001	0.003	0.047	0.062	0.062	0.067	0.028

Notes:

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Tissue Analysis Results

		Client ID	RG_LILC3_INV-6_2020-07-15	RG_LILC3_INV-7_2020-07-15	RG_LILC3_INV-8_2020-07-15	RG_LILC3_INV-9_2020-07-15	RG_LILC3_INV-10_2020-07-15
		Lab ID	076	077	078	079	080
		Wet Weight (g)	1.1599	0.7958	0.7786	1.3660	1.8062
		Dry Weight (g)	0.2571	0.1514	0.1744	0.2685	0.3223
		Moisture (%)	77.8	81.0	77.6	80.3	82.2
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.515	0.651	0.598	0.512	1.2
11B	0.102	0.340	1.0	0.914	1.1	1.2	2.0
23Na	6.7	22	2,992	3,669	2,575	2,292	3,616
24Mg	0.071	0.237	1,608	1,831	1,389	1,321	1,488
27Al	0.189	0.630	131	271	405	335	779
31P	67	223	11,055	14,311	12,219	9,440	11,582
39K	8.7	29	13,457	14,830	12,634	9,309	11,337
44Ca	39	130	2,617	2,442	2,887	2,475	3,467
49Ti	0.213	0.710	6.2	16	24	20	50
51V	0.025	0.083	0.841	0.831	1.1	0.927	1.8
52Cr	0.331	1.1	3.1	3.3	4.0	3.0	3.7
55Mn	0.019	0.063	207	176	136	205	151
57Fe	4.4	15	449	445	394	383	743
59Co	0.003	0.010	2.4	11	2.5	3.6	3.2
60Ni	0.019	0.063	19	29	15	17	23
63Cu	0.006	0.020	48	30	23	20	25
66Zn	0.527	1.8	373	423	245	276	281
75As	0.435	1.4	3.3	2.0	1.8	1.4	1.7
77Se	0.287	0.957	7.7	9.6	6.0	6.2	9.3
88Sr	0.001	0.003	4.6	6.5	6.1	4.5	6.1
95Mo	0.006	0.020	0.740	0.930	0.740	0.625	0.500
107Ag	0.001	0.003	0.038	0.023	0.023	0.013	0.026
111Cd	0.185	0.617	7.0	13	5.4	6.7	6.8
118Sn	0.022	0.073	0.164	0.397	0.229	0.181	0.382
121Sb	0.004	0.013	0.045	0.045	0.039	0.042	0.069
137Ba	0.001	0.003	17	14	12	15	31
202Hg	0.049	0.163	0.117	0.137	0.089	0.087	0.120
205Tl	0.001	0.003	0.032	0.037	0.023	0.024	0.038
208Pb	0.002	0.007	0.141	0.216	0.139	0.137	0.140
238U	0.001	0.003	0.109	0.061	0.054	0.055	0.131

Notes:

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Tissue Analysis Results

		Client ID	RG_LISP24_INV-1_2020-07-15	RG_LISP24_INV-2_2020-07-15	RG_LISP24_INV-3_2020-07-15	RG_LISP24_INV-4_2020-07-15	RG_LISP24_INV-5_2020-07-15
		Lab ID	081	082	083	084	085
		Wet Weight (g)	0.8519	0.7827	1.1124	0.8732	0.8945
		Dry Weight (g)	0.1637	0.1825	0.2267	0.1740	0.1673
		Moisture (%)	80.8	76.7	79.6	80.1	81.3
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.456	0.525	0.506	0.522	0.549
11B	0.102	0.340	1.2	0.596	0.718	0.756	0.823
23Na	6.7	22	2,211	3,470	3,605	3,716	3,424
24Mg	0.071	0.237	1,213	1,623	1,310	1,348	1,436
27Al	0.189	0.630	257	202	195	366	387
31P	67	223	9,163	13,815	11,408	10,545	12,227
39K	8.7	29	10,137	13,014	10,545	11,069	10,752
44Ca	39	130	2,385	3,238	2,723	2,751	2,474
49Ti	0.213	0.710	17	10	10	27	23
51V	0.025	0.083	0.590	0.556	0.570	0.758	0.755
52Cr	0.331	1.1	2.4	3.1	2.9	3.9	5.3
55Mn	0.019	0.063	142	79	130	75	106
57Fe	4.4	15	343	289	350	372	476
59Co	0.003	0.010	4.2	6.4	7.4	2.6	3.8
60Ni	0.019	0.063	19	20	24	14	20
63Cu	0.006	0.020	23	25	25	20	20
66Zn	0.527	1.8	470	637	599	386	405
75As	0.435	1.4	1.7	1.9	1.5	1.2	1.1
77Se	0.287	0.957	6.6	6.5	7.6	5.4	6.0
88Sr	0.001	0.003	4.4	6.2	4.3	3.9	4.8
95Mo	0.006	0.020	0.718	0.511	0.544	0.470	0.426
107Ag	0.001	0.003	0.024	0.031	0.038	0.025	0.037
111Cd	0.185	0.617	7.2	14	17	5.5	6.5
118Sn	0.022	0.073	0.286	0.492	0.448	0.324	0.454
121Sb	0.004	0.013	0.030	0.015	0.030	0.026	0.030
137Ba	0.001	0.003	13	11	13	16	18
202Hg	0.049	0.163	0.086	0.107	0.117	0.090	0.096
205Tl	0.001	0.003	0.042	0.065	0.051	0.043	0.061
208Pb	0.002	0.007	0.118	0.082	0.109	0.100	0.170
238U	0.001	0.003	0.053	0.034	0.047	0.064	0.052

Notes:

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g = grams

% = percent

Tissue Analysis Results

		Client ID	RG_LISP24_INV-6_2020-07-15	RG_LISP24_INV-7_2020-07-15	RG_LISP24_INV-8_2020-07-15	RG_LISP24_INV-9_2020-07-15	RG_LISP24_INV-10_2020-07-15
		Lab ID	086	087	088	089	090
		Wet Weight (g)	1.0935	1.0281	1.6332	0.7835	1.0343
		Dry Weight (g)	0.2234	0.2256	0.3138	0.1750	0.2122
		Moisture (%)	79.6	78.1	80.8	77.7	79.5
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.684	0.503	0.224	0.460	0.375
11B	0.102	0.340	1.0	0.956	0.247	0.560	0.632
23Na	6.7	22	3,986	3,641	1,809	3,311	2,819
24Mg	0.071	0.237	1,930	1,858	741	2,081	1,707
27Al	0.189	0.630	357	172	53	215	186
31P	67	223	14,262	13,690	6,572	14,441	13,827
39K	8.7	29	13,769	12,613	5,575	11,360	8,640
44Ca	39	130	2,551	2,488	1,670	4,304	6,308
49Ti	0.213	0.710	21	8.2	2.0	11	9.8
51V	0.025	0.083	0.720	0.394	0.124	0.475	0.481
52Cr	0.331	1.1	3.4	2.2	1.5	3.3	2.6
55Mn	0.019	0.063	103	127	28	67	46
57Fe	4.4	15	400	277	101	304	229
59Co	0.003	0.010	7.1	5.2	0.861	3.4	1.1
60Ni	0.019	0.063	29	22	3.6	14	8.1
63Cu	0.006	0.020	29	20	14	25	18
66Zn	0.527	1.8	684	440	225	391	273
75As	0.435	1.4	2.1	1.7	0.446	1.1	0.754
77Se	0.287	0.957	7.1	5.8	3.3	4.4	4.5
88Sr	0.001	0.003	4.8	4.1	2.4	7.3	10
95Mo	0.006	0.020	0.635	0.731	0.261	0.409	0.357
107Ag	0.001	0.003	0.033	0.028	0.021	0.047	0.039
111Cd	0.185	0.617	11	9.6	2.0	6.3	2.5
118Sn	0.022	0.073	0.485	0.529	0.114	0.391	0.158
121Sb	0.004	0.013	0.043	0.035	0.017	0.023	0.023
137Ba	0.001	0.003	15	14	6.5	15	21
202Hg	0.049	0.163	0.115	0.074	0.057	0.082	0.076
205Tl	0.001	0.003	0.088	0.046	0.019	0.064	0.030
208Pb	0.002	0.007	0.113	0.097	0.026	0.084	0.060
238U	0.001	0.003	0.073	0.051	0.018	0.046	0.080

Notes:

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% = percent

Tissue Analysis Results

		Client ID	RG_SLINE_INV-1_2020-07-14	RG_SLINE_INV-2_2020-07-14	RG_SLINE_INV-3_2020-07-14	RG_SLINE_INV-4_2020-07-14	RG_SLINE_INV-5_2020-07-14
		Lab ID	091	092	093	094	095
		Wet Weight (g)	1.2286	1.1047	1.0703	1.3897	1.0109
		Dry Weight (g)	0.2577	0.2067	0.2330	0.2943	0.2023
		Moisture (%)	79.0	81.3	78.2	78.8	80.0
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.124	0.150	0.173	0.120	0.133
11B	0.102	0.340	0.303	0.226	0.523	0.288	0.346
23Na	6.7	22	3,171	2,383	3,279	3,251	3,228
24Mg	0.071	0.237	1,707	1,973	2,007	2,216	1,752
27Al	0.189	0.630	58	80	115	73	68
31P	67	223	11,595	9,294	11,321	13,314	11,247
39K	8.7	29	10,677	6,108	10,224	10,353	10,126
44Ca	39	130	2,337	2,297	2,840	3,429	2,926
49Ti	0.213	0.710	3.5	4.8	6.5	4.2	3.6
51V	0.025	0.083	0.589	0.488	0.824	0.455	0.356
52Cr	0.331	1.1	1.9	2.1	3.9	2.5	2.4
55Mn	0.019	0.063	14	16	27	30	27
57Fe	4.4	15	176	156	328	238	190
59Co	0.003	0.010	0.648	0.454	1.4	0.886	0.906
60Ni	0.019	0.063	4.4	4.0	12	5.4	5.9
63Cu	0.006	0.020	18	20	20	24	18
66Zn	0.527	1.8	923	509	1,253	839	585
75As	0.435	1.4	1.9	1.4	2.9	2.4	2.2
77Se	0.287	0.957	4.8	4.6	6.8	6.5	6.5
88Sr	0.001	0.003	3.2	4.7	4.8	6.9	5.5
95Mo	0.006	0.020	0.383	0.331	0.558	0.602	0.662
107Ag	0.001	0.003	0.084	0.093	0.081	0.140	0.086
111Cd	0.185	0.617	7.9	4.5	9.0	6.4	4.8
118Sn	0.022	0.073	0.274	0.304	0.365	0.313	0.532
121Sb	0.004	0.013	0.007	0.010	0.018	0.015	0.011
137Ba	0.001	0.003	7.0	11	17	32	17
202Hg	0.049	0.163	0.086	0.090	0.150	0.126	0.144
205Tl	0.001	0.003	0.092	0.052	0.118	0.092	0.074
208Pb	0.002	0.007	0.038	0.052	0.066	0.050	0.035
238U	0.001	0.003	0.076	0.067	0.129	0.070	0.076

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Tissue Analysis Results

		Client ID	RG_SLINE_INV-6_2020-07-14	RG_SLINE_INV-7_2020-07-14	RG_SLINE_INV-8_2020-07-14	RG_SLINE_INV-9_2020-07-14	RG_SLINE_INV-10_2020-07-14
		Lab ID	096	097	098	099	100
		Wet Weight (g)	1.0439	0.9469	0.7675	1.0164	1.4305
		Dry Weight (g)	0.2426	0.2080	0.1665	0.2243	0.3089
		Moisture (%)	76.8	78.0	78.3	77.9	78.4
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.139	0.281	0.190	0.123	0.179
11B	0.102	0.340	0.314	0.758	0.353	0.353	0.346
23Na	6.7	22	3,057	2,911	2,654	3,482	2,951
24Mg	0.071	0.237	1,496	2,078	1,758	2,160	1,843
27Al	0.189	0.630	91	227	114	69	138
31P	67	223	11,436	10,267	12,429	12,241	10,541
39K	8.7	29	10,215	9,646	10,048	10,676	9,361
44Ca	39	130	1,652	2,608	3,058	2,458	2,833
49Ti	0.213	0.710	5.8	13	5.1	4.2	8.9
51V	0.025	0.083	0.350	1.2	0.328	0.625	0.582
52Cr	0.331	1.1	2.3	5.7	3.3	2.3	2.4
55Mn	0.019	0.063	28	30	23	25	27
57Fe	4.4	15	139	446	163	213	216
59Co	0.003	0.010	0.379	1.3	0.480	0.825	0.754
60Ni	0.019	0.063	3.4	16	6.2	6.8	5.0
63Cu	0.006	0.020	17	17	16	21	18
66Zn	0.527	1.8	613	814	441	999	739
75As	0.435	1.4	1.1	2.5	1.3	2.5	2.0
77Se	0.287	0.957	5.7	8.1	5.5	7.0	6.1
88Sr	0.001	0.003	3.0	5.4	5.9	3.9	5.4
95Mo	0.006	0.020	0.492	0.728	0.438	0.514	0.514
107Ag	0.001	0.003	0.081	0.099	0.112	0.089	0.092
111Cd	0.185	0.617	3.1	6.6	2.6	8.0	4.6
118Sn	0.022	0.073	0.072	0.465	0.178	0.245	0.154
121Sb	0.004	0.013	0.011	0.022	0.011	0.011	0.015
137Ba	0.001	0.003	18	23	25	15	26
202Hg	0.049	0.163	0.150	0.120	0.108	0.120	0.084
205Tl	0.001	0.003	0.064	0.117	0.050	0.142	0.086
208Pb	0.002	0.007	0.050	0.112	0.045	0.045	0.055
238U	0.001	0.003	0.065	0.153	0.038	0.099	0.070

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited: LCO LAEMP/Minnow Project 207202.0015

Tissue QA/QC Relative Percent Difference Results

	Client ID	RG_FO23_INV-1_2020-07-16			RG_FRUL_INV-8_2020-07-16			RG_LCUT_INV-7_2020-07-13		
	Lab ID	001			018			027		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.005	1.0	1.0	0.0	2.2	2.3	4.4	1.6	1.8	11.8
11B	0.102	2.3	2.1	9.1	0.947	1.1	-	3.9	5.0	24.7
23Na	6.7	3,509	3,814	8.3	4,227	6,042	35.3	2,675	2,799	4.5
24Mg	0.071	1,850	1,809	2.2	1,898	2,158	12.8	2,922	2,938	0.5
27Al	0.189	1,445	1,234	15.8	637	834	26.8	2,702	3,307	20.1
31P	67	11,595	11,121	4.2	13,759	13,001	5.7	12,538	12,880	2.7
39K	8.7	11,293	11,679	3.4	11,996	11,151	7.3	14,931	16,323	8.9
44Ca	39	4,621	4,078	12.5	4,233	4,419	4.3	6,802	7,446	9.0
49Ti	0.213	116	87	28.6	42	58	32.0	280	283	1.1
51V	0.025	2.5	2.3	8.3	1.7	2.2	25.6	3.4	4.2	21.1
52Cr	0.331	8.9	8.1	9.4	23	34	38.6	8.8	10	12.8
55Mn	0.019	64	64	0.0	74	78	5.3	70	67	4.4
57Fe	4.4	775	704	9.6	848	961	12.5	714	821	13.9
59Co	0.003	5.0	4.4	12.8	4.1	4.3	4.8	4.4	4.5	2.2
60Ni	0.019	24	22	8.7	43	59	31.4	37	41	10.3
63Cu	0.006	22	22	0.0	22	22	0.0	43	52	18.9
66Zn	0.527	488	448	8.5	359	267	29.4	448	505	12.0
75As	0.435	2.1	1.8	-	1.3	1.3	-	4.8	4.8	0.0
77Se	0.287	9.7	9.2	5.3	12	12	0.0	5.1	5.3	3.8
88Sr	0.001	7.0	5.8	18.8	5.4	5.5	1.8	9.1	9.1	0.0
95Mo	0.006	0.543	0.535	1.5	0.568	0.641	12.1	0.714	0.692	3.1
107Ag	0.001	0.124	0.124	0.0	0.202	0.229	12.5	0.039	0.039	0.0
111Cd	0.185	6.5	6.1	6.3	4.8	4.4	8.7	6.8	7.3	7.1
118Sn	0.022	0.437	0.407	7.1	0.269	0.307	13.2	0.388	0.444	13.5
121Sb	0.004	0.041	0.035	-	0.033	0.033	-	0.105	0.101	3.9
137Ba	0.001	52	42	21.3	31	31	0.0	105	89	16.5
202Hg	0.049	0.098	0.098	-	0.093	0.071	-	0.089	0.106	-
205Tl	0.001	0.033	0.032	3.1	0.031	0.031	0.0	0.056	0.061	8.5
208Pb	0.002	0.322	0.300	7.1	0.244	0.253	3.6	0.551	0.634	14.0
238U	0.001	0.086	0.076	12.3	0.064	0.075	15.8	0.196	0.194	1.0

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

Tissue QA/QC Relative Percent Difference Results

Client ID		RG_LI8_INV-4_2020-07-15			RG_LI24_INV-1_2020-07-14			RG_LI24_INV-4_2020-07-14		
Lab ID		034			041			044		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.005	0.320	0.324	1.2	0.508	0.693	30.8	0.328	0.442	29.6
11B	0.102	0.544	0.455	-	0.626	0.810	-	0.432	0.534	-
23Na	6.7	3,632	3,677	1.2	3,488	3,686	5.5	3,047	3,609	16.9
24Mg	0.071	1,773	1,887	6.2	1,828	2,009	9.4	1,396	1,426	2.1
27Al	0.189	183	158	14.7	374	488	26.5	245	354	36.4
31P	67	11,267	11,067	1.8	12,313	13,849	11.7	11,069	11,859	6.9
39K	8.7	9,945	9,782	1.7	10,064	10,728	6.4	8,499	9,790	14.1
44Ca	39	2,464	2,255	8.9	4,724	5,513	15.4	3,446	3,977	14.3
49Ti	0.213	8.8	9.6	8.7	26	36	32.3	13	18	32.3
51V	0.025	0.399	0.331	18.6	1.2	1.5	22.2	0.998	1.3	26.3
52Cr	0.331	2.6	2.4	-	3.4	3.9	13.7	3.8	5.2	31.1
55Mn	0.019	34	29	15.9	27	32	16.9	24	23	4.3
57Fe	4.4	259	239	8.0	325	405	21.9	225	335	39.3
59Co	0.003	2.8	3.4	19.4	1.4	1.6	13.3	1.2	1.2	0.0
60Ni	0.019	20	21	4.9	12	14	15.4	11	14	24.0
63Cu	0.006	18	17	5.7	15	16	6.5	16	17	6.1
66Zn	0.527	932	865	7.5	755	839	10.5	513	536	4.4
75As	0.435	2.1	2.5	-	1.7	2.0	-	1.5	1.8	-
77Se	0.287	5.1	5.5	7.5	5.9	6.1	3.3	4.7	5.2	10.1
88Sr	0.001	3.3	3.0	9.5	7.5	8.6	13.7	6.5	6.9	6.0
95Mo	0.006	0.335	0.263	24.1	0.391	0.447	13.4	0.410	0.460	11.5
107Ag	0.001	0.029	0.027	7.1	0.074	0.074	0.0	0.073	0.081	10.4
111Cd	0.185	19	22	14.6	3.0	3.2	6.5	2.2	2.4	8.7
118Sn	0.022	0.246	0.242	1.6	0.736	0.912	21.4	0.419	0.442	5.3
121Sb	0.004	0.017	0.021	-	0.033	0.041	-	0.019	0.027	-
137Ba	0.001	12	10	18.2	24	27	11.8	20	21	4.9
202Hg	0.049	0.106	0.122	-	0.096	0.085	-	0.175	0.084	-
205Tl	0.001	0.066	0.064	3.1	0.078	0.087	10.9	0.053	0.055	3.7
208Pb	0.002	0.080	0.075	6.5	0.135	0.170	23.0	0.120	0.150	22.2
238U	0.001	0.061	0.043	34.6	0.093	0.112	18.5	0.084	0.096	13.3

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

Tissue QA/QC Relative Percent Difference Results

Client ID		RG_LIDSL_INV-4_2020-07-13			RG_LIDSL_INV-10_2020-07-13			RG_LISP24_INV-2_2020-07-15		
Lab ID		064			070			082		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.005	0.423	0.437	3.3	0.401	0.411	2.5	0.525	0.568	7.9
11B	0.102	0.681	0.607	-	0.672	0.590	-	0.596	0.660	-
23Na	6.7	2,506	2,613	4.2	3,274	2,970	9.7	3,470	3,236	7.0
24Mg	0.071	1,288	1,286	0.2	1,382	1,250	10.0	1,623	1,506	7.5
27Al	0.189	355	259	31.3	212	186	13.1	202	221	9.0
31P	67	11,220	11,262	0.4	11,127	9,530	15.5	13,815	12,134	13.0
39K	8.7	8,766	9,054	3.2	10,360	9,585	7.8	13,014	11,907	8.9
44Ca	39	2,320	2,139	8.1	2,764	2,339	16.7	3,238	2,960	9.0
49Ti	0.213	20	14	35.3	11	9.0	20.0	10	14	33.3
51V	0.025	0.654	0.541	18.9	0.425	0.438	3.0	0.556	0.539	3.1
52Cr	0.331	3.6	4.2	15.4	3.0	3.2	-	3.1	3.0	-
55Mn	0.019	59	59	0.0	138	120	14.0	79	76	3.9
57Fe	4.4	325	314	3.4	285	287	0.7	289	283	2.1
59Co	0.003	4.0	3.7	7.8	5.6	5.7	1.8	6.4	7.1	10.4
60Ni	0.019	15	16	6.5	18	23	24.4	20	22	9.5
63Cu	0.006	21	21	0.0	22	23	4.4	25	26	3.9
66Zn	0.527	610	585	4.2	636	664	4.3	637	564	12.2
75As	0.435	2.3	2.1	-	2.1	2.1	-	1.9	1.7	-
77Se	0.287	5.6	6.0	6.9	6.0	6.0	0.0	6.5	6.4	1.6
88Sr	0.001	5.0	4.8	4.1	4.1	3.8	7.6	6.2	5.6	10.2
95Mo	0.006	0.361	0.398	9.7	0.486	0.496	2.0	0.511	0.402	23.9
107Ag	0.001	0.023	0.021	9.1	0.033	0.030	9.5	0.031	0.033	6.3
111Cd	0.185	13	12	8.0	13	13	0.0	14	13	7.4
118Sn	0.022	0.575	0.552	4.1	0.352	0.441	22.4	0.492	0.424	14.8
121Sb	0.004	0.021	0.021	-	0.021	0.025	-	0.015	0.018	-
137Ba	0.001	17	16	6.1	14	15	6.9	11	9.1	18.9
202Hg	0.049	0.101	0.084	-	0.113	0.096	-	0.107	0.112	-
205Tl	0.001	0.036	0.038	5.4	0.047	0.043	8.9	0.065	0.064	1.6
208Pb	0.002	0.120	0.100	18.2	0.082	0.091	10.4	0.082	0.075	8.9
238U	0.001	0.043	0.037	15.0	0.044	0.042	4.7	0.034	0.040	16.2

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

Tissue QA/QC Relative Percent Difference Results

Client ID	RG_SLINE_INV-9_2020-07-14
Lab ID	099

Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.005	0.123	0.125	1.6
11B	0.102	0.353	0.353	-
23Na	6.7	3,482	2,873	19.2
24Mg	0.071	2,160	1,943	10.6
27Al	0.189	69	93	29.6
31P	67	12,241	10,802	12.5
39K	8.7	10,676	9,227	14.6
44Ca	39	2,458	2,172	12.4
49Ti	0.213	4.2	5.7	30.3
51V	0.025	0.625	0.705	12.0
52Cr	0.331	2.3	2.3	-
55Mn	0.019	25	18	32.6
57Fe	4.4	213	207	2.9
59Co	0.003	0.825	0.786	4.8
60Ni	0.019	6.8	6.6	3.0
63Cu	0.006	21	17	21.1
66Zn	0.527	999	918	8.5
75As	0.435	2.5	2.5	-
77Se	0.287	7.0	6.9	1.4
88Sr	0.001	3.9	3.5	10.8
95Mo	0.006	0.514	0.449	13.5
107Ag	0.001	0.089	0.076	15.8
111Cd	0.185	8.0	7.2	10.5
118Sn	0.022	0.245	0.229	6.8
121Sb	0.004	0.011	0.011	-
137Ba	0.001	15	11	30.8
202Hg	0.049	0.120	0.138	-
205Tl	0.001	0.142	0.121	16.0
208Pb	0.002	0.045	0.041	9.3
238U	0.001	0.099	0.095	4.1

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

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	0.005	1.21	1.4	113	9.0	1.3	104	3.5
11B	0.102	4.5	5.3	118	2.4	5.2	116	2.7
23Na	6.7	14000	15,177	108	5.4	13,703	98	4.4
24Mg	0.071	910	1,045	115	7.1	915	101	3.7
27Al	0.189	197.2	216	110	9.9	208	105	4.2
31P	67	8000	8,567	107	4.8	7,635	95	4.1
39K	8.7	15500	17,884	115	6.5	15,615	101	4.5
44Ca	39	2360	2,765	117	5.8	2,346	99	5.4
49Ti	0.213	12.24	13	105	10.3	15	126	19.7
51V	0.025	1.57	1.6	105	3.7	1.6	105	14.0
52Cr	0.331	1.87	2.1	114	5.5	1.9	101	7.0
55Mn	0.019	3.17	3.7	115	6.5	3.1	99	2.7
57Fe	4.4	343	403	117	4.8	343	100	4.3
59Co	0.003	0.25	0.302	121	6.0	0.260	104	4.9
60Ni	0.019	1.34	1.6	116	6.1	1.4	103	6.7
63Cu	0.006	15.7	19	118	8.0	16	104	5.6
66Zn	0.527	51.6	59	114	4.6	52	101	4.9
75As	0.435	6.87	7.2	104	5.4	6.8	99	3.3
77Se	0.375	3.45	3.5	101	6.8	3.5	102	3.3
88Sr	0.001	10.1	12	114	6.8	10	103	3.2
95Mo	0.006	0.29	0.328	113	8.3	0.301	104	7.2
107Ag	0.001	0.0252	0.033	130	12.4	0.028	110	6.4
111Cd	0.185	0.299	0.364	122	5.8	0.336	113	5.6
118Sn	0.022	0.061	0.068	111	12.6	0.067	109	11.7
121Sb	0.004	0.011	0.012	105	16.0	0.012	113	16.1
137Ba	0.001	8.6	9.6	112	2.5	9.6	112	2.7
202Hg	0.049	0.412	0.467	113	9.7	0.450	109	12.9
205Tl	0.001	-	-	-	-	-	-	-
208Pb	0.002	0.404	0.487	120	4.5	0.445	110	12.0
238U	0.001	0.05	0.059	118	7.3	0.051	102	9.4

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% was established for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

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	0.005	1.21	1.1	94	6.8	1.3	111	7.2
11B	0.102	4.5	4.5	100	3.4	5.2	115	2.9
23Na	6.7	14000	13,519	97	5.2	15,601	111	4.8
24Mg	0.071	910	859	94	6.3	981	108	8.8
27Al	0.189	197.2	214	108	3.7	213	108	8.6
31P	67	8000	7,489	94	4.4	8,584	107	4.8
39K	8.7	15500	14,555	94	6.4	16,230	105	5.6
44Ca	39	2360	2,324	99	4.1	2,410	102	4.8
49Ti	0.213	12.24	14	114	9.1	14	111	15.6
51V	0.025	1.57	1.6	103	14.9	1.7	108	4.0
52Cr	0.331	1.87	1.9	100	3.8	2.1	111	3.7
55Mn	0.019	3.17	3.2	100	6.3	3.5	111	8.4
57Fe	4.4	343	345	101	5.8	363	106	6.1
59Co	0.003	0.25	0.246	98	7.6	0.279	112	7.7
60Ni	0.019	1.34	1.3	99	3.0	1.5	113	6.7
63Cu	0.006	15.7	15	95	4.3	18	115	5.4
66Zn	0.527	51.6	48	92	5.6	56	108	6.9
75As	0.435	6.87	6.5	95	3.6	7.3	106	3.0
77Se	0.375	3.45	3.3	95	6.1	3.6	105	1.7
88Sr	0.001	10.1	10	101	5.3	10	104	6.2
95Mo	0.006	0.29	0.288	99	5.7	0.294	101	5.5
107Ag	0.001	0.0252	0.024	96	9.3	0.028	110	6.5
111Cd	0.185	0.299	0.296	99	11.8	0.347	116	4.5
118Sn	0.022	0.061	0.063	103	10.1	0.065	106	10.9
121Sb	0.004	0.011	0.012	108	15.2	0.010	92	**21.1**
137Ba	0.001	8.6	8.9	104	3.2	8.3	97	2.8
202Hg	0.049	0.412	0.421	102	5.8	0.407	99	6.3
205Tl	0.001	-	-	-	-	-	-	-
208Pb	0.002	0.404	0.446	111	19.1	0.425	105	12.8
238U	0.001	0.05	0.054	108	11.9	0.048	96	10.0

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% was established for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Bold indicates DQO exceedance

Tissue QA/QC Accuracy and Precision Results

	Sample Group ID		05			06		
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.005	1.21	1.4	113	11.3	1.3	105	2.4
11B	0.102	4.5	5.6	125	2.6	4.3	96	2.1
23Na	6.7	14000	16,843	120	6.4	15,899	114	5.9
24Mg	0.071	910	1,067	117	8.1	922	101	3.8
27Al	0.189	197.2	217	110	4.5	175	89	1.7
31P	67	8000	8,939	112	5.0	8,703	109	3.1
39K	8.7	15500	18,963	122	9.2	16,304	105	5.1
44Ca	39	2360	2,813	119	3.9	2,528	107	3.5
49Ti	0.213	12.24	14	117	8.4	10	85	3.0
51V	0.025	1.57	1.9	120	9.5	1.8	112	12.7
52Cr	0.331	1.87	2.2	118	5.8	2.1	111	4.0
55Mn	0.019	3.17	3.9	123	7.7	3.3	104	5.6
57Fe	4.4	343	419	122	6.5	374	109	5.8
59Co	0.003	0.25	0.306	122	5.0	0.280	112	4.6
60Ni	0.019	1.34	1.7	128	6.7	1.5	113	4.8
63Cu	0.006	15.7	20	129	6.3	17	110	3.7
66Zn	0.527	51.6	59	114	2.6	57	111	3.1
75As	0.435	6.87	7.5	109	2.0	7.3	106	3.2
77Se	0.375	3.45	3.6	103	3.6	3.6	105	4.9
88Sr	0.001	10.1	12	119	7.8	11	113	3.0
95Mo	0.006	0.29	0.347	120	6.8	0.340	117	2.9
107Ag	0.001	0.0252	0.032	127	9.7	0.026	102	4.4
111Cd	0.185	0.299	0.375	125	3.8	0.341	114	8.5
118Sn	0.022	0.061	0.075	124	10.1	0.069	113	8.4
121Sb	0.004	0.011	0.013	120	**26.1**	0.010	92	16.1
137Ba	0.001	8.6	10	117	3.1	8.1	94	2.3
202Hg	0.049	0.412	0.503	122	8.4	0.460	112	5.0
205Tl	0.001	-	-	-	-	-	-	-
208Pb	0.002	0.404	0.526	130	4.8	0.499	123	15.0
238U	0.001	0.05	0.067	**133**	7.4	0.056	112	8.3

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% was established for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Bold indicates DQO exceedance

Tissue QA/QC Accuracy and Precision Results

		Sample Group ID	07			08		
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.005	1.21	1.4	115	8.3	1.2	98	6.8
11B	0.102	4.5	5.3	118	3.1	4.7	103	3.3
23Na	6.7	14000	16,115	115	6.0	14,869	106	5.4
24Mg	0.071	910	1,064	117	0.3	949	104	3.0
27Al	0.189	197.2	183	93	7.0	200	101	5.6
31P	67	8000	8,647	108	2.2	8,433	105	2.2
39K	8.7	15500	17,721	114	2.7	17,139	111	5.7
44Ca	39	2360	2,506	106	2.1	2,433	103	7.1
49Ti	0.213	12.24	13	104	8.6	13	104	15.0
51V	0.025	1.57	1.9	119	10.1	1.9	123	12.4
52Cr	0.331	1.87	2.2	115	5.8	2.0	109	2.0
55Mn	0.019	3.17	3.7	118	3.3	3.5	110	2.3
57Fe	4.4	343	417	122	3.1	381	111	1.2
59Co	0.003	0.25	0.300	120	4.2	0.271	108	4.4
60Ni	0.019	1.34	1.6	117	5.6	1.4	107	1.3
63Cu	0.006	15.7	18	118	3.0	17	106	3.2
66Zn	0.527	51.6	58	113	1.6	55	107	2.0
75As	0.435	6.87	7.3	106	2.3	7.2	106	3.1
77Se	0.375	3.45	3.7	107	2.0	3.6	104	5.1
88Sr	0.001	10.1	12	119	4.8	11	108	2.8
95Mo	0.006	0.29	0.344	119	2.4	0.292	101	4.2
107Ag	0.001	0.0252	0.029	114	7.1	0.024	95	14.2
111Cd	0.185	0.299	0.374	125	3.1	0.361	121	10.1
118Sn	0.022	0.061	0.083	136	17.4	0.074	122	18.4
121Sb	0.004	0.011	0.013	120	**23.6**	0.013	120	14.0
137Ba	0.001	8.6	9.6	111	3.2	8.8	102	4.9
202Hg	0.049	0.412	0.474	115	4.1	0.409	99	4.9
205Tl	0.001	-	-	-	-	-	-	-
208Pb	0.002	0.404	0.527	**131**	9.0	0.474	117	11.2
238U	0.001	0.05	0.064	128	11.2	0.058	117	9.0

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% was established for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Bold indicates DQO exceedance

Tissue QA/QC Accuracy and Precision Results

	Sample Group ID		09			10		
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.005	1.21	1.4	119	4.4	1.4	115	7.4
11B	0.102	4.5	5.5	123	2.1	5.0	110	1.6
23Na	6.7	14000	16,883	121	4.9	15,473	111	5.6
24Mg	0.071	910	1,094	120	3.6	1,021	112	6.3
27Al	0.189	197.2	209	106	8.3	203	103	2.2
31P	67	8000	9,105	114	3.5	8,258	103	2.6
39K	8.7	15500	18,597	120	2.0	16,881	109	4.9
44Ca	39	2360	2,731	116	3.7	2,555	108	3.2
49Ti	0.213	12.24	14	116	10.0	13	107	9.4
51V	0.025	1.57	2.0	124	9.3	1.7	107	6.1
52Cr	0.331	1.87	2.2	120	2.0	2.2	118	2.8
55Mn	0.019	3.17	3.9	123	6.3	3.7	118	6.6
57Fe	4.4	343	419	122	4.9	405	118	4.9
59Co	0.003	0.25	0.314	126	3.9	0.297	119	3.6
60Ni	0.019	1.34	2.0	**148**	8.9	1.6	119	4.6
63Cu	0.006	15.7	20	125	3.0	19	120	1.6
66Zn	0.527	51.6	62	120	2.5	56	109	3.7
75As	0.435	6.87	7.6	110	4.2	7.0	101	1.1
77Se	0.375	3.45	3.7	107	5.4	3.3	97	3.1
88Sr	0.001	10.1	12	118	4.1	12	119	5.1
95Mo	0.006	0.29	0.358	124	2.9	0.337	116	4.4
107Ag	0.001	0.0252	0.034	136	6.6	0.030	120	7.1
111Cd	0.185	0.299	0.395	**132**	10.7	0.383	128	11.4
118Sn	0.022	0.061	0.081	132	11.7	0.081	133	12.9
121Sb	0.004	0.011	0.012	113	0.0	0.012	106	**22.9**
137Ba	0.001	8.6	9.9	115	2.7	9.1	106	1.7
202Hg	0.049	0.412	0.459	111	4.4	0.450	109	6.4
205Tl	0.001	-	-	-	-	-	-	-
208Pb	0.002	0.404	0.518	128	4.8	0.509	126	7.4
238U	0.001	0.05	0.064	128	4.6	0.055	110	5.5

Notes:

ppm = parts per million

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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% was established for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Bold indicates DQO exceedance

Tissue QA/QC Accuracy and Precision Results

	Sample Group ID		11			12		
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.005	1.21	1.3	109	6.6	1.3	108	2.2
11B	0.102	4.5	4.8	107	2.9	5.0	112	2.8
23Na	6.7	14000	14,406	103	4.6	15,130	108	3.5
24Mg	0.071	910	912	100	3.1	1,024	113	6.7
27Al	0.189	197.2	187	95	4.1	201	102	6.9
31P	67	8000	7,783	97	7.9	8,855	111	3.4
39K	8.7	15500	16,413	106	5.2	16,322	105	6.0
44Ca	39	2360	2,389	101	5.9	2,614	111	3.3
49Ti	0.213	12.24	12	95	10.6	14	118	8.7
51V	0.025	1.57	1.6	103	6.7	1.6	99	12.1
52Cr	0.331	1.87	2.1	112	3.0	2.0	108	4.6
55Mn	0.019	3.17	3.5	110	3.2	3.6	115	6.0
57Fe	4.4	343	372	109	4.2	389	113	3.9
59Co	0.003	0.25	0.290	116	5.8	0.276	110	6.8
60Ni	0.019	1.34	1.5	111	4.1	1.5	111	7.5
63Cu	0.006	15.7	17	109	5.1	17	111	6.7
66Zn	0.527	51.6	54	105	2.9	59	114	6.5
75As	0.435	6.87	6.5	95	5.7	7.4	107	5.8
77Se	0.375	3.45	3.2	92	6.1	3.7	108	11.2
88Sr	0.001	10.1	11	108	8.1	11	111	5.3
95Mo	0.006	0.29	0.303	104	5.1	0.328	113	7.5
107Ag	0.001	0.0252	0.031	123	5.0	0.027	107	12.2
111Cd	0.185	0.299	0.384	129	5.7	0.355	119	9.4
118Sn	0.022	0.061	0.078	127	17.2	0.065	107	4.6
121Sb	0.004	0.011	0.013	114	11.8	0.011	103	7.2
137Ba	0.001	8.6	9.2	107	1.7	9.7	113	3.9
202Hg	0.049	0.412	0.444	108	2.7	0.499	121	4.5
205Tl	0.001	-	-	-	-	-	-	-
208Pb	0.002	0.404	0.521	129	7.6	0.385	95	19.0
238U	0.001	0.05	0.056	112	7.0	0.050	100	12.7

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% was established for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Sample Group Information

Sample Group ID	Client ID	Lab ID	Date of Analysis
01	RG_FO23_INV-1_2020-07-16	001	03 Aug 2020
	RG_FO23_INV-2_2020-07-16	002	
	RG_FO23_INV-3_2020-07-16	003	
	RG_FO23_INV-4_2020-07-16	004	
	RG_FO23_INV-5_2020-07-16	005	
	RG_FO23_INV-6_2020-07-16	006	
	RG_FO23_INV-7_2020-07-16	007	
	RG_FO23_INV-8_2020-07-16	008	
02	RG_FO23_INV-9_2020-07-16	009	03 Aug 2020
	RG_FO23_INV-10_2020-07-16	010	
	RG_FRUL_INV-1_2020-07-16	011	
	RG_FRUL_INV-2_2020-07-16	012	
	RG_FRUL_INV-3_2020-07-16	013	
	RG_FRUL_INV-4_2020-07-16	014	
	RG_FRUL_INV-5_2020-07-16	015	
	RG_FRUL_INV-6_2020-07-16	016	
	RG_FRUL_INV-7_2020-07-16	017	
03	RG_FRUL_INV-8_2020-07-16	018	03 Aug 2020
	RG_FRUL_INV-9_2020-07-16	019	
	RG_FRUL_INV-10_2020-07-16	020	
	RG_LCUT_INV-1_2020-07-13	021	
	RG_LCUT_INV-2_2020-07-13	022	
	RG_LCUT_INV-3_2020-07-13	023	
	RG_LCUT_INV-4_2020-07-13	024	
	RG_LCUT_INV-5_2020-07-13	025	
04	RG_LCUT_INV-6_2020-07-13	026	03 Aug 2020
	RG_LCUT_INV-7_2020-07-13	027	
	RG_LCUT_INV-8_2020-07-13	028	
	RG_LCUT_INV-9_2020-07-13	029	
	RG_LCUT_INV-10_2020-07-13	030	
	RG_LI8_INV-1_2020-07-15	031	
	RG_LI8_INV-2_2020-07-15	032	
	RG_LI8_INV-3_2020-07-15	033	
05	RG_LI8_INV-4_2020-07-15	034	04 Aug 2020
	RG_LI8_INV-5_2020-07-15	035	
	RG_LI8_INV-6_2020-07-15	036	
	RG_LI8_INV-7_2020-07-15	037	
	RG_LI8_INV-8_2020-07-15	038	
	RG_LI8_INV-9_2020-07-15	039	
	RG_LI8_INV-10_2020-07-15	040	

Sample Group Information

Sample Group ID	Client ID	Lab ID	Date of Analysis
05	RG_LI24_INV-1_2020-07-14	041	04 Aug 2020
06	RG_LI24_INV-2_2020-07-14	042	04 Aug 2020
	RG_LI24_INV-3_2020-07-14	043	
	RG_LI24_INV-4_2020-07-14	044	
	RG_LI24_INV-5_2020-07-14	045	
	RG_LI24_INV-6_2020-07-14	046	
	RG_LI24_INV-7_2020-07-14	047	
	RG_LI24_INV-8_2020-07-14	048	
	RG_LI24_INV-9_2020-07-14	049	
	RG_LI24_INV-10_2020-07-14	050	
07	RG_LIDCOM_INV-1_2020-07-14	051	04 Aug 2020
	RG_LIDCOM_INV-2_2020-07-14	052	
	RG_LIDCOM_INV-3_2020-07-14	053	
	RG_LIDCOM_INV-4_2020-07-14	054	
	RG_LIDCOM_INV-5_2020-07-14	055	
	RG_LIDCOM_INV-6_2020-07-14	056	
	RG_LIDCOM_INV-7_2020-07-14	057	
	RG_LIDCOM_INV-8_2020-07-14	058	
08	RG_LIDCOM_INV-9_2020-07-14	059	04 Aug 2020
	RG_LIDCOM_INV-10_2020-07-14	060	
	RG_LIDSL_INV-1_2020-07-13	061	
	RG_LIDSL_INV-2_2020-07-13	062	
	RG_LIDSL_INV-3_2020-07-13	063	
	RG_LIDSL_INV-4_2020-07-13	064	
	RG_LIDSL_INV-5_2020-07-13	065	
	RG_LIDSL_INV-6_2020-07-13	066	
09	RG_LIDSL_INV-7_2020-07-13	067	04 Aug 2020
	RG_LIDSL_INV-8_2020-07-13	068	
	RG_LIDSL_INV-9_2020-07-13	069	
	RG_LIDSL_INV-10_2020-07-13	070	
	RG_LILC3_INV-1_2020-07-15	071	
	RG_LILC3_INV-2_2020-07-15	072	
	RG_LILC3_INV-3_2020-07-15	073	
	RG_LILC3_INV-4_2020-07-15	074	
10	RG_LILC3_INV-5_2020-07-15	075	05 Aug 2020
	RG_LILC3_INV-6_2020-07-15	076	
	RG_LILC3_INV-7_2020-07-15	077	
	RG_LILC3_INV-8_2020-07-15	078	
	RG_LILC3_INV-9_2020-07-15	079	
	RG_LILC3_INV-10_2020-07-15	080	

Sample Group Information

Sample Group ID	Client ID	Lab ID	Date of Analysis
10	RG_LISP24_INV-1_2020-07-15	081	05 Aug 2020
	RG_LISP24_INV-2_2020-07-15	082	
	RG_LISP24_INV-3_2020-07-15	083	
11	RG_LISP24_INV-4_2020-07-15	084	05 Aug 2020
	RG_LISP24_INV-5_2020-07-15	085	
	RG_LISP24_INV-6_2020-07-15	086	
	RG_LISP24_INV-7_2020-07-15	087	
	RG_LISP24_INV-8_2020-07-15	088	
	RG_LISP24_INV-9_2020-07-15	089	
	RG_LISP24_INV-10_2020-07-15	090	
	RG_SLINE_INV-1_2020-07-14	091	
	RG_SLINE_INV-2_2020-07-14	092	
12	RG_SLINE_INV-3_2020-07-14	093	05 Aug 2020
	RG_SLINE_INV-4_2020-07-14	094	
	RG_SLINE_INV-5_2020-07-14	095	
	RG_SLINE_INV-6_2020-07-14	096	
	RG_SLINE_INV-7_2020-07-14	097	
	RG_SLINE_INV-8_2020-07-14	098	
	RG_SLINE_INV-9_2020-07-14	099	
	RG_SLINE_INV-10_2020-07-14	100	

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Minnow Contact: Katharina Batchelar
Contact Email: kbatchelar@minnow.ca
Minnow Project #: 207202.0015
Date Results Required By: 07-Aug-20

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
001	1	RG_FO23_INV-1_2020-07-16 ✓	16-Jul-20	Invertebrate tissue	x	x				1	
002	2	RG_FO23_INV-2_2020-07-16 ✓	16-Jul-20	Invertebrate tissue	x	x				1	
003	3	RG_FO23_INV-3_2020-07-16 ✓	16-Jul-20	Invertebrate tissue	x	x				1	
004	4	RG_FO23_INV-4_2020-07-16 ✓	16-Jul-20	Invertebrate tissue	x	x				1	
005	5	RG_FO23_INV-5_2020-07-16 ✓	16-Jul-20	Invertebrate tissue	x	x				1	
006	6	RG_FO23_INV-6_2020-07-16 ✓	16-Jul-20	Invertebrate tissue	x	x				1	
007	7	RG_FO23_INV-7_2020-07-16 ✓	16-Jul-20	Invertebrate tissue	x	x				1	
008	8	RG_FO23_INV-8_2020-07-16 ✓	16-Jul-20	Invertebrate tissue	x	x				1	
009	9	RG_FO23_INV-9_2020-07-16 ✓	16-Jul-20	Invertebrate tissue	x	x				1	
010	10	RG_FO23_INV-10_2020-07-16 ✓	16-Jul-20	Invertebrate tissue	x	x				1	
011	11										
012	12										
013	13										
014	14										
EGO2 30JUL2020	15										

Samples Relinquished to Lab By: (Minnow Employee Signature) Date: Time: Shipment Method: Regular shipping in iced cooler (Project # 2020-130)

Samples Received in Lab By: (Lab Employee Signature) Date: 30JUL2020 Time: 10:58 Sample Condition upon Receipt: FROZEN W/ ICEPACKS.

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: Katharina Batchelar
Phone: 778-679-4350 Fax:

Minnow Contact: Katharina Batchelar
Contact Email: kbatchelar@minnow.ca
Minnow Project #: 207202.0015
Date Results Required By: 07-Aug-20

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
011	1	RG_FRUL_INV-1_2020-07-16 ✓	16-Jul-20	Invertebrate tissue	x	x				1	
012	2	RG_FRUL_INV-2_2020-07-16 ✓	16-Jul-20	Invertebrate tissue	x	x				1	
013	3	RG_FRUL_INV-3_2020-07-16 ✓	16-Jul-20	Invertebrate tissue	x	x				1	
014	4	RG_FRUL_INV-4_2020-07-16 ✓	16-Jul-20	Invertebrate tissue	x	x				1	
015	5	RG_FRUL_INV-5_2020-07-16 ✓	16-Jul-20	Invertebrate tissue	x	x				1	
016	6	RG_FRUL_INV-6_2020-07-16 ✓	16-Jul-20	Invertebrate tissue	x	x				1	
017	7	RG_FRUL_INV-7_2020-07-16 ✓	16-Jul-20	Invertebrate tissue	x	x				1	
018	8	RG_FRUL_INV-8_2020-07-16 ✓	16-Jul-20	Invertebrate tissue	x	x				1	
019	9	RG_FRUL_INV-9_2020-07-16 ✓	16-Jul-20	Invertebrate tissue	x	x				1	
020	10	RG_FRUL_INV-10_2020-07-16 ✓	16-Jul-20	Invertebrate tissue	x	x				1	
	11										
	12										
	13										
	14										
	15										

Samples Relinquished to Lab By: (Minnow Employee Signature) Date: Time: Shipment Method: Regular shipping in iced cooler (PROJECT # 2020-130)

Samples Received in Lab By: (Lab Employee Signature) [signature] Date: 30 Jul 2020 Time: 10:58 Sample Condition upon Receipt: FROZEN W/ ICE PACKS

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Minnow Project #: 207202.0015
Date Results Required By: 07-Aug-20

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
021	1	RG_LCUT_INV-1_2020-07-13 ✓	13-Jul-20	Invertebrate tissue	x	x				1	
022	2	RG_LCUT_INV-2_2020-07-13 ✓	13-Jul-20	Invertebrate tissue	x	x				1	
023	3	RG_LCUT_INV-3_2020-07-13 ✓	13-Jul-20	Invertebrate tissue	x	x				1	
024	4	RG_LCUT_INV-4_2020-07-13 ✓	13-Jul-20	Invertebrate tissue	x	x				1	
025	5	RG_LCUT_INV-5_2020-07-13 ✓	13-Jul-20	Invertebrate tissue	x	x				1	
026	6	RG_LCUT_INV-6_2020-07-13 ✓	13-Jul-20	Invertebrate tissue	x	x				1	
027	7	RG_LCUT_INV-7_2020-07-13 ✓	13-Jul-20	Invertebrate tissue	x	x				1	
028	8	RG_LCUT_INV-8_2020-07-13 ✓	13-Jul-20	Invertebrate tissue	x	x				1	
029	9	RG_LCUT_INV-9_2020-07-13 ✓	13-Jul-20	Invertebrate tissue	x	x				1	
030	10	RG_LCUT_INV-10_2020-07-13 ✓	13-Jul-20	Invertebrate tissue	x	x				1	
	11										
	12										
	13										
	14										
	15										

Samples Relinquished to Lab By: (Minnow Employee Signature) — Date: — Time: — Shipment Method: Regular shipping in iced cooler (PROJECT # 2020-130)

Samples Received in Lab By: (Lab Employee Signature) — Date: 30 JUL 2020 — Time: 10:58 — Sample Condition upon Receipt: FROZEN W/ ICE PACKS

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Minnow Contact: Katharina Batchelar
Contact Email: kbatchelar@minnow.ca
Minnow Project #: 207202.0015
Date Results Required By: 07-Aug-20

Trich ID #:	Sample Number	Minnow Sample ID	Date Sampled	Matrix	Analysis Required: Moisture (Freeze Drying)	Full Metals including Hg				Number of Containers	Comments
031	1	RG_LI8_INV-1_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x				1	
032	2	RG_LI8_INV-2_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x				1	
033	3	RG_LI8_INV-3_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x				1	
034	4	RG_LI8_INV-4_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x				1	
035	5	RG_LI8_INV-5_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x				1	
036	6	RG_LI8_INV-6_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x				1	
037	7	RG_LI8_INV-7_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x				1	
038	8	RG_LI8_INV-8_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x				1	
039	9	RG_LI8_INV-9_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x				1	
040	10	RG_LI8_INV-10_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x				1	
	11										
	12										
	13										
	14										
	15										

Samples Relinquished to Lab By: (Minnow Employee Signature) Date: Time: Shipment Method: Regular shipping in iced cooler (PROJECT # 2020-130)

Samples Received in Lab By: (Lab Employee Signature) Date: 30 JUL 2020 Time: 10:58 Sample Condition upon Receipt: FROZEN W/ ICE PACKS

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Telephone:(250) 595-1627
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CHAIN OF CUSTODY RECORD

Laboratory: Trich Analytics

Contact: Katharina Batchelar
Phone: 778-679-4350 Fax:

Minnow Contact: Katharina Batchelar
Contact Email: kbatchelar@minnow.ca
Minnow Project #: 207202.0015
Date Results Required By: 07-Aug-20

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
041	1	RG_LI24_INV-1_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x				1	
042	2	RG_LI24_INV-2_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x				1	
043	3	RG_LI24_INV-3_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x				1	
044	4	RG_LI24_INV-4_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x				1	
045	5	RG_LI24_INV-5_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x				1	
046	6	RG_LI24_INV-6_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x				1	
047	7	RG_LI24_INV-7_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x				1	
048	8	RG_LI24_INV-8_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x				1	
049	9	RG_LI24_INV-9_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x				1	
050	10	RG_LI24_INV-10_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x				1	
	11										
	12										
	13										
	14										
	15										

Samples Relinquished to Lab By: (Minnow Employee Signature) Date: Time: Shipment Method: Regular shipping in iced cooler (PROJECT # 2020-130)

Samples Received in Lab By: (Lab Employee Signature) [signature] Date: 30 JUL 2020 Time: 10:58 Sample Condition upon Receipt: FROZEN W/ ICE PACKS

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CHAIN OF CUSTODY RECORD

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Contact: Katharina Batchelar
Phone: 778-679-4350 Fax:

Minnow Contact: Katharina Batchelar
Contact Email: kbatchelar@minnow.ca
Minnow Project #: 207202.0015
Date Results Required By: 07-Aug-20

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
051	1	RG_LIDCOM_INV-1_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x	1	
052	2	RG_LIDCOM_INV-2_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x	1	
053	3	RG_LIDCOM_INV-3_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x	1	
054	4	RG_LIDCOM_INV-4_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x	1	
055	5	RG_LIDCOM_INV-5_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x	1	
056	6	RG_LIDCOM_INV-6_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x	1	
057	7	RG_LIDCOM_INV-7_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x	1	
058	8	RG_LIDCOM_INV-8_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x	1	
059	9	RG_LIDCOM_INV-9_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x	1	
060	10	RG_LIDCOM_INV-10_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x	1	
	11							
	12							
	13							
	14							
	15							

Samples Relinquished to Lab By: (Minnow Employee Signature) Date: Time: Shipment Method: Regular shipping in iced cooler (PROJECT #2020-130)

Samples Received in Lab By: (Lab Employee Signature) Date: 30 Jul 2020 Time: 10:58 Sample Condition upon Receipt: FROZEN W/ ICE PACKS.

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Minnow Project #: 207202.0015
Date Results Required By: 07-Aug-20

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
061	1	RG_LIDSL_INV-1_2020-07-13 ✓	13-Jul-20	Invertebrate tissue	x	x				1	
062	2	RG_LIDSL_INV-2_2020-07-13 ✓	13-Jul-20	Invertebrate tissue	x	x				1	
063	3	RG_LIDSL_INV-3_2020-07-13 ✓	13-Jul-20	Invertebrate tissue	x	x				1	
064	4	RG_LIDSL_INV-4_2020-07-13 ✓	13-Jul-20	Invertebrate tissue	x	x				1	
065	5	RG_LIDSL_INV-5_2020-07-13 ✓	13-Jul-20	Invertebrate tissue	x	x				1	
066	6	RG_LIDSL_INV-6_2020-07-13 ✓	13-Jul-20	Invertebrate tissue	x	x				1	
067	7	RG_LIDSL_INV-7_2020-07-13 ✓	13-Jul-20	Invertebrate tissue	x	x				1	
068	8	RG_LIDSL_INV-8_2020-07-13 ✓	13-Jul-20	Invertebrate tissue	x	x				1	
069	9	RG_LIDSL_INV-9_2020-07-13 ✓	13-Jul-20	Invertebrate tissue	x	x				1	
070	10	RG_LIDSL_INV-10_2020-07-13 ✓	13-Jul-20	Invertebrate tissue	x	x				1	
	11										
	12										
	13										
	14										
	15										

Samples Relinquished to Lab By: (Minnow Employee Signature) — Date: — Time: — Shipment Method: Regular shipping in iced cooler (PROJECT #: 2020-130)

Samples Received in Lab By: (Lab Employee Signature) — Date: 30 JUL 2020 — Time: 10:58 — Sample Condition upon Receipt: FROZEN W/ ICE PACKS

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

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CHAIN OF CUSTODY RECORD

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Contact: Katharina Batchelar
Phone: 778-679-4350 Fax:

Minnow Contact: Katharina Batchelar
Contact Email: kbatchelar@minnow.ca
Minnow Project #: 207202.0015
Date Results Required By: 07-Aug-20

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
071	1	RG_LILC3_INV-1_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x	1	
072	2	RG_LILC3_INV-2_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x	1	
073	3	RG_LILC3_INV-3_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x	1	
074	4	RG_LILC3_INV-4_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x	1	
075	5	RG_LILC3_INV-5_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x	1	
076	6	RG_LILC3_INV-6_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x	1	
077	7	RG_LILC3_INV-7_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x	1	
078	8	RG_LILC3_INV-8_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x	1	
079	9	RG_LILC3_INV-9_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x	1	
080	10	RG_LILC3_INV-10_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x	1	
	11							
	12							
	13							
	14							
	15							

Samples Relinquished to Lab By: (Minnow Employee Signature) — Date: — Time: — Shipment Method: Regular shipping in iced cooler (PROJECT # 2020-130)

Samples Received in Lab By: (Lab Employee Signature) — Date: 30 JUL 2020 — Time: 10:58 — Sample Condition upon Receipt: FROZEN W/ ICE PACKS

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Contact Email: kbatchelar@minnow.ca
Minnow Project #: 207202.0015
Date Results Required By: 07-Aug-20

Trich ID #:	Sample Number	Minnow Sample ID	Date Sampled	Matrix	Analysis Required: Moisture (Freeze Drying)	Full Metals including Hg				Number of Containers	Comments
081	1	RG_LISP24_INV-1_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x				1	
082	2	RG_LISP24_INV-2_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x				1	
083	3	RG_LISP24_INV-3_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x				1	
084	4	RG_LISP24_INV-4_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x				1	
085	5	RG_LISP24_INV-5_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x				1	
086	6	RG_LISP24_INV-6_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x				1	
087	7	RG_LISP24_INV-7_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x				1	
088	8	RG_LISP24_INV-8_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x				1	
089	9	RG_LISP24_INV-9_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x				1	
090	10	RG_LISP24_INV-10_2020-07-15 ✓	15-Jul-20	Invertebrate tissue	x	x				1	
	11										
	12										
	13										
	14										
	15										

Samples Relinquished to Lab By: (Minnow Employee Signature) Date: Time: Shipment Method: Regular shipping in iced cooler (PROJECT # 2020-130)

Samples Received in Lab By: (Lab Employee Signature) [signature] Date: 30 JUL 2020 Time: 10:58 Sample Condition upon Receipt: FROZEN W/ ICE PACKS

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Contact Email: kbatchelar@minnow.ca
Minnow Project #: 207202.0015
Date Results Required By: 07-Aug-20

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
091	1	RG_SLINE_INV-1_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x				1	
092	2	RG_SLINE_INV-2_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x				1	
093	3	RG_SLINE_INV-3_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x				1	
094	4	RG_SLINE_INV-4_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x				1	
095	5	RG_SLINE_INV-5_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x				1	
096	6	RG_SLINE_INV-6_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x				1	
097	7	RG_SLINE_INV-7_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x				1	
098	8	RG_SLINE_INV-8_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x				1	
099	9	RG_SLINE_INV-9_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x				1	
100	10	RG_SLINE_INV-10_2020-07-14 ✓	14-Jul-20	Invertebrate tissue	x	x				1	
	11										
	12										
	13										
	14										
	15										

Samples Relinquished to Lab By: (Minnow Employee Signature) Date: Time:

Shipment Method: Regular shipping in iced cooler (PROJECT # 2020-130)

Samples Received in Lab By: (Lab Employee Signature) Date: 30 JUL 2020 Time: 10:58

Sample Condition upon Receipt: FROZEN W/ ICE PACKS

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

BENTHIC TISSUE CHEMISTRY

TrichAnalytics Laboratory Report 2020-138

(Finalized September 17, 2020)

TrichAnalytics Inc.

Tissue Microchemistry Analysis Report

Client: Katharina Batchelar
Aquatic Scientist
Minnow Environmental
Phone: (250) 595-1627 ext. 22
Email: kbatchelar@minnow.ca

Date Received: 04 Sep 2020
Date of Analysis: 14 Sep 2020
15 Sep 2020
Final Report Date: 17 Sep 2020
Project No.: 2020-138
Method No.: MET-002.04

Client Project: Teck Coal Limited/Minnow Environmental Project 207202.0015

Analytical Request: Benthic 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 part per million (ppm) dry weight.
Samples quantified using DORM-4, NIST-1566b, and NIST-2976 certified reference standards.
CoC transcription error noted for sample IDs RG_LISP24_INV-1_2020-09-15 to RG_LISP24_INV-5_2020-09-15 and corrected for reporting.
Client specific DQO for Selenium accuracy is 90 - 110% of the certified value; (average achieved 99%; range 94 - 104%).
RPD values calculated according to the British Columbia Environmental Laboratory Manual (2020) criteria.

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 — 17 Sep 2020 Date

TrichAnalytics Inc.
207-1753 Sean Heights
Saanichton, BC V8M 0B3
www.trichanalytics.com

CALA Testing Accreditation No. A4196

		Client ID	RG_FO23_INV-1_2020-08-28	RG_FO23_INV-2_2020-08-28	RG_FO23_INV-3_2020-08-28	RG_FO23_INV-4_2020-08-28	RG_FO23_INV-5_2020-08-28
		Lab ID	001	002	003	004	005
		Wet Weight (g)	0.9328	0.8067	1.2002	0.9738	1.1984
		Dry Weight (g)	0.2166	0.1752	0.2540	0.1751	0.2703
		Moisture (%)	76.8	78.3	78.8	82.0	77.4
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.692	0.436	0.726	1.1	0.311
11B	0.089	0.297	0.959	0.893	0.591	0.669	0.392
23Na	3.9	13	4,907	3,638	3,947	8,981	2,284
24Mg	0.041	0.137	1,567	1,401	1,221	1,615	1,064
27Al	0.060	0.200	128	115	198	162	64
31P	67	223	10,384	9,907	8,643	10,468	6,578
39K	26	87	9,969	10,600	10,173	11,662	6,923
44Ca	58	193	2,078	2,137	1,903	2,568	1,336
49Ti	0.265	0.883	7.2	6.7	9.9	11	3.5
51V	0.014	0.047	0.335	0.238	0.302	0.427	0.198
52Cr	0.299	0.997	3.4	3.1	2.6	4.4	2.7
55Mn	0.014	0.047	20	37	27	44	14
57Fe	6.9	23	177	186	164	251	120
59Co	0.003	0.010	0.950	1.6	0.772	2.1	0.487
60Ni	0.007	0.023	8.7	13	8.6	19	5.7
63Cu	0.005	0.017	21	18	14	18	19
66Zn	0.793	2.6	295	293	342	283	172
75As	0.334	1.1	0.454	0.867	0.474	0.837	<0.334
77Se	0.382	1.3	6.9	10	6.8	8.3	5.5
88Sr	0.001	0.003	3.3	3.3	3.1	2.9	1.6
95Mo	0.009	0.030	0.184	0.392	0.147	0.319	0.159
107Ag	0.001	0.003	0.143	0.145	0.158	0.141	0.194
111Cd	0.059	0.197	1.3	2.5	1.2	3.8	0.764
118Sn	0.027	0.090	0.288	0.296	0.141	0.248	0.101
121Sb	0.006	0.020	0.018	0.048	0.029	0.037	0.018
137Ba	0.001	0.003	11	10	15	13	4.3
202Hg	0.025	0.083	0.058	0.071	0.061	0.064	0.045
205Tl	0.001	0.003	0.012	0.016	0.013	0.020	0.007
208Pb	0.001	0.003	0.076	0.111	0.084	0.091	0.026
238U	0.001	0.003	0.019	0.031	0.022	0.031	0.007

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

			Client ID	RG_FRUL_INV-1_2020-08-29	RG_FRUL_INV-2_2020-08-29	RG_FRUL_INV-3_2020-08-29	RG_FRUL_INV-4_2020-08-29	RG_FRUL_INV-5_2020-08-29
			Lab ID	006	007	008	009	010
			Wet Weight (g)	1.8877	1.4841	1.5011	2.7844	1.2716
			Dry Weight (g)	0.4618	0.3652	0.3666	0.6163	0.3135
			Moisture (%)	75.5	75.4	75.6	77.9	75.3
Parameter	DL (ppm)	LOQ (ppm)		(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017		1.0	1.0	0.482	1.3	0.952
11B	0.089	0.297		1.0	1.3	1.1	0.706	1.1
23Na	3.9	13		5,871	3,409	2,108	4,970	3,727
24Mg	0.041	0.137		1,804	1,776	1,132	1,996	1,602
27Al	0.060	0.200		127	598	143	92	172
31P	67	223		12,504	10,618	7,789	13,152	10,206
39K	26	87		13,165	9,906	7,377	10,842	9,526
44Ca	58	193		2,273	2,563	1,635	3,326	2,539
49Ti	0.265	0.883		8.2	39	7.3	7.1	11
51V	0.014	0.047		0.272	0.959	0.280	0.264	0.415
52Cr	0.299	0.997		2.5	3.7	3.3	2.9	2.5
55Mn	0.014	0.047		27	36	24	42	53
57Fe	6.9	23		144	341	151	180	235
59Co	0.003	0.010		0.820	1.5	0.892	2.0	2.3
60Ni	0.007	0.023		6.0	10	8.6	8.5	13
63Cu	0.005	0.017		30	25	17	23	18
66Zn	0.793	2.6		209	371	342	362	255
75As	0.334	1.1		0.625	0.771	0.519	0.882	1.4
77Se	0.382	1.3		10	13	7.9	11	12
88Sr	0.001	0.003		3.1	3.6	2.4	4.8	3.3
95Mo	0.009	0.030		0.312	0.312	0.196	0.331	0.319
107Ag	0.001	0.003		0.316	0.243	0.210	0.294	0.220
111Cd	0.059	0.197		1.1	1.9	1.2	2.8	2.4
118Sn	0.027	0.090		0.248	0.210	0.111	0.136	0.126
121Sb	0.006	0.020		0.022	0.033	0.022	0.024	0.048
137Ba	0.001	0.003		11	23	14	28	15
202Hg	0.025	0.083		0.061	0.097	0.103	0.090	0.077
205Tl	0.001	0.003		0.010	0.017	0.010	0.012	0.014
208Pb	0.001	0.003		0.056	0.140	0.057	0.070	0.117
238U	0.001	0.003		0.020	0.049	0.024	0.038	0.056

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

		Client ID	RG_LI24_INV-1_2020-08-31	RG_LI24_INV-2_2020-08-31	RG_LI24_INV-3_2020-08-31	RG_LI24_INV-4_2020-08-31	RG_LI24_INV-5_2020-09-01
		Lab ID	011	012	013	014	015
		Wet Weight (g)	0.6338	1.3127	1.3131	0.8511	0.9512
		Dry Weight (g)	0.1164	0.2281	0.2793	0.1689	0.1633
		Moisture (%)	81.6	82.6	78.7	80.2	82.8
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.378	0.354	0.145	0.314	0.216
11B	0.089	0.297	0.899	0.452	0.229	0.494	0.446
23Na	3.9	13	4,695	4,890	4,314	5,352	5,096
24Mg	0.041	0.137	1,517	1,573	1,592	1,631	1,828
27Al	0.060	0.200	369	264	25	223	105
31P	67	223	12,474	12,599	11,421	13,370	15,127
39K	26	87	12,734	11,605	10,193	14,247	14,833
44Ca	58	193	3,794	3,320	2,277	2,726	3,037
49Ti	0.265	0.883	20	13	2.0	16	7.2
51V	0.014	0.047	1.0	1.1	0.259	1.2	0.771
52Cr	0.299	0.997	3.9	4.2	2.2	4.9	2.9
55Mn	0.014	0.047	30	23	13	16	23
57Fe	6.9	23	312	296	89	306	206
59Co	0.003	0.010	0.917	0.798	0.213	0.652	0.752
60Ni	0.007	0.023	14	14	6.8	17	11
63Cu	0.005	0.017	14	15	16	13	15
66Zn	0.793	2.6	436	431	365	379	466
75As	0.334	1.1	2.6	2.4	0.837	2.4	2.8
77Se	0.382	1.3	6.6	6.5	5.4	6.9	7.8
88Sr	0.001	0.003	12	9.5	3.9	7.7	8.6
95Mo	0.009	0.030	0.380	0.502	0.282	0.478	0.509
107Ag	0.001	0.003	0.076	0.082	0.059	0.069	0.066
111Cd	0.059	0.197	2.2	2.0	1.1	1.9	2.2
118Sn	0.027	0.090	0.685	0.480	0.248	0.607	0.543
121Sb	0.006	0.020	0.037	0.040	0.018	0.059	0.022
137Ba	0.001	0.003	32	22	10	17	20
202Hg	0.025	0.083	0.077	0.097	0.058	0.071	0.071
205Tl	0.001	0.003	0.079	0.064	0.034	0.072	0.074
208Pb	0.001	0.003	0.295	0.161	0.056	0.143	0.154
238U	0.001	0.003	0.186	0.094	0.042	0.113	0.093

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

			Client ID	RG_SLINE_INV-1_2020-08-31	RG_SLINE_INV-2_2020-08-31	RG_SLINE_INV-3_2020-08-31	RG_SLINE_INV-4_2020-08-31	RG_SLINE_INV-5_2020-08-31
			Lab ID	016	017	018	019	020
			Wet Weight (g)	2.3808	1.4779	1.4638	1.9426	2.1848
			Dry Weight (g)	0.4600	0.3002	0.2656	0.3459	0.4931
			Moisture (%)	80.7	79.7	81.9	82.2	77.4
Parameter	DL (ppm)	LOQ (ppm)		(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017		0.462	0.388	0.379	0.318	0.304
11B	0.089	0.297		1.9	0.929	2.4	0.714	1.1
23Na	3.9	13		6,572	3,054	4,542	3,659	3,629
24Mg	0.041	0.137		2,252	1,447	2,050	2,077	1,723
27Al	0.060	0.200		247	429	240	295	90
31P	67	223		17,041	12,112	15,960	14,378	11,994
39K	26	87		17,419	8,999	14,189	9,927	11,530
44Ca	58	193		2,768	2,385	2,716	2,633	1,749
49Ti	0.265	0.883		15	25	16	18	4.8
51V	0.014	0.047		0.611	0.938	0.622	0.722	0.281
52Cr	0.299	0.997		3.3	3.7	3.4	3.3	2.8
55Mn	0.014	0.047		25	24	21	29	15
57Fe	6.9	23		268	318	219	287	98
59Co	0.003	0.010		0.414	0.392	0.318	0.398	0.188
60Ni	0.007	0.023		8.0	7.7	8.1	7.9	3.6
63Cu	0.005	0.017		23	16	17	18	12
66Zn	0.793	2.6		394	346	266	403	188
75As	0.334	1.1		1.5	0.746	0.862	0.829	0.614
77Se	0.382	1.3		9.5	5.7	6.4	6.4	4.6
88Sr	0.001	0.003		6.6	6.1	6.4	5.1	3.1
95Mo	0.009	0.030		0.478	0.374	0.306	0.325	0.168
107Ag	0.001	0.003		0.100	0.079	0.085	0.085	0.045
111Cd	0.059	0.197		1.9	2.1	1.1	1.6	0.662
118Sn	0.027	0.090		0.296	0.248	0.301	0.318	0.078
121Sb	0.006	0.020		0.040	0.029	0.018	0.017	0.010
137Ba	0.001	0.003		24	28	20	24	13
202Hg	0.025	0.083		0.084	0.077	0.077	0.087	0.053
205Tl	0.001	0.003		0.074	0.047	0.051	0.049	0.029
208Pb	0.001	0.003		0.131	0.188	0.185	0.124	0.056
238U	0.001	0.003		0.117	0.087	0.114	0.074	0.096

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

			Client ID	RG_LCUT_INV-1_2020-09-01	RG_LCUT_INV-2_2020-09-01	RG_LCUT_INV-3_2020-09-01	RG_LCUT_INV-4_2020-09-01	RG_LCUT_INV-5_2020-09-01
			Lab ID	021	022	023	024	025
			Wet Weight (g)	1.4296	1.2827	1.1235	0.9211	1.9419
			Dry Weight (g)	0.3386	0.2889	0.2750	0.1851	0.4274
			Moisture (%)	76.3	77.5	75.5	79.9	78.0
Parameter	DL (ppm)	LOQ (ppm)		(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017		0.601	0.509	0.455	0.625	0.557
11B	0.089	0.297		0.677	0.446	0.446	0.782	1.0
23Na	3.9	13		4,151	3,544	3,137	3,533	3,821
24Mg	0.041	0.137		1,304	1,056	822	1,489	1,745
27Al	0.060	0.200		320	108	135	272	310
31P	67	223		15,393	10,702	8,969	14,719	12,971
39K	26	87		12,112	10,572	9,407	13,587	10,222
44Ca	58	193		1,455	1,253	804	3,135	4,468
49Ti	0.265	0.883		16	6.4	6.9	13	20
51V	0.014	0.047		0.562	0.279	0.273	0.636	0.621
52Cr	0.299	0.997		2.3	2.7	2.2	3.0	3.4
55Mn	0.014	0.047		27	24	17	20	22
57Fe	6.9	23		184	130	115	188	317
59Co	0.003	0.010		0.471	0.814	0.544	1.3	2.9
60Ni	0.007	0.023		7.3	7.6	4.1	5.5	9.3
63Cu	0.005	0.017		19	21	16	22	26
66Zn	0.793	2.6		217	217	160	179	191
75As	0.334	1.1		0.663	0.663	0.473	0.512	0.585
77Se	0.382	1.3		7.0	8.3	6.6	8.0	6.3
88Sr	0.001	0.003		2.1	1.8	1.1	6.2	8.8
95Mo	0.009	0.030		0.348	0.361	0.279	0.394	0.487
107Ag	0.001	0.003		0.015	0.019	0.015	0.021	0.021
111Cd	0.059	0.197		2.0	3.3	2.1	2.8	4.3
118Sn	0.027	0.090		0.151	0.120	0.063	0.128	0.173
121Sb	0.006	0.020		0.023	0.022	0.022	0.023	0.026
137Ba	0.001	0.003		24	20	14	15	17
202Hg	0.025	0.083		0.126	0.118	0.097	0.093	0.083
205Tl	0.001	0.003		0.029	0.036	0.028	0.029	0.027
208Pb	0.001	0.003		0.165	0.130	0.121	0.206	0.223
238U	0.001	0.003		0.072	0.054	0.055	0.039	0.038

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

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g = grams

% = percent

			Client ID	RG_LILC3_INV-1_2020-08-27	RG_LILC3_INV-2_2020-08-27	RG_LILC3_INV-3_2020-08-27	RG_LILC3_INV-4_2020-08-27	RG_LILC3_INV-5_2020-08-27
			Lab ID	026	027	028	029	030
			Wet Weight (g)	5.8495	7.1026	8.0793	8.9293	8.0674
			Dry Weight (g)	1.0532	1.3067	1.6652	1.6940	1.6995
			Moisture (%)	82.0	81.6	79.4	81.0	78.9
Parameter	DL (ppm)	LOQ (ppm)		(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017		0.450	0.726	0.709	0.707	0.469
11B	0.089	0.297		0.788	0.874	1.5	1.1	0.335
23Na	3.9	13		3,563	6,007	4,488	4,683	3,345
24Mg	0.041	0.137		874	1,321	1,451	1,160	922
27Al	0.060	0.200		260	285	477	460	57
31P	67	223		7,501	13,407	14,130	10,972	8,889
39K	26	87		8,359	15,630	12,551	11,672	9,538
44Ca	58	193		1,062	1,798	2,471	1,910	1,011
49Ti	0.265	0.883		16	16	26	31	2.7
51V	0.014	0.047		0.692	1.2	1.4	1.4	0.272
52Cr	0.299	0.997		2.8	2.4	2.8	3.3	1.9
55Mn	0.014	0.047		77	119	145	140	39
57Fe	6.9	23		533	1,071	1,175	1,346	333
59Co	0.003	0.010		1.0	2.2	2.5	2.2	0.721
60Ni	0.007	0.023		9.2	20	19	22	7.4
63Cu	0.005	0.017		11	21	25	23	13
66Zn	0.793	2.6		127	219	230	202	154
75As	0.334	1.1		<0.334	0.770	0.804	0.705	0.480
77Se	0.382	1.3		6.9	12	13	12	9.3
88Sr	0.001	0.003		2.1	2.9	3.8	4.0	1.4
95Mo	0.009	0.030		0.278	0.499	0.638	0.837	0.501
107Ag	0.001	0.003		0.009	0.015	0.038	0.019	0.011
111Cd	0.059	0.197		1.1	2.7	3.6	1.7	0.968
118Sn	0.027	0.090		0.190	0.374	0.438	0.388	0.105
121Sb	0.006	0.020		0.035	0.053	0.059	0.070	0.026
137Ba	0.001	0.003		15	20	31	28	7.7
202Hg	0.025	0.083		0.047	0.106	0.166	0.101	0.115
205Tl	0.001	0.003		0.016	0.027	0.030	0.049	0.025
208Pb	0.001	0.003		0.094	0.142	0.195	0.273	0.044
238U	0.001	0.003		0.041	0.118	0.142	0.117	0.032

Notes:

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g = grams

% = percent

			Client ID	RG_LISP24_INV-1_2020-09-01	RG_LISP24_INV-2_2020-09-01	RG_LISP24_INV-3_2020-09-01	RG_LISP24_INV-4_2020-09-01	RG_LISP24_INV-5_2020-09-01
			Lab ID	031	032	033	034	035
			Wet Weight (g)	1.1845	2.4547	1.5849	1.9175	0.9957
			Dry Weight (g)	0.2384	0.5373	0.3658	0.4121	0.2018
			Moisture (%)	79.9	78.1	76.9	78.5	79.7
Parameter	DL (ppm)	LOQ (ppm)		(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017		0.752	0.509	0.465	0.428	0.533
11B	0.089	0.297		1.3	0.345	0.406	0.529	0.628
23Na	3.9	13		3,107	5,834	4,306	4,029	5,999
24Mg	0.041	0.137		1,456	1,373	1,219	1,419	1,594
27Al	0.060	0.200		680	79	62	102	221
31P	67	223		9,245	17,795	11,902	11,922	14,237
39K	26	87		8,627	14,266	10,108	9,962	14,114
44Ca	58	193		2,562	1,209	1,152	1,600	1,292
49Ti	0.265	0.883		58	4.2	4.0	6.3	14
51V	0.014	0.047		1.6	0.292	0.340	0.378	0.605
52Cr	0.299	0.997		7.8	2.0	3.2	2.7	3.7
55Mn	0.014	0.047		81	102	62	58	55
57Fe	6.9	23		1,137	363	378	400	407
59Co	0.003	0.010		3.6	1.0	0.974	2.1	1.1
60Ni	0.007	0.023		36	9.4	11	9.8	13
63Cu	0.005	0.017		17	15	16	15	12
66Zn	0.793	2.6		339	240	178	277	198
75As	0.334	1.1		0.846	0.526	0.595	0.721	0.551
77Se	0.382	1.3		6.7	8.1	12	10	9.1
88Sr	0.001	0.003		4.7	1.6	1.6	1.9	2.0
95Mo	0.009	0.030		0.427	0.418	0.452	0.441	0.267
107Ag	0.001	0.003		0.026	0.024	0.027	0.021	0.024
111Cd	0.059	0.197		4.2	2.1	1.6	3.1	1.4
118Sn	0.027	0.090		0.428	0.366	0.140	0.218	0.167
121Sb	0.006	0.020		0.048	0.018	0.023	0.023	0.017
137Ba	0.001	0.003		22	14	10	9.1	11
202Hg	0.025	0.083		0.072	0.096	0.083	0.077	0.073
205Tl	0.001	0.003		0.051	0.025	0.022	0.027	0.020
208Pb	0.001	0.003		0.385	0.063	0.053	0.061	0.071
238U	0.001	0.003		0.073	0.041	0.037	0.042	0.031

Notes:

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DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

			Client ID	RG_LIDSL_INV-1_2020-08-25	RG_LIDSL_INV-2_2020-08-25	RG_LIDSL_INV-3_2020-08-25	RG_LIDSL_INV-4_2020-08-25	RG_LIDSL_INV-5_2020-08-25
			Lab ID	036	037	038	039	040
			Wet Weight (g)	3.9326	3.7931	6.5759	4.3567	6.4578
			Dry Weight (g)	0.7791	0.8008	1.1854	0.8186	1.2342
			Moisture (%)	80.2	78.9	82.0	81.2	80.9
Parameter	DL (ppm)	LOQ (ppm)		(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017		0.273	0.593	0.717	0.744	0.566
11B	0.089	0.297		0.615	0.858	1.0	1.9	0.597
23Na	3.9	13		2,534	4,144	7,159	4,361	5,555
24Mg	0.041	0.137		1,359	1,646	2,289	2,009	1,420
27Al	0.060	0.200		116	275	126	743	133
31P	67	223		7,624	13,268	15,758	11,745	13,325
39K	26	87		6,428	12,002	17,956	12,012	14,126
44Ca	58	193		2,079	2,312	2,835	2,527	1592
49Ti	0.265	0.883		5.9	19	7.6	62	6.4
51V	0.014	0.047		0.328	0.745	0.417	1.5	0.357
52Cr	0.299	0.997		2.1	4.4	2.6	4.3	2.3
55Mn	0.014	0.047		53	78	101	86	77
57Fe	6.9	23		402	537	517	664	327
59Co	0.003	0.010		3.8	3.4	5.6	4.5	1.7
60Ni	0.007	0.023		13	21	34	33	18
63Cu	0.005	0.017		12	21	26	18	22
66Zn	0.793	2.6		455	448	506	341	379
75As	0.334	1.1		0.839	1.1	1.7	1.1	0.762
77Se	0.382	1.3		7.3	11	11	11	9.3
88Sr	0.001	0.003		2.5	3.5	3.9	4.7	2.4
95Mo	0.009	0.030		0.232	0.378	0.463	0.351	0.526
107Ag	0.001	0.003		0.012	0.045	0.039	0.045	0.042
111Cd	0.059	0.197		5.7	6.2	8.9	4.8	5.0
118Sn	0.027	0.090		0.142	0.182	0.140	0.329	0.114
121Sb	0.006	0.020		0.021	0.035	0.044	0.048	0.028
137Ba	0.001	0.003		13	21	15	31	18
202Hg	0.025	0.083		0.073	0.115	0.082	0.105	0.111
205Tl	0.001	0.003		0.029	0.055	0.049	0.035	0.029
208Pb	0.001	0.003		0.070	0.148	0.087	0.302	0.087
238U	0.001	0.003		0.048	0.088	0.075	0.114	0.085

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

			Client ID	RG_LIDCOM_INV-1_2020-08-30	RG_LIDCOM_INV-2_2020-08-30	RG_LIDCOM_INV-3_2020-08-30	RG_LIDCOM_INV-4_2020-08-30	RG_LIDCOM_INV-5_2020-08-30
			Lab ID	041	042	043	044	045
			Wet Weight (g)	4.1134	3.5154	6.1685	3.8027	3.5957
			Dry Weight (g)	0.9147	0.7558	1.4284	0.8343	0.7710
			Moisture (%)	77.8	78.5	76.8	78.1	78.6
Parameter	DL (ppm)	LOQ (ppm)		(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017		0.492	0.274	0.283	0.468	0.352
11B	0.089	0.297		0.624	0.353	0.366	0.665	0.285
23Na	3.9	13		3,421	3,232	3,017	3,510	3,469
24Mg	0.041	0.137		1,249	982	1,165	1,131	1,329
27Al	0.060	0.200		289	66	65	145	64
31P	67	223		10,435	9,898	9,901	11,793	10,647
39K	26	87		10,800	9,458	7,882	10,783	9,553
44Ca	58	193		1,562	1,333	696	1,474	1,444
49Ti	0.265	0.883		15	4.3	2.9	5.8	4.1
51V	0.014	0.047		0.615	0.154	0.125	0.253	0.164
52Cr	0.299	0.997		3.7	2.1	2.2	2.5	2.4
55Mn	0.014	0.047		48	35	38	52	40
57Fe	6.9	23		278	98	91	231	146
59Co	0.003	0.010		0.839	0.363	0.356	0.573	0.323
60Ni	0.007	0.023		15	5.3	5.6	13	7.4
63Cu	0.005	0.017		13	9.2	9.6	14	13
66Zn	0.793	2.6		271	199	185	254	287
75As	0.334	1.1		0.698	0.386	0.558	0.741	0.741
77Se	0.382	1.3		7.7	5.3	5.7	6.7	6.4
88Sr	0.001	0.003		2.7	1.7	1.1	3.1	2.0
95Mo	0.009	0.030		0.313	0.188	0.188	0.401	0.275
107Ag	0.001	0.003		0.026	0.013	0.013	0.039	0.027
111Cd	0.059	0.197		2.8	2.2	1.0	2.4	1.5
118Sn	0.027	0.090		0.132	0.052	0.054	0.098	0.096
121Sb	0.006	0.020		0.026	0.015	0.011	0.026	0.015
137Ba	0.001	0.003		14	11	11	26	12
202Hg	0.025	0.083		0.065	0.072	0.046	0.065	0.092
205Tl	0.001	0.003		0.020	0.013	0.012	0.021	0.016
208Pb	0.001	0.003		0.109	0.028	0.036	0.078	0.044
238U	0.001	0.003		0.045	0.027	0.022	0.079	0.042

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

			Client ID	RG_LI8_INV-1_2020-08-29	RG_LI8_INV-2_2020-08-29	RG_LI8_INV-3_2020-08-29	RG_LI8_INV-4_2020-08-29	RG_LI8_INV-5_2020-08-29
			Lab ID	046	047	048	049	050
			Wet Weight (g)	2.6983	4.5030	2.7833	7.5604	7.0413
			Dry Weight (g)	0.5372	0.9072	0.6018	1.6307	1.4310
			Moisture (%)	80.1	79.9	78.4	78.4	79.7
Parameter	DL (ppm)	LOQ (ppm)		(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017		0.449	0.571	0.590	0.564	0.794
11B	0.089	0.297		0.719	0.774	0.882	0.920	1.3
23Na	3.9	13		4,386	3,400	4,873	3,820	5,395
24Mg	0.041	0.137		1,499	1,099	2,134	1,683	1,547
27Al	0.060	0.200		280	152	368	296	393
31P	67	223		11,980	11,417	15,116	14,321	14,692
39K	26	87		12,263	9,577	14,027	10,038	14,297
44Ca	58	193		2,141	1,697	3,186	2,410	1,806
49Ti	0.265	0.883		17	8.9	24	19	29
51V	0.014	0.047		0.405	0.349	0.650	0.563	0.628
52Cr	0.299	0.997		3.1	2.4	2.8	2.5	2.0
55Mn	0.014	0.047		39	27	46	66	59
57Fe	6.9	23		229	152	287	283	257
59Co	0.003	0.010		1.1	0.462	1.2	0.892	1.3
60Ni	0.007	0.023		20	9.2	15	14	18
63Cu	0.005	0.017		14	8.7	21	16	14
66Zn	0.793	2.6		485	224	517	435	394
75As	0.334	1.1		0.859	0.529	0.821	0.719	0.794
77Se	0.382	1.3		9.4	9.7	11	8.9	13
88Sr	0.001	0.003		4.1	3.7	6.0	5.0	3.5
95Mo	0.009	0.030		0.363	0.263	0.476	0.443	0.526
107Ag	0.001	0.003		0.023	0.019	0.035	0.030	0.039
111Cd	0.059	0.197		4.7	2.3	7.7	4.0	4.5
118Sn	0.027	0.090		0.111	0.108	0.101	0.103	0.409
121Sb	0.006	0.020		0.022	0.018	0.029	0.033	0.037
137Ba	0.001	0.003		16	14	28	29	25
202Hg	0.025	0.083		0.092	0.057	0.114	0.075	0.059
205Tl	0.001	0.003		0.025	0.021	0.027	0.037	0.022
208Pb	0.001	0.003		0.095	0.080	0.144	0.167	0.172
238U	0.001	0.003		0.059	0.063	0.110	0.113	0.147

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Client ID		RG_FRUL_INV-4_2020-08-29			RG_LILC3_INV-1_2020-08-27			RG_LISP24_INV-5_2020-09-01		
Lab ID		009			026			035		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.005	1.3	1.7	26.7	0.450	0.572	23.9	0.533	0.484	9.6
11B	0.089	0.706	1.1	-	0.788	1.0	-	0.628	0.708	-
23Na	3.9	4,970	6,707	29.8	3,563	4,788	29.3	5,999	4,007	39.8
24Mg	0.041	1,996	2,397	18.3	874	1,150	27.3	1,594	1,348	16.7
27Al	0.060	92	94	2.2	260	370	34.9	221	292	27.7
31P	67	13,152	13,104	0.4	7,501	10,229	30.8	14,237	11,532	21.0
39K	26	10,842	12,965	17.8	8,359	13,231	**45.1**	14,114	9,810	36.0
44Ca	58	3,326	3,834	14.2	1,062	1,743	48.6	1,292	1,699	27.2
49Ti	0.265	7.1	5.2	30.9	16	16	0.0	14	18	25.0
51V	0.014	0.264	0.228	14.6	0.692	0.687	0.7	0.605	0.737	19.7
52Cr	0.299	2.9	3.1	-	2.8	2.8	-	3.7	4.1	10.3
55Mn	0.014	42	55	26.8	77	76	1.3	55	65	16.7
57Fe	6.9	180	253	33.7	533	475	11.5	407	428	5.0
59Co	0.003	2.0	1.8	10.5	1.0	1.2	18.2	1.1	1.3	16.7
60Ni	0.007	8.5	11	25.6	9.2	12	24.8	13	16	20.7
63Cu	0.005	23	25	8.3	11	13	16.7	12	15	22.2
66Zn	0.793	362	281	25.2	127	156	20.5	198	234	16.7
75As	0.334	0.882	0.988	-	<0.334	0.624	-	0.551	0.546	-
77Se	0.382	11	12	8.7	6.9	10	31.7	9.1	8.1	11.6
88Sr	0.001	4.8	5.7	17.1	2.1	2.4	13.3	2.0	2.7	29.8
95Mo	0.009	0.331	0.380	13.8	0.278	0.348	22.4	0.267	0.302	12.3
107Ag	0.001	0.294	0.286	2.8	0.009	0.015	-	0.024	0.027	11.8
111Cd	0.059	2.8	2.4	15.4	1.1	1.3	16.7	1.4	1.5	6.9
118Sn	0.027	0.136	0.202	-	0.190	0.318	-	0.167	0.156	-
121Sb	0.006	0.024	0.037	-	0.035	0.033	-	0.017	0.017	-
137Ba	0.001	28	28	0.0	15	22	37.8	11	15	30.8
202Hg	0.025	0.090	0.077	-	0.047	0.100	-	0.073	0.080	-
205Tl	0.001	0.012	0.013	8.0	0.016	0.021	27.0	0.020	0.023	14.0
208Pb	0.001	0.070	0.065	7.4	0.094	0.133	34.4	0.071	0.067	5.8
238U	0.001	0.038	0.056	38.3	0.041	0.041	0.0	0.031	0.037	17.6

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

Bold indicates DQO exceedance, but result is accepted as it does not impact the reportable results

Client ID	RG_LIDSL_INV-2_2020-08-25			RG_LIDCOM_INV-4_2020-08-30		
Lab ID	037			044		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.005	0.593	0.712	18.2	0.468	0.431	8.2
11B	0.089	0.858	1.1	-	0.665	0.509	-
23Na	3.9	4,144	4,518	8.6	3,510	3,749	6.6
24Mg	0.041	1,646	1,680	2.0	1,131	1,343	17.1
27Al	0.060	275	281	2.2	145	115	23.1
31P	67	13,268	13,115	1.2	11,793	10,970	7.2
39K	26	12,002	11,625	3.2	10,783	11,162	3.5
44Ca	58	2,312	2,567	10.5	1,474	1,747	17.0
49Ti	0.265	19	28	38.3	5.8	6.7	14.4
51V	0.014	0.745	1.0	29.2	0.253	0.260	2.7
52Cr	0.299	4.4	3.7	17.3	2.5	2.0	-
55Mn	0.014	78	99	23.7	52	59	12.6
57Fe	6.9	537	691	25.1	231	208	10.5
59Co	0.003	3.4	5.1	40.0	0.573	0.513	11.0
60Ni	0.007	21	24	13.3	13	12	8.0
63Cu	0.005	21	22	4.7	14	12	15.4
66Zn	0.793	448	458	2.2	254	255	0.4
75As	0.334	1.1	1.2	-	0.741	0.510	-
77Se	0.382	11	11	0.0	6.7	7.0	4.4
88Sr	0.001	3.5	4.5	25.0	3.1	2.3	29.6
95Mo	0.009	0.378	0.476	23.0	0.401	0.288	32.8
107Ag	0.001	0.045	0.038	16.9	0.039	0.029	29.4
111Cd	0.059	6.2	6.7	7.8	2.4	2.5	4.1
118Sn	0.027	0.182	0.245	-	0.098	0.083	-
121Sb	0.006	0.035	0.044	-	0.026	0.011	-
137Ba	0.001	21	29	32.0	26	21	21.3
202Hg	0.025	0.115	0.086	-	0.065	0.062	-
205Tl	0.001	0.055	0.060	8.7	0.021	0.016	27.0
208Pb	0.001	0.148	0.202	30.9	0.078	0.082	5.0
238U	0.001	0.088	0.122	32.4	0.079	0.058	30.7

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

	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	0.005	1.21	1.3	106	7.2	1.2	102	6.8
11B	0.089	4.5	5.0	112	1.8	5.3	117	3.1
23Na	3.9	14,000	15,424	110	3.3	15,075	108	4.2
24Mg	0.041	910	941	103	6.0	1,010	111	3.7
27Al	0.060	197.2	214	109	7.9	205	104	3.8
31P	67	8,000	7,801	98	5.4	8,402	105	4.3
39K	26	15,500	15,627	101	2.7	16,333	105	6.1
44Ca	58	2,360	2,424	103	1.7	2,567	109	5.6
49Ti	0.265	12.24	14	115	13.3	12	101	6.7
51V	0.014	1.57	1.6	102	7.9	1.7	107	7.3
52Cr	0.299	1.87	2.1	113	2.5	2.2	119	5.4
55Mn	0.014	3.17	3.3	103	6.2	3.7	116	3.9
57Fe	6.9	343	352	103	5.8	388	113	5.2
59Co	0.003	0.25	0.289	116	5.4	0.313	125	6.0
60Ni	0.007	1.34	1.5	115	7.2	1.6	121	4.1
63Cu	0.005	15.7	17	111	3.5	18	118	6.0
66Zn	0.793	51.6	56	109	6.4	59	114	7.3
75As	0.334	6.87	7.0	102	4.0	7.1	104	4.4
77Se	0.382	3.45	3.4	99	6.2	3.6	104	5.3
88Sr	0.001	10.1	11	110	6.5	11	111	4.1
95Mo	0.009	0.29	0.316	109	6.4	0.329	114	6.9
107Ag	0.001	0.0252	0.031	121	4.8	0.034	136	11.5
111Cd	0.059	0.299	0.376	126	6.2	0.345	115	12.4
118Sn	0.027	0.061	0.055	90	14.3	0.062	102	6.3
121Sb	0.006	0.011	0.011	100	**33.3**	0.011	102	16.1
137Ba	0.001	8.6	9.1	106	3.5	9.1	106	2.7
202Hg	0.025	0.412	0.467	113	5.3	0.472	115	6.6
205Tl	0.001	-	-	-	-	-	-	-
208Pb	0.001	0.404	0.454	112	13.3	0.435	108	13.0
238U	0.001	0.050	0.054	108	8.0	0.048	97	10.1

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% was established for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Bold indicates DQO exceedance but result is accepted as it does not impact the reportable 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	0.005	1.2	1.3	105	2.0	1.5	120	7.7
11B	0.089	4.5	5.1	113	1.5	4.8	107	1.7
23Na	3.9	14,000	14,078	101	2.7	15,494	111	4.9
24Mg	0.041	910	949	104	3.2	977	107	8.3
27Al	0.060	197	210	107	2.4	193	98	6.7
31P	67	8,000	7,565	95	2.1	7,754	97	5.1
39K	26	15,500	16,467	106	3.4	17,395	112	6.7
44Ca	58	2,360	2,420	103	5.7	2,602	110	9.5
49Ti	0.265	12	14	114	5.2	13	104	8.9
51V	0.014	1.6	1.6	99	7.9	1.5	93	5.4
52Cr	0.299	1.9	2.0	108	2.5	2.1	112	6.8
55Mn	0.014	3.2	3.3	105	7.8	3.4	108	7.0
57Fe	6.9	343	359	105	4.9	370	108	7.1
59Co	0.003	0.250	0.286	114	4.1	0.282	113	7.5
60Ni	0.007	1.3	1.5	115	5.6	1.6	117	7.1
63Cu	0.005	16	18	112	2.9	18	112	5.5
66Zn	0.793	52	54	105	3.6	57	110	2.9
75As	0.334	6.9	6.5	94	3.2	7.0	103	4.4
77Se	0.382	3.5	3.2	94	3.3	3.6	103	3.1
88Sr	0.001	10	11	109	3.4	11	104	9.6
95Mo	0.009	0.290	0.285	98	4.8	0.317	109	5.1
107Ag	0.001	0.025	0.032	128	10.0	0.030	120	12.0
111Cd	0.059	0.299	0.351	117	7.9	0.366	122	13.0
118Sn	0.027	0.061	0.059	96	13.5	0.063	103	13.0
121Sb	0.006	0.011	0.012	107	14.0	0.013	120	0.0
137Ba	0.001	8.6	9.8	114	3.6	9.2	107	3.7
202Hg	0.025	0.412	0.452	110	6.3	0.496	120	5.4
205Tl	0.001	-	-	-	-	-	-	-
208Pb	0.001	0.404	0.454	113	8.4	0.433	107	13.0
238U	0.001	0.050	0.050	99	3.8	0.051	101	6.7

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% was established for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Sample Group ID	Client ID	Lab ID	Date of Analysis
01	RG_FO23_INV-1_2020-08-28	001	14 Sep 2020
	RG_FO23_INV-2_2020-08-28	002	
	RG_FO23_INV-3_2020-08-28	003	
	RG_FO23_INV-4_2020-08-28	004	
	RG_FO23_INV-5_2020-08-28	005	
	RG_FRUL_INV-1_2020-08-29	006	
	RG_FRUL_INV-2_2020-08-29	007	
	RG_FRUL_INV-3_2020-08-29	008	
	RG_FRUL_INV-4_2020-08-29	009	
	RG_FRUL_INV-5_2020-08-29	010	
	RG_LI24_INV-1_2020-08-31	011	
	RG_LI24_INV-2_2020-08-31	012	
	RG_LI24_INV-3_2020-08-31	013	
	RG_LI24_INV-4_2020-08-31	014	
	RG_LI24_INV-5_2020-09-01	015	
	RG_SLINE_INV-1_2020-08-31	016	
	RG_SLINE_INV-2_2020-08-31	017	
	RG_SLINE_INV-3_2020-08-31	018	
02	RG_SLINE_INV-4_2020-08-31	019	14 Sep 2020
	RG_SLINE_INV-5_2020-08-31	020	
	RG_LCUT_INV-1_2020-09-01	021	
	RG_LCUT_INV-4_2020-09-01	024	
	RG_LCUT_INV-5_2020-09-01	025	
	RG_LILC3_INV-1_2020-08-27	026	
	RG_LILC3_INV-2_2020-08-27	027	
	RG_LILC3_INV-3_2020-08-27	028	
	RG_LISP24_INV-2_2020-09-01	032	
	RG_LISP24_INV-3_2020-09-01	033	
	RG_LISP24_INV-4_2020-09-01	034	
	RG_LISP24_INV-5_2020-09-01	035	
	RG_LIDSL_INV-1_2020-08-25	036	
03	RG_LIDSL_INV-3_2020-08-25	038	14 Sep 2020
	RG_LIDSL_INV-4_2020-08-25	039	
	RG_LIDSL_INV-5_2020-08-25	040	
	RG_LIDCOM_INV-1_2020-08-30	041	
	RG_LIDCOM_INV-2_2020-08-30	042	
	RG_LIDCOM_INV-3_2020-08-30	043	
	RG_LIDCOM_INV-4_2020-08-30	044	
	RG_LIDCOM_INV-5_2020-08-30	045	
	RG_LI8_INV-1_2020-08-29	046	

Sample Group ID	Client ID	Lab ID	Date of Analysis
03	RG_LI8_INV-3_2020-08-29	048	14 Sep 2020
	RG_LI8_INV-5_2020-08-29	050	
04	RG_LCUT_INV-2_2020-09-01	022	15 Sep 2020
	RG_LCUT_INV-3_2020-09-01	023	
	RG_LILC3_INV-4_2020-08-27	029	
	RG_LILC3_INV-5_2020-08-27	030	
	RG_LISP24_INV-1_2020-09-01	031	
	RG_LIDSL_INV-2_2020-08-25	037	
	RG_LI8_INV-2_2020-08-29	047	
	RG_LI8_INV-4_2020-08-29	049	

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: Katharina Batchelar
Contact Email: kbatchelar@minnow.ca
Minnow Project #: 207202.0015
Date Results Required By: 18-Sep-20 GSL

Contact: Katharina Batchelar
Phone: 778-679-4350 Fax:

Report mailing list: kbatchelar@minnow.ca; sweech@minnow.ca; Cait.Good@teck.com; Carlie.Meyer@teck.com; cwiramanaden@minnow.ca

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
001	1	RG_FO23_INV-1_2020-08-28 ✓	28-Aug-20	Invertebrate tissue	x	x	1	
002	2	RG_FO23_INV-2_2020-08-28 ✓	28-Aug-20	Invertebrate tissue	x	x	1	
003	3	RG_FO23_INV-3_2020-08-28 ✓	28-Aug-20	Invertebrate tissue	x	x	1	
004	4	RG_FO23_INV-4_2020-08-28 ✓	28-Aug-20	Invertebrate tissue	x	x	1	
005	5	RG_FO23_INV-5_2020-08-28 ✓	28-Aug-20	Invertebrate tissue	x	x	1	
006	6	RG_FRUL_INV-1_2020-08-29 ✓	29-Aug-20	Invertebrate tissue	x	x	1	
007	7	RG_FRUL_INV-2_2020-08-29 ✓	29-Aug-20	Invertebrate tissue	x	x	1	
008	8	RG_FRUL_INV-3_2020-08-29 ✓	29-Aug-20	Invertebrate tissue	x	x	1	
009	9	RG_FRUL_INV-4_2020-08-29 ✓	29-Aug-20	Invertebrate tissue	x	x	1	
010	10	RG_FRUL_INV-5_2020-08-29 ✓	29-Aug-20	Invertebrate tissue	x	x	1	
011	11	RG_LI24_INV-1_2020-08-31 ✓	31-Aug-20	Invertebrate tissue	x	x	1	
012	12	RG_LI24_INV-2_2020-08-31 ✓	31-Aug-20	Invertebrate tissue	x	x	1	
013	13	RG_LI24_INV-3_2020-08-31 ✓	31-Aug-20	Invertebrate tissue	x	x	1	
014	14	RG_LI24_INV-4_2020-08-31 ✓	31-Aug-20	Invertebrate tissue	x	x	1	
015	15	RG_LI24_INV-5_2020-09-01 ✓	1-Sep-20	Invertebrate tissue	x	x	1	

Samples Relinquished to Lab By: (Minnow Employee Signature) Date: Time: Shipment Method: Hand delivered (Project #: 2020-138)

Samples Received in Lab By: (Lab Employee Signature) Date: 04 SEP 2020 Time: 13:00 Sample Condition upon Receipt: Frozen w/ ice packs

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

MINNOW ENVIRONMENTAL INCORPORATED

204-1006 Fort Street
Victoria, British Columbia V8V 3K4
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Facsmile:(250) 595-1625

CHAIN OF CUSTODY RECORD

Laboratory: Trich Analytics

Minnow Contact: Katharina Batchelar
Contact Email: kbatchelar@minnow.ca
Minnow Project #: 207202.0015
Date Results Required By: 18-Sep-20

Contact: Katharina Batchelar
Phone: 778-679-4350 Fax:

Report mailing list: kbatchelar@minnow.ca; sweech@minnow.ca; Cait.Good@teck.com; Carlie.Meyer@teck.com; cwiramanaden@minnow.ca

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
016	1	RG_SLINE_INV-1_2020-08-31	31-Aug-20	Invertebrate tissue	x	x	1	
017	2	RG_SLINE_INV-2_2020-08-31	31-Aug-20	Invertebrate tissue	x	x	1	
018	3	RG_SLINE_INV-3_2020-08-31	31-Aug-20	Invertebrate tissue	x	x	1	
019	4	RG_SLINE_INV-4_2020-08-31	31-Aug-20	Invertebrate tissue	x	x	1	
020	5	RG_SLINE_INV-5_2020-08-31	31-Aug-20	Invertebrate tissue	x	x	1	
021	6	RG_LCUT_INV-1_2020-09-01	1-Sep-20	Invertebrate tissue	x	x	1	
022	7	RG_LCUT_INV-2_2020-09-01	1-Sep-20	Invertebrate tissue	x	x	1	
023	8	RG_LCUT_INV-3_2020-09-01	1-Sep-20	Invertebrate tissue	x	x	1	
024	9	RG_LCUT_INV-4_2020-09-01	1-Sep-20	Invertebrate tissue	x	x	1	
025	10	RG_LCUT_INV-5_2020-09-01	1-Sep-20	Invertebrate tissue	x	x	1	
026	11	RG_LILC3_INV-1_2020-08-27	27-Aug-20	Invertebrate tissue	x	x	1	
027	12	RG_LILC3_INV-2_2020-08-27	27-Aug-20	Invertebrate tissue	x	x	1	
028	13	RG_LILC3_INV-3_2020-08-27	27-Aug-20	Invertebrate tissue	x	x	1	
029	14	RG_LILC3_INV-4_2020-08-27	27-Aug-20	Invertebrate tissue	x	x	1	
030	15	RG_LILC3_INV-5_2020-08-27	27-Aug-20	Invertebrate tissue	x	x	1	

Samples Relinquished to Lab By: (Minnow Employee Signature) Date: Time: Shipment Method: Regular shipping in iced cooler (Project #: 2020-138)

Samples Received in Lab By: (Lab Employee Signature) Date: 04 SEP 2020 Time: 13:00 Sample Condition upon Receipt: Frozen w/ Ice Packs

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: Katharina Batchelar
Contact Email: kbatchelar@minnow.ca
Minnow Project #: 207202.0015
Date Results Required By: 18-Sep-20

Contact: Katharina Batchelar
Phone: 778-679-4350 Fax:

Report mailing list: kbatchelar@minnow.ca; sweech@minnow.ca; Cait.Good@teck.com; Carlie.Meyer@teck.com; cwiramanaden@minnow.ca

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
031	1 ▲	RG_LISP24_INV-1_2020-09-15 ✓	1-Sep-20	Invertebrate tissue	x	x	1	
032	2 ▲	RG_LISP24_INV-2_2020-09-15 ✓	1-Sep-20	Invertebrate tissue	x	x	1	
033	3 ▲	RG_LISP24_INV-3_2020-09-15 ✓	1-Sep-20	Invertebrate tissue	x	x	1	
034	4 ▲	RG_LISP24_INV-4_2020-09-15 ✓	1-Sep-20	Invertebrate tissue	x	x	1	
035	5 ▲	RG_LISP24_INV-5_2020-09-15 ✓	1-Sep-20	Invertebrate tissue	x	x	1	
036	6	RG_LIDSL_INV-1_2020-08-25 ✓	25-Aug-20	Invertebrate tissue	x	x	1	
037	7	RG_LIDSL_INV-2_2020-08-25 ✓	25-Aug-20	Invertebrate tissue	x	x	1	
038	8	RG_LIDSL_INV-3_2020-08-25 ✓	25-Aug-20	Invertebrate tissue	x	x	1	
039	9	RG_LIDSL_INV-4_2020-08-25 ✓	25-Aug-20	Invertebrate tissue	x	x	1	
040	10	RG_LIDSL_INV-5_2020-08-25 ✓	25-Aug-20	Invertebrate tissue	x	x	1	
041	11	RG_LIDCOM_INV-1_2020-08-30 ✓	30-Aug-20	Invertebrate tissue	x	x	1	
042	12	RG_LIDCOM_INV-2_2020-08-30 ✓	30-Aug-20	Invertebrate tissue	x	x	1	
043	13	RG_LIDCOM_INV-3_2020-08-30 ✓	30-Aug-20	Invertebrate tissue	x	x	1	
044	14	RG_LIDCOM_INV-4_2020-08-30 ✓	30-Aug-20	Invertebrate tissue	x	x	1	
045	15	RG_LIDCOM_INV-5_2020-08-30 ✓	30-Aug-20	Invertebrate tissue	x	x	1	

Samples Relinquished to Lab By: (Minnow Employee Signature) — Date: — Time: — Shipment Method: Regular shipping in iced cooler (Project #: 2020-138)

Samples Received in Lab By: (Lab Employee Signature) — Date: 04 SEP 2020 — Time: 13:00 — Sample Condition upon Receipt: Frozen w/ ice Packs

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

* NOTE: For Trich IDs #031 to #035, the original sample containers show Minnow Sample ID with the date "1-Sept-2020" not "2020-09-15".

▲ NOTE: CLIENT CONFIRMED VIA EMAIL ON 14SEP2020 THAT THE SAMPLE IDs ARE A TRANSCRIPTION ERROR, AND THE SAMPLE ID'S SHOULD CONTAIN "01" INSTEAD OF "15"! GQ 15Sep2020 REGNL 15Sep2020.

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CHAIN OF CUSTODY RECORD

Laboratory: Trich Analytics

Minnow Contact: Katharina Batchelar
Contact Email: kbatchelar@minnow.ca
Minnow Project #: 207202.0015
Date Results Required By: 18-Sep-20

Contact: Katharina Batchelar
Phone: 778-679-4350 Fax:

Report mailing list: kbatchelar@minnow.ca; sweech@minnow.ca; Cait.Good@teck.com; Carlie.Meyer@teck.com; cwiramanaden@minnow.ca

Trich ID:	Sample Number	Minnow Sample ID	Date Sampled	Matrix	Moisture (Freeze Drying)	Full Metals including Hg	Analysis Required			Number of Containers	Comments
~~036~~ 046	1	RG_LI8_INV-1_2020-08-29 ✓	29-Aug-20	Invertebrate tissue	x	x				1	
047	2	RG_LI8_INV-2_2020-08-29 ✓	29-Aug-20	Invertebrate tissue	x	x				1	
048	3	RG_LI8_INV-3_2020-08-29 ✓	29-Aug-20	Invertebrate tissue	x	x				1	
049	4	RG_LI8_INV-4_2020-08-29 ✓	29-Aug-20	Invertebrate tissue	x	x				1	
050	5	RG_LI8_INV-5_2020-08-29 ✓	29-Aug-20	Invertebrate tissue	x	x				1	
	6										
	7										
	8										
	9										
	10										
	11										
	12										
	13										
	14										
	15										

Samples Relinquished to Lab By: (Minnow Employee Signature) Date: Time: Shipment Method: Regular shipping in iced cooler

Samples Received in Lab By: (Lab Employee Signature) Date: 04Sep2020 Time: 13:00 Sample Condition upon Receipt: Frozen w/ ice packs

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

BENTHIC TISSUE CHEMISTRY

TrichAnalytics Laboratory Report 2020-178

(Finalized December 16, 2020)

TrichAnalytics Inc.

Tissue Microchemistry Analysis Report

Client: Katharina Batchelar
Aquatic Scientist
Minnow Environmental
Phone: (250) 595-1627 ext. 22
Email: kbatchelar@minnow.ca

Date Received: 10 Dec 2020
Date of Analysis: 15 Dec 2020
16 Dec 2020
Final Report Date: 16 Dec 2020
Project No.: 2020-178
Method No.: MET-002.04

Client Project: Teck Coal Limited/Minnow Environmental Project LCO LAEMP 207202.0015

Analytical Request: Benthic 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 part per million (ppm) dry weight.
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; (average achieved 107%; range 101 - 110%).
RPD values calculated according to the British Columbia Environmental Laboratory Manual (2020) criteria.

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 — 16 Dec 2020 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_2020-12-02	RG_FO23_INV-2_2020-12-02	RG_FO23_INV-3_2020-12-02	RG_FO23_INV-4_2020-12-02	RG_FO23_INV-5_2020-12-02
		Lab ID	073	074	075	076	077
		Wet Weight (g)	0.7927	0.5711	1.3612	1.0338	1.4586
		Dry Weight (g)	0.1176	0.1129	0.2108	0.1387	0.2361
		Moisture (%)	85.2	80.2	84.5	86.6	83.8
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.007	0.023	1.0	0.829	0.962	0.954	0.506
11B	0.112	0.373	0.952	1.3	1.5	1.9	1.8
23Na	0.651	2.2	4,246	4,660	3,721	3,482	2,308
24Mg	0.017	0.057	2,061	1,934	1,797	1,750	1,439
27Al	0.039	0.130	214	349	330	453	409
31P	59	197	8,474	11,254	10,660	9,341	8,501
39K	6.8	23	5,962	9,750	9,853	7,640	6,373
44Ca	13	43	2,845	2,923	3,273	3,612	2,768
49Ti	0.192	0.640	19	25	25	34	28
51V	0.037	0.123	0.409	0.937	0.632	0.864	0.783
52Cr	0.505	1.7	3.2	5.9	3.6	3.7	4.1
55Mn	0.006	0.020	23	29	27	25	21
57Fe	1.8	6.0	169	369	223	329	281
59Co	0.003	0.010	0.832	1.4	0.794	1.0	0.752
60Ni	0.019	0.063	4.6	13	7.6	8.6	8.9
63Cu	0.016	0.053	18	22	17	20	20
66Zn	0.358	1.2	294	594	446	537	510
75As	0.487	1.6	<0.487	<0.487	0.511	0.552	<0.487
77Se	0.373	1.2	6.8	8.1	6.5	6.7	8.0
88Sr	0.001	0.003	3.8	4.3	5.5	6.2	4.2
95Mo	0.001	0.003	0.266	0.455	0.298	0.392	0.251
107Ag	0.001	0.003	0.102	0.107	0.125	0.165	0.145
111Cd	0.061	0.203	1.7	3.1	2.3	3.2	2.0
118Sn	0.047	0.157	0.529	0.727	0.657	0.657	0.421
121Sb	0.006	0.020	0.022	0.033	0.028	0.022	0.022
137Ba	0.001	0.003	14	20	20	23	18
202Hg	0.033	0.110	0.082	0.102	0.077	0.107	0.068
205Tl	0.001	0.003	0.019	0.021	0.018	0.023	0.018
208Pb	0.005	0.017	0.085	0.131	0.069	0.110	0.102
238U	0.001	0.003	0.041	0.137	0.049	0.059	0.059

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_2020-11-30	RG_FRUL_INV-2_2020-11-30	RG_FRUL_INV-3_2020-11-30	RG_FRUL_INV-4_2020-11-30	RG_FRUL_INV-5_2020-11-30
		Lab ID	078	079	080	081	082
		Wet Weight (g)	1.9956	1.0628	1.1772	1.9572	1.3271
		Dry Weight (g)	0.3329	0.1830	0.1814	0.3385	0.1970
		Moisture (%)	83.3	82.8	84.6	82.7	85.2
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.007	0.023	0.493	0.927	0.676	0.845	0.632
11B	0.112	0.373	0.643	0.984	0.889	2.2	0.718
23Na	0.651	2.2	2,699	3,131	2,789	4,371	3,303
24Mg	0.017	0.057	1,334	1,479	1,303	2,501	1,813
27Al	0.039	0.130	158	381	324	576	201
31P	59	197	8,188	9,146	8,090	14,668	11,249
39K	6.8	23	6,848	6,739	5,981	11,782	8,558
44Ca	13	43	1,915	4,271	2,568	7,367	3,845
49Ti	0.192	0.640	19	30	22	49	15
51V	0.037	0.123	0.388	0.893	0.736	1.6	0.473
52Cr	0.505	1.7	3.3	4.0	3.6	5.1	3.5
55Mn	0.006	0.020	17	22	26	37	26
57Fe	1.8	6.0	178	346	314	463	202
59Co	0.003	0.010	0.312	0.379	0.465	0.765	0.454
60Ni	0.019	0.063	4.9	7.5	7.2	12	5.0
63Cu	0.016	0.053	15	22	19	31	22
66Zn	0.358	1.2	230	457	366	432	380
75As	0.487	1.6	<0.487	<0.487	<0.487	0.698	<0.487
77Se	0.373	1.2	7.7	8.2	7.8	13	11
88Sr	0.001	0.003	2.6	6.1	3.8	10	6.1
95Mo	0.001	0.003	0.125	0.266	0.235	0.361	0.213
107Ag	0.001	0.003	0.138	0.289	0.209	0.394	0.451
111Cd	0.061	0.203	0.626	1.0	1.3	2.0	1.2
118Sn	0.047	0.157	0.159	0.497	0.312	0.460	0.201
121Sb	0.006	0.020	0.017	0.028	0.022	0.042	0.014
137Ba	0.001	0.003	12	30	24	52	28
202Hg	0.033	0.110	0.068	0.116	0.116	0.093	0.083
205Tl	0.001	0.003	0.009	0.015	0.015	0.024	0.012
208Pb	0.005	0.017	0.046	0.133	0.118	0.180	0.076
238U	0.001	0.003	0.022	0.047	0.047	0.138	0.048

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_2020-12-01	RG_LCUT_INV-2_2020-12-01	RG_LCUT_INV-3_2020-12-01	RG_LCUT_INV-4_2020-12-01	RG_LCUT_INV-5_2020-12-01
		Lab ID	083	084	085	086	087
		Wet Weight (g)	1.7001	2.0491	1.2641	1.8596	1.7933
		Dry Weight (g)	0.3387	0.3939	0.2223	0.3738	0.3205
		Moisture (%)	80.1	80.8	82.4	79.9	82.1
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.007	0.023	0.916	1.1	1.2	0.939	1.1
11B	0.112	0.373	2.0	3.0	2.0	1.7	2.2
23Na	0.651	2.2	2,701	3,048	3,332	3,060	2,467
24Mg	0.017	0.057	1,576	1,429	2,224	1,311	1,380
27Al	0.039	0.130	696	1,521	868	799	1,051
31P	59	197	10,575	9,778	11,523	9,942	10,613
39K	6.8	23	9,286	8,259	7,923	9,061	8,471
44Ca	13	43	3,613	3,272	4,349	3,036	3,316
49Ti	0.192	0.640	54	117	68	59	81
51V	0.037	0.123	1.5	3.5	1.9	1.6	2.2
52Cr	0.505	1.7	4.7	7.3	4.9	4.0	5.1
55Mn	0.006	0.020	24	41	14	12	15
57Fe	1.8	6.0	340	774	381	343	482
59Co	0.003	0.010	0.811	1.3	0.767	0.798	0.626
60Ni	0.019	0.063	15	23	14	15	14
63Cu	0.016	0.053	35	22	29	34	26
66Zn	0.358	1.2	290	219	217	221	223
75As	0.487	1.6	2.4	1.3	1.2	1.5	1.0
77Se	0.373	1.2	5.4	5.9	5.1	5.8	6.9
88Sr	0.001	0.003	5.8	6.9	7.7	5.4	6.4
95Mo	0.001	0.003	0.427	0.410	0.394	0.394	0.460
107Ag	0.001	0.003	0.027	0.022	0.032	0.038	0.027
111Cd	0.061	0.203	3.2	2.9	3.2	3.0	2.5
118Sn	0.047	0.157	0.216	0.344	0.437	0.246	0.580
121Sb	0.006	0.020	0.038	0.061	0.047	0.042	0.052
137Ba	0.001	0.003	28	42	24	19	30
202Hg	0.033	0.110	0.111	0.074	0.074	0.065	0.093
205Tl	0.001	0.003	0.052	0.061	0.046	0.050	0.056
208Pb	0.005	0.017	0.259	0.489	0.299	0.266	0.313
238U	0.001	0.003	0.101	0.121	0.112	0.095	0.126

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-1_2020-12-02	RG_LI8_INV-2_2020-12-02	RG_LI8_INV-3_2020-12-02	RG_LI8_INV-4_2020-12-02	RG_LI8_INV-5_2020-12-02
		Lab ID	088	089	090	091	092
		Wet Weight (g)	2.0070	1.5105	1.3812	1.4931	1.7532
		Dry Weight (g)	0.4011	0.2873	0.2701	0.3661	0.2787
		Moisture (%)	80.0	81.0	80.4	75.5	84.1
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.007	0.023	0.812	0.447	0.577	0.386	0.522
11B	0.112	0.373	1.8	1.2	1.5	0.740	1.0
23Na	0.651	2.2	2,420	3,225	2,994	2,598	3,020
24Mg	0.017	0.057	1,500	1,552	1,281	1,522	1,501
27Al	0.039	0.130	630	324	579	254	354
31P	59	197	10,658	11,089	10,286	10,676	10,586
39K	6.8	23	8,961	8,619	8,186	7,271	7,193
44Ca	13	43	3,985	2,152	2,477	1,788	2,097
49Ti	0.192	0.640	54	20	46	15	30
51V	0.037	0.123	1.4	0.635	1.3	0.479	0.798
52Cr	0.505	1.7	4.0	2.6	3.3	2.3	3.0
55Mn	0.006	0.020	44	52	48	38	41
57Fe	1.8	6.0	313	196	317	154	224
59Co	0.003	0.010	0.879	0.673	0.744	0.406	0.548
60Ni	0.019	0.063	21	13	15	8.3	11
63Cu	0.016	0.053	16	16	13	14	16
66Zn	0.358	1.2	308	503	270	280	297
75As	0.487	1.6	0.682	0.747	0.553	0.530	<0.487
77Se	0.373	1.2	8.3	8.2	6.4	7.5	7.0
88Sr	0.001	0.003	10	4.3	6.6	3.6	4.9
95Mo	0.001	0.003	0.345	0.400	0.322	0.261	0.296
107Ag	0.001	0.003	0.030	0.032	0.027	0.022	0.027
111Cd	0.061	0.203	4.2	5.9	4.4	3.2	3.5
118Sn	0.047	0.157	0.240	0.229	0.211	0.100	0.132
121Sb	0.006	0.020	0.038	0.030	0.042	0.024	0.030
137Ba	0.001	0.003	37	18	30	20	24
202Hg	0.033	0.110	0.046	0.055	0.055	0.044	0.066
205Tl	0.001	0.003	0.032	0.032	0.026	0.028	0.019
208Pb	0.005	0.017	0.198	0.113	0.178	0.089	0.133
238U	0.001	0.003	0.246	0.080	0.135	0.052	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_LI24_INV-1_2020-11-30	RG_LI24_INV-2_2020-11-30	RG_LI24_INV-3_2020-11-30	RG_LI24_INV-4_2020-11-30	RG_LI24_INV-5_2020-11-30
		Lab ID	093	094	095	096	097
		Wet Weight (g)	1.4202	1.2576	1.4061	1.1480	1.4677
		Dry Weight (g)	0.2524	0.1493	0.2488	0.1931	0.2182
		Moisture (%)	82.2	88.1	82.3	83.2	85.1
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.007	0.023	0.164	0.727	0.325	0.254	0.296
11B	0.112	0.373	0.685	1.2	0.777	0.814	0.586
23Na	0.651	2.2	2,576	6,787	3,323	2,874	5,211
24Mg	0.017	0.057	1,289	1,567	1,451	1,451	1,315
27Al	0.039	0.130	124	355	207	216	164
31P	59	197	8,828	9,947	10,665	9,935	10,159
39K	6.8	23	7,262	7,548	9,144	8,634	8,195
44Ca	13	43	2,545	3,074	2,865	3,123	2,340
49Ti	0.192	0.640	6.1	24	11	14	9.5
51V	0.037	0.123	1.5	2.1	2.0	1.9	1.3
52Cr	0.505	1.7	2.2	4.0	3.4	3.3	2.4
55Mn	0.006	0.020	13	18	17	13	16
57Fe	1.8	6.0	134	252	183	159	138
59Co	0.003	0.010	0.417	0.577	0.527	0.449	0.489
60Ni	0.019	0.063	6.0	10	9.0	9.4	5.6
63Cu	0.016	0.053	11	15	14	12	11
66Zn	0.358	1.2	370	474	512	380	409
75As	0.487	1.6	1.2	1.3	1.3	1.4	1.2
77Se	0.373	1.2	5.2	7.0	6.4	5.1	5.9
88Sr	0.001	0.003	8.1	8.3	8.1	9.8	6.3
95Mo	0.001	0.003	0.296	0.452	0.383	0.348	0.250
107Ag	0.001	0.003	0.065	0.108	0.076	0.059	0.053
111Cd	0.061	0.203	1.8	2.2	2.1	1.5	1.6
118Sn	0.047	0.157	0.415	0.874	0.268	0.236	0.387
121Sb	0.006	0.020	0.015	0.030	0.024	0.024	0.022
137Ba	0.001	0.003	11	18	18	19	15
202Hg	0.033	0.110	0.060	0.087	0.055	0.044	0.066
205Tl	0.001	0.003	0.060	0.056	0.071	0.042	0.043
208Pb	0.005	0.017	0.069	0.170	0.133	0.109	0.146
238U	0.001	0.003	0.091	0.119	0.166	0.118	0.110

Notes:

ppm = parts per million

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g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_LIDCOM_INV-1_2020-12-01	RG_LIDCOM_INV-2_2020-12-01	RG_LIDCOM_INV-3_2020-12-01	RG_LIDCOM_INV-4_2020-12-01	RG_LIDCOM_INV-5_2020-12-01
		Lab ID	098	099	100	101	102
		Wet Weight (g)	3.1442	1.6239	2.5060	1.9052	2.4102
		Dry Weight (g)	0.5895	0.3207	0.4166	0.3562	0.4756
		Moisture (%)	81.3	80.3	83.4	81.3	80.3
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.007	0.023	0.413	0.416	0.552	0.363	0.404
11B	0.112	0.373	1.0	0.943	1.8	0.957	1.2
23Na	0.651	2.2	2,829	1,829	2,706	2,331	2,449
24Mg	0.017	0.057	1,381	1,098	1,407	988	1,351
27Al	0.039	0.130	244	470	566	293	333
31P	59	197	10,154	7,601	8,599	7,659	9,973
39K	6.8	23	7,726	5,362	7,200	6,337	7,745
44Ca	13	43	2,678	2,739	4,156	2,176	3,731
49Ti	0.192	0.640	17	39	52	21	27
51V	0.037	0.123	0.481	0.818	1.2	0.553	0.653
52Cr	0.505	1.7	2.4	3.5	4.0	2.4	2.4
55Mn	0.006	0.020	70	60	68	64	61
57Fe	1.8	6.0	232	306	457	223	297
59Co	0.003	0.010	0.761	0.597	0.835	0.677	0.832
60Ni	0.019	0.063	14	11	19	9.5	14
63Cu	0.016	0.053	12	13	17	11	15
66Zn	0.358	1.2	257	207	275	246	308
75As	0.487	1.6	<0.487	<0.487	0.519	<0.487	<0.487
77Se	0.373	1.2	5.6	4.5	6.0	5.8	5.4
88Sr	0.001	0.003	5.8	6.5	9.9	4.5	7.7
95Mo	0.001	0.003	0.274	0.191	0.322	0.262	0.250
107Ag	0.001	0.003	0.023	0.026	0.030	0.026	0.030
111Cd	0.061	0.203	2.8	2.1	3.6	2.5	3.8
118Sn	0.047	0.157	0.220	0.366	0.465	0.469	0.213
121Sb	0.006	0.020	0.039	0.033	0.055	0.028	0.039
137Ba	0.001	0.003	22	25	37	18	27
202Hg	0.033	0.110	0.050	0.041	0.066	0.075	0.058
205Tl	0.001	0.003	0.031	0.025	0.034	0.026	0.035
208Pb	0.005	0.017	0.099	0.109	0.190	0.099	0.116
238U	0.001	0.003	0.161	0.078	0.180	0.074	0.180

Notes:

ppm = parts per million

DL = detection limit

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g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_LIDSL_INV-1_2020-12-01	RG_LIDSL_INV-2_2020-12-01	RG_LIDSL_INV-3_2020-12-01	RG_LIDSL_INV-4_2020-12-01	RG_LIDSL_INV-5_2020-12-01
		Lab ID	103	104	105	106	107
		Wet Weight (g)	2.6959	2.0038	1.8868	1.7097	2.0196
		Dry Weight (g)	0.5378	0.4166	0.3711	0.2942	0.3714
		Moisture (%)	80.1	79.2	80.3	82.8	81.6
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.007	0.023	0.240	0.255	0.276	0.226	0.513
11B	0.112	0.373	0.586	1.1	0.617	0.471	1.2
23Na	0.651	2.2	1,846	1,605	2,452	1,414	1,517
24Mg	0.017	0.057	1,136	956	840	847	1,305
27Al	0.039	0.130	83	150	70	68	488
31P	59	197	7,635	6,411	8,557	6,677	6,818
39K	6.8	23	5,228	4,546	6,886	4,576	4,394
44Ca	13	43	1,738	2,345	1,285	1,493	1,882
49Ti	0.192	0.640	6.0	9.0	2.9	2.5	26
51V	0.037	0.123	0.238	0.459	0.155	0.185	0.919
52Cr	0.505	1.7	1.7	2.1	1.8	1.8	2.7
55Mn	0.006	0.020	102	74	89	102	155
57Fe	1.8	6.0	261	344	165	157	562
59Co	0.003	0.010	1.1	0.762	0.844	0.861	1.3
60Ni	0.019	0.063	7.8	8.3	6.3	5.4	12
63Cu	0.016	0.053	13	15	11	10	15
66Zn	0.358	1.2	197	218	197	196	176
75As	0.487	1.6	<0.487	0.562	<0.487	<0.487	0.502
77Se	0.373	1.2	6.8	3.7	5.4	5.8	5.7
88Sr	0.001	0.003	2.6	4.4	2.1	2.6	4.0
95Mo	0.001	0.003	0.322	0.215	0.276	0.276	0.318
107Ag	0.001	0.003	0.026	0.026	0.011	0.011	0.015
111Cd	0.061	0.203	1.7	1.4	2.1	1.3	1.6
118Sn	0.047	0.157	0.163	0.270	0.188	0.163	0.351
121Sb	0.006	0.020	0.033	0.033	0.022	0.017	0.039
137Ba	0.001	0.003	12	16	9.4	10	26
202Hg	0.033	0.110	0.066	0.050	0.047	0.038	<0.033
205Tl	0.001	0.003	0.015	0.014	0.011	0.007	0.024
208Pb	0.005	0.017	0.042	0.065	0.030	0.034	0.125
238U	0.001	0.003	0.039	0.055	0.024	0.030	0.074

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_2020-12-01	RG_LILC3_INV-2_2020-12-01	RG_LILC3_INV-3_2020-12-01	RG_LILC3_INV-4_2020-12-01	RG_LILC3_INV-5_2020-12-01
		Lab ID	108	109	110	111	112
		Wet Weight (g)	1.8283	1.4643	1.8338	1.6101	2.7349
		Dry Weight (g)	0.3217	0.2544	0.3260	0.2897	0.5417
		Moisture (%)	82.4	82.6	82.2	82.0	80.2
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.007	0.023	0.516	0.529	0.606	0.521	0.473
11B	0.112	0.373	0.788	0.569	0.821	1.2	1.2
23Na	0.651	2.2	2,259	3,677	3,606	2,644	3,089
24Mg	0.017	0.057	1,074	1,255	1,603	1,685	1,096
27Al	0.039	0.130	122	152	255	186	192
31P	59	197	8,225	10,001	11,389	9,873	9,171
39K	6.8	23	5,319	8,702	8,312	6,486	8,319
44Ca	13	43	1,695	2,034	1,950	2,496	2,877
49Ti	0.192	0.640	5.2	7.1	15	11	11
51V	0.037	0.123	0.601	0.592	0.850	1.1	0.876
52Cr	0.505	1.7	1.9	2.2	2.4	2.1	2.1
55Mn	0.006	0.020	201	183	207	291	251
57Fe	1.8	6.0	684	889	1,142	1,139	1,051
59Co	0.003	0.010	2.0	2.2	1.9	2.6	3.7
60Ni	0.019	0.063	7.2	12	10	14	23
63Cu	0.016	0.053	10	14	13	12	14
66Zn	0.358	1.2	153	159	163	157	209
75As	0.487	1.6	0.535	0.515	0.687	0.772	0.832
77Se	0.373	1.2	6.3	6.8	8.7	8.9	12
88Sr	0.001	0.003	3.1	3.5	4.5	4.9	5.3
95Mo	0.001	0.003	0.304	0.428	0.497	0.428	0.663
107Ag	0.001	0.003	0.008	0.011	0.019	0.011	0.015
111Cd	0.061	0.203	1.4	1.5	1.6	2.1	2.3
118Sn	0.047	0.157	0.368	0.445	0.428	0.668	0.501
121Sb	0.006	0.020	0.055	0.072	0.072	0.105	0.099
137Ba	0.001	0.003	16	19	24	24	28
202Hg	0.033	0.110	0.057	0.047	0.085	0.057	0.085
205Tl	0.001	0.003	0.030	0.025	0.035	0.035	0.041
208Pb	0.005	0.017	0.061	0.080	0.114	0.080	0.091
238U	0.001	0.003	0.077	0.080	0.085	0.108	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_LISP24_INV-1_2020-12-02	RG_LISP24_INV-2_2020-12-02	RG_LISP24_INV-3_2020-12-02	RG_LISP24_INV-4_2020-12-02	RG_LISP24_INV-5_2020-12-02
		Lab ID	113	114	115	116	117
		Wet Weight (g)	1.5396	1.3987	1.7738	1.9012	2.0503
		Dry Weight (g)	0.3297	0.2634	0.3644	0.3645	0.3576
		Moisture (%)	78.6	81.2	79.5	80.8	82.6
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.007	0.023	0.348	0.502	0.394	0.316	0.378
11B	0.112	0.373	0.796	1.4	0.498	0.846	0.761
23Na	0.651	2.2	2,329	3,171	2,947	2,305	1,747
24Mg	0.017	0.057	1,125	1,238	1,332	1,002	1,463
27Al	0.039	0.130	272	273	108	156	154
31P	59	197	9,219	8,887	10,407	8,046	8,907
39K	6.8	23	6,621	8,763	8,412	6,758	5,296
44Ca	13	43	2,281	2,725	1,698	1,877	2,636
49Ti	0.192	0.640	15	16	6.5	8.2	10
51V	0.037	0.123	0.702	0.997	0.349	0.521	0.525
52Cr	0.505	1.7	2.1	2.5	2.3	2.1	2.5
55Mn	0.006	0.020	162	197	128	140	132
57Fe	1.8	6.0	751	954	379	575	610
59Co	0.003	0.010	1.7	2.3	1.6	1.4	1.5
60Ni	0.019	0.063	12	14	8.6	13	12
63Cu	0.016	0.053	17	19	17	14	22
66Zn	0.358	1.2	209	333	413	186	314
75As	0.487	1.6	0.561	0.778	0.747	0.671	0.656
77Se	0.373	1.2	7.5	7.2	11	7.0	7.0
88Sr	0.001	0.003	4.1	5.8	3.3	3.4	4.9
95Mo	0.001	0.003	0.387	0.552	0.418	0.418	0.435
107Ag	0.001	0.003	0.023	0.032	0.027	0.022	0.027
111Cd	0.061	0.203	2.7	4.6	2.1	1.5	2.8
118Sn	0.047	0.157	0.338	0.453	0.306	0.235	0.310
121Sb	0.006	0.020	0.050	0.091	0.050	0.050	0.058
137Ba	0.001	0.003	22	27	13	16	18
202Hg	0.033	0.110	0.047	0.057	0.057	0.057	0.057
205Tl	0.001	0.003	0.025	0.029	0.022	0.020	0.034
208Pb	0.005	0.017	0.098	0.102	0.043	0.064	0.064
238U	0.001	0.003	0.077	0.092	0.048	0.054	0.093

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_2020-11-30	RG_SLINE_INV-2_2020-11-30	RG_SLINE_INV-3_2020-11-30	RG_SLINE_INV-4_2020-11-30	RG_SLINE_INV-5_2020-11-30
		Lab ID	118	119	120	121	122
		Wet Weight (g)	1.7348	1.0322	1.3245	1.1803	1.3487
		Dry Weight (g)	0.3430	0.1796	0.2522	0.1790	0.1898
		Moisture (%)	80.2	82.6	81.0	84.8	85.9
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.007	0.023	0.237	0.208	0.332	0.270	0.409
11B	0.112	0.373	0.808	0.696	1.2	0.921	1.2
23Na	0.651	2.2	3,245	2,707	3,334	2,253	3,117
24Mg	0.017	0.057	1,560	1,349	1,949	1,314	1,488
27Al	0.039	0.130	226	222	482	414	382
31P	59	197	10,986	9,135	13,020	9,552	10,844
39K	6.8	23	10,947	7,669	9,837	7,373	8,258
44Ca	13	43	2,407	2,479	3,016	2,741	2,908
49Ti	0.192	0.640	15	13	28	25	33
51V	0.037	0.123	1.0	0.695	1.4	0.849	1.4
52Cr	0.505	1.7	2.2	2.5	3.3	3.9	3.4
55Mn	0.006	0.020	16	19	26	27	23
57Fe	1.8	6.0	179	175	282	270	295
59Co	0.003	0.010	0.272	0.403	0.586	0.459	0.592
60Ni	0.019	0.063	5.4	5.0	8.5	8.3	8.1
63Cu	0.016	0.053	15	15	17	14	15
66Zn	0.358	1.2	348	519	466	448	500
75As	0.487	1.6	1.0	1.0	1.4	1.0	1.4
77Se	0.373	1.2	7.0	7.7	8.5	6.1	6.9
88Sr	0.001	0.003	6.7	6.2	8.8	7.8	8.9
95Mo	0.001	0.003	0.284	0.368	0.435	0.452	0.335
107Ag	0.001	0.003	0.130	0.092	0.113	0.103	0.103
111Cd	0.061	0.203	1.6	3.1	3.4	2.8	3.3
118Sn	0.047	0.157	0.109	0.294	0.323	0.445	0.529
121Sb	0.006	0.020	0.025	0.025	0.041	0.033	0.033
137Ba	0.001	0.003	17	18	25	33	32
202Hg	0.033	0.110	0.080	0.137	0.091	0.091	0.091
205Tl	0.001	0.003	0.056	0.071	0.094	0.056	0.074
208Pb	0.005	0.017	0.138	0.089	0.213	0.157	0.183
238U	0.001	0.003	0.104	0.108	0.213	0.162	0.137

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-4_2020-12-02			RG_LCUT_INV-2_2020-12-01			RG_LI24_INV-4_2020-11-30		
Lab ID		076			084			096		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.007	0.954	0.829	14	1.1	1.2	8.7	0.254	0.309	20
11B	0.112	1.9	1.5	24	3.0	2.9	3.4	0.814	0.851	-
23Na	0.651	3,482	3,439	1.2	3,048	3,271	7.1	2,874	2,715	5.7
24Mg	0.017	1,750	1,750	0.0	1,429	1,276	11	1,451	1,465	1.0
27Al	0.039	453	350	26	1,521	1,597	4.9	216	228	5.4
31P	59	9,341	8,807	5.9	9,778	8,840	10	9,935	9,981	0.5
39K	6.8	7,640	7,032	8.3	8,259	8,981	8.4	8,634	8,079	6.6
44Ca	13	3,612	3,636	0.7	3,272	3,229	1.3	3,123	3,358	7.3
49Ti	0.192	34	26	27	117	128	9.0	14	15	6.9
51V	0.037	0.864	0.603	36	3.5	3.0	15	1.9	2.1	10
52Cr	0.505	3.7	3.1	-	7.3	6.0	20	3.3	3.4	-
55Mn	0.006	25	23	8.3	41	39	5.0	13	14	7.4
57Fe	1.8	329	265	22	774	643	19	159	181	13
59Co	0.003	1.0	0.953	4.8	1.3	1.1	17	0.449	0.477	6.0
60Ni	0.019	8.6	6.9	22	23	28	20	9.4	9.9	5.2
63Cu	0.016	20	18	11	22	21	4.7	12	13	8.0
66Zn	0.358	537	456	16	219	237	7.9	380	319	18
75As	0.487	0.552	<0.487	-	1.3	1.3	-	1.4	1.6	-
77Se	0.373	6.7	6.8	1.5	5.9	5.7	3.4	5.1	5.0	2.0
88Sr	0.001	6.2	5.6	10	6.9	6.5	6.0	9.8	11	12
95Mo	0.001	0.392	0.266	38	0.410	0.361	13	0.348	0.331	5.0
107Ag	0.001	0.165	0.169	2.4	0.022	0.022	0.0	0.059	0.065	9.7
111Cd	0.061	3.2	2.9	9.8	2.9	2.3	23	1.5	1.5	0.0
118Sn	0.047	0.657	0.453	-	0.344	0.313	-	0.236	0.294	-
121Sb	0.006	0.022	0.028	-	0.061	0.057	-	0.024	0.030	-
137Ba	0.001	23	19	19	42	34	21	19	19	0.0
202Hg	0.033	0.107	0.087	-	0.074	0.083	-	0.044	0.049	-
205Tl	0.001	0.023	0.018	24	0.061	0.063	3.2	0.042	0.047	11
208Pb	0.005	0.110	0.095	15	0.489	0.457	6.8	0.109	0.129	17
238U	0.001	0.059	0.054	8.8	0.121	0.131	7.9	0.118	0.122	3.3

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_LIDCOM_INV-3_2020-12-01			RG_LILC3_INV-3_2020-12-01		
Lab ID		100			110		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.007	0.552	0.524	5.2	0.606	0.522	15
11B	0.112	1.8	1.4	25	0.821	0.739	-
23Na	0.651	2,706	3,119	14	3,606	2,755	27
24Mg	0.017	1,407	1,580	12	1,603	1,286	22
27Al	0.039	566	567	0.2	255	299	16
31P	59	8,599	9,348	8.3	11,389	9,130	22
39K	6.8	7,200	8,290	14	8,312	6,695	22
44Ca	13	4,156	4,346	4.5	1,950	1,821	6.8
49Ti	0.192	52	43	19	15	15	0.0
51V	0.037	1.2	0.959	22	0.850	1.2	34
52Cr	0.505	4.0	3.8	-	2.4	2.4	-
55Mn	0.006	68	67	1.5	207	213	2.9
57Fe	1.8	457	404	12	1,142	1,219	6.5
59Co	0.003	0.835	0.775	7.5	1.9	2.4	23
60Ni	0.019	19	19	0.0	10	13	26
63Cu	0.016	17	16	6.1	13	12	8.0
66Zn	0.358	275	320	15	163	186	13
75As	0.487	0.519	0.526	-	0.687	0.713	-
77Se	0.422	6.0	6.7	11	8.7	8.2	5.9
88Sr	0.001	9.9	9.6	3.1	4.5	3.9	14
95Mo	0.001	0.322	0.346	7.2	0.497	0.566	13
107Ag	0.001	0.030	0.030	0.0	0.019	0.015	24
111Cd	0.061	3.6	3.4	5.7	1.6	2.0	22
118Sn	0.047	0.465	0.412	-	0.428	0.492	-
121Sb	0.006	0.055	0.055	-	0.072	0.083	14
137Ba	0.001	37	35	5.6	24	32	29
202Hg	0.033	0.066	0.083	-	0.085	0.075	-
205Tl	0.001	0.034	0.036	5.7	0.035	0.041	16
208Pb	0.005	0.190	0.153	22	0.114	0.129	12
238U	0.001	0.180	0.169	6.3	0.085	0.122	36

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	0.007	1.21	1.4	116	6.5	1.5	120	6.7
11B	0.112	4.5	5.5	122	4.2	4.6	103	3.3
23Na	0.651	14,000	15,499	111	2.6	16,299	116	4.6
24Mg	0.017	910	1,085	119	5.6	998	110	6.3
27Al	0.039	197.2	196	100	4.4	186	94	7.3
31P	59	8,000	9,258	116	5.3	8,815	110	7.6
39K	6.8	15,500	17,301	112	7.1	16,957	109	6.3
44Ca	13	2,360	2,686	114	7.8	2,564	109	7.2
49Ti	0.192	12.24	15	120	14	12	99	16
51V	0.037	1.57	1.8	113	9.1	1.7	111	6.3
52Cr	0.505	1.87	2.2	117	2.9	2.1	111	6.3
55Mn	0.006	3.17	3.9	123	8.0	3.5	109	6.2
57Fe	1.8	343	414	121	4.1	376	110	7.2
59Co	0.003	0.25	0.300	120	5.6	0.287	115	7.3
60Ni	0.019	1.34	1.7	125	3.8	1.6	117	7.1
63Cu	0.016	15.7	19	123	3.1	18	118	4.5
66Zn	0.358	51.6	60	116	6.3	59	114	6.3
75As	0.487	6.87	7.7	112	5.7	7.6	111	7.4
77Se	0.373	3.45	3.8	110	2.9	3.8	110	5.2
88Sr	0.001	10.1	11	114	5.2	11	109	4.6
95Mo	0.001	0.29	0.326	112	7.1	0.312	108	6.7
107Ag	0.001	0.0252	0.029	116	8.3	0.030	120	9.8
111Cd	0.061	0.299	0.347	116	11	0.373	125	11
118Sn	0.047	0.061	0.067	110	**25**	0.067	117	17
121Sb	0.006	0.011	0.013	112	17	0.009	86	0.0
137Ba	0.001	8.6	9.7	113	4.3	8.5	99	5.6
202Hg	0.033	0.412	0.430	104	6.9	0.365	89	7.2
205Tl	0.001	0.0013	-	-	-	-	-	-
208Pb	0.005	0.404	0.407	101	9.8	0.407	101	10
238U	0.001	0.05	0.054	109	4.7	0.054	108	4.1

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.

Bold indicates DQO exceedance but result is accepted as it does not impact the reportable results

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	0.007	1.21	1.2	103	4.5	1.2	102	8.5
11B	0.112	4.5	4.9	108	1.6	5.3	117	6.1
23Na	0.651	14,000	14,583	104	6.2	15,035	107	7.8
24Mg	0.017	910	968	106	2.3	973	107	7.1
27Al	0.039	197.2	200	101	6.9	221	112	5.0
31P	59	8,000	8,087	101	4.4	8,512	106	6.4
39K	6.8	15,500	15,191	98	4.0	17,287	112	6.2
44Ca	13	2,360	2,532	107	3.7	2,271	96	4.1
49Ti	0.192	12.24	13	104	11	15	124	17
51V	0.037	1.57	1.5	94	6.1	1.8	118	14
52Cr	0.505	1.87	2.0	104	3.9	2.2	119	6.4
55Mn	0.006	3.17	3.4	107	3.4	3.6	113	7.2
57Fe	1.8	343	347	101	4.8	393	115	6.5
59Co	0.003	0.25	0.258	103	6.5	0.301	120	9.5
60Ni	0.019	1.34	1.4	104	4.5	1.6	119	8.2
63Cu	0.016	15.7	17	105	6.5	18	113	6.3
66Zn	0.358	51.6	56	109	4.3	58	112	7.4
75As	0.487	6.87	7.2	105	5.6	7.4	107	7.0
77Se	0.373	3.45	3.6	106	3.9	3.5	101	4.5
88Sr	0.001	10.1	11	105	6.8	11	108	6.6
95Mo	0.001	0.29	0.308	106	9.3	0.300	104	15
107Ag	0.001	0.0252	0.029	116	10	0.031	123	10
111Cd	0.061	0.299	0.306	102	4.9	0.359	120	7.9
118Sn	0.047	0.061	0.056	91	10	0.078	128	**24**
121Sb	0.006	0.011	0.012	109	0.0	0.014	132	16
137Ba	0.001	8.6	9.2	107	4.8	9.4	110	4.8
202Hg	0.033	0.412	0.505	123	13	0.445	108	8.3
205Tl	0.001	0.0013	-	-	-	-	-	-
208Pb	0.005	0.404	0.367	91	9.1	0.477	118	12
238U	0.001	0.05	0.053	106	5.1	0.055	109	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.

Bold indicates DQO exceedance but result is accepted as it does not impact the reportable results

Teck Coal Limited

Tissue QA/QC Accuracy and Precision Results

			Sample Group ID	05			06	
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.007	1.21	1.3	106	11	1.2	100	9.4
11B	0.112	4.5	4.7	105	8.7	4.8	106	4.2
23Na	0.651	14,000	14,732	105	6.7	14,651	105	7.7
24Mg	0.017	910	976	107	7.3	962	106	6.5
27Al	0.039	197.2	189	96	2.9	195	99	3.9
31P	59	8,000	8,439	106	4.2	8,447	106	5.4
39K	6.8	15,500	16,413	106	3.6	16,161	104	6.7
44Ca	13	2,360	2,550	108	3.8	2,518	107	3.7
49Ti	0.192	12.24	11	89	6.6	12	101	10
51V	0.037	1.57	1.5	96	4.1	1.8	113	9.4
52Cr	0.505	1.87	1.9	103	4.3	2.0	106	6.4
55Mn	0.006	3.17	3.5	110	8.3	3.5	109	8.6
57Fe	1.8	343	359	104	6.5	363	106	6.1
59Co	0.003	0.25	0.272	109	6.7	0.265	106	6.9
60Ni	0.019	1.34	1.4	106	6.8	1.4	108	9.6
63Cu	0.016	15.7	17	108	7.7	17	110	2.9
66Zn	0.358	51.6	54	105	7.4	55	106	9.1
75As	0.487	6.87	7.0	102	7.5	7.3	106	5.9
77Se	0.373	3.45	3.7	107	6.2	3.7	107	7.4
88Sr	0.001	10.1	11	107	2.7	11	110	5.9
95Mo	0.001	0.29	0.298	103	9.0	0.318	110	3.7
107Ag	0.001	0.0252	0.026	102	12	0.029	114	18
111Cd	0.061	0.299	0.347	116	13	0.345	115	12
118Sn	0.047	0.061	0.061	101	**26**	0.058	95	20
121Sb	0.006	0.011	0.013	120	16	0.015	111	10
137Ba	0.001	8.6	8.7	102	6.5	9.2	107	4.9
202Hg	0.033	0.412	0.409	99	5.4	0.436	106	4.0
205Tl	0.001	0.0013	-	-	-	-	-	-
208Pb	0.005	0.404	0.378	94	9.7	0.434	108	17
238U	0.001	0.05	0.049	98	5.4	0.051	102	9.4

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.

Bold indicates DQO exceedance but result is accepted as it does not impact the reportable results

Teck Coal Limited
Sample Group Information

Sample Group ID	Client ID	Lab ID	Date of Analysis
01	RG_FO23_INV-1_2020-12-02	073	15 Dec 2020
	RG_FO23_INV-2_2020-12-02	074	
	RG_FO23_INV-3_2020-12-02	075	
	RG_FO23_INV-4_2020-12-02	076	
	RG_FO23_INV-5_2020-12-02	077	
	RG_FRUL_INV-1_2020-11-30	078	
	RG_FRUL_INV-2_2020-11-30	079	
	RG_FRUL_INV-3_2020-11-30	080	
02	RG_FRUL_INV-4_2020-11-30	081	15 Dec 2020
	RG_FRUL_INV-5_2020-11-30	082	
	RG_LCUT_INV-1_2020-12-01	083	
	RG_LCUT_INV-2_2020-12-01	084	
	RG_LCUT_INV-3_2020-12-01	085	
	RG_LCUT_INV-4_2020-12-01	086	
	RG_LCUT_INV-5_2020-12-01	087	
	RG_LI8_INV-1_2020-12-02	088	
03	RG_LI8_INV-2_2020-12-02	089	15 Dec 2020
	RG_LI8_INV-3_2020-12-02	090	
	RG_LI8_INV-4_2020-12-02	091	
	RG_LI8_INV-5_2020-12-02	092	
	RG_LI24_INV-1_2020-11-30	093	
	RG_LI24_INV-2_2020-11-30	094	
	RG_LI24_INV-3_2020-11-30	095	
	RG_LI24_INV-4_2020-11-30	096	
04	RG_LI24_INV-5_2020-11-30	097	16 Dec 2020
	RG_LIDCOM_INV-1_2020-12-01	098	
	RG_LIDCOM_INV-2_2020-12-01	099	
	RG_LIDCOM_INV-3_2020-12-01	100	
	RG_LIDCOM_INV-4_2020-12-01	101	
	RG_LIDCOM_INV-5_2020-12-01	102	
	RG_LIDSL_INV-1_2020-12-01	103	
	RG_LIDSL_INV-2_2020-12-01	104	
05	RG_LIDSL_INV-3_2020-12-01	105	16 Dec 2020
	RG_LIDSL_INV-4_2020-12-01	106	
	RG_LIDSL_INV-5_2020-12-01	107	
	RG_LILC3_INV-1_2020-12-01	108	
	RG_LILC3_INV-2_2020-12-01	109	
	RG_LILC3_INV-3_2020-12-01	110	
	RG_LILC3_INV-4_2020-12-01	111	
	RG_LILC3_INV-5_2020-12-01	112	

Teck Coal Limited
Sample Group Information

Sample Group ID	Client ID	Lab ID	Date of Analysis
05	RG_LISP24_INV-1_2020-12-02	113	16 Dec 2020
06	RG_LISP24_INV-2_2020-12-02	114	16 Dec 2020
	RG_LISP24_INV-3_2020-12-02	115	
	RG_LISP24_INV-4_2020-12-02	116	
	RG_LISP24_INV-5_2020-12-02	117	
	RG_SLINE_INV-1_2020-11-30	118	
	RG_SLINE_INV-2_2020-11-30	119	
	RG_SLINE_INV-3_2020-11-30	120	
	RG_SLINE_INV-4_2020-11-30	121	
	RG_SLINE_INV-5_2020-11-30	122	

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Minnow Project #: 207202.0015
Date Results Required By: 18-Dec-20 GOZ

Contact: Katharina Batchelar
Phone: 778-679-4350 Fax:
Report mailing list: kbatchelar@minnow.ca; Cait.Good@teck.com; Carlie.Meyer@teck.com; cwiramanaden@minnow.ca

Trich sample ID:	Sample Number	Minnow Sample ID	Date Sampled	Matrix	Analysis Required: Moisture (Freeze Drying)	Analysis Required: Full Metals including Hg	Number of Containers	Comments
073	1	RG_FO23_INV-1_2020-12-02	02-Dec-20	Invertebrate tissue	x	x	1	
074	2	RG_FO23_INV-2_2020-12-02	02-Dec-20	Invertebrate tissue	x	x	1	
075	3	RG_FO23_INV-3_2020-12-02	02-Dec-20	Invertebrate tissue	x	x	1	
076	4	RG_FO23_INV-4_2020-12-02	02-Dec-20	Invertebrate tissue	x	x	1	
077	5	RG_FO23_INV-5_2020-12-02	02-Dec-20	Invertebrate tissue	x	x	1	
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(Project # 2020-178)
GOZ 10 Dec 2020.

Samples Relinquished to Lab By: (Minnow Employee Signature) Matt	Date: 8 Dec 2020	Time: 10:00	Shipment Method: Pacific Coastal cargo in iced cooler
Samples Received in Lab By: (Lab Employee Signature)	Date: 10 Dec 2020	Time: 08:30	Sample Condition upon Receipt: Cooler w/ Frozen PKG.

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: Katharina Batchelar
Contact Email: kbatchelar@minnow.ca
Minnow Project #: 207202.0015
Date Results Required By: 18-Dec-20

Contact: Katharina Batchelar
Phone: 778-679-4350 Fax:
Report mailing list: kbatchelar@minnow.ca; Cait.Good@teck.com; Carlie.Meyer@teck.com; cwiramanaden@minnow.ca

Trich Sample ID Number	Sample Number	Minnow Sample ID	Date Sampled	Matrix	Analysis Required: Moisture (Freeze Drying)	Full Metals including Hg				Number of Containers	Comments
078	1	RG_FRUL_INV-1_2020-11-30	30-Nov-20	Invertebrate tissue	x	x				1	
079	2	RG_FRUL_INV-2_2020-11-30	30-Nov-20	Invertebrate tissue	x	x				1	
080	3	RG_FRUL_INV-3_2020-11-30	30-Nov-20	Invertebrate tissue	x	x				1	
081	4	RG_FRUL_INV-4_2020-11-30	30-Nov-20	Invertebrate tissue	x	x				1	
082	5	RG_FRUL_INV-5_2020-11-30	30-Nov-20	Invertebrate tissue	x	x				1	
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	14										
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Samples Relinquished to Lab By: (Minnow Employee Signature) mdb — Date: 8 Dec 2020 — Time: 10:00 — Shipment Method: Pacific Coastal cargo in iced cooler

Samples Received in Lab By: (Lab Employee Signature) Gemma LB — Date: 10 Dec 2020 — Time: 08:30 — Sample Condition upon Receipt: Cooler w/ Frozen PKGs

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

MINNOW ENVIRONMENTAL INCORPORATED

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Victoria, British Columbia V8V 3K4
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CHAIN OF CUSTODY RECORD

Laboratory: Trich Analytics

Contact: Katharina Batchelar
Phone: 778-679-4350 Fax:
Report mailing list: kbatchelar@minnow.ca; Cait.Good@teck.com; Carlie.Meyer@teck.com; cwiramanaden@minnow.ca

Minnow Contact: Katharina Batchelar
Contact Email: kbatchelar@minnow.ca
Minnow Project #: 207202.0015
Date Results Required By: 18-Dec-20

Trich Sample 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
083	1	RG_LCUT_INV-1_2020-12-01	01-Dec-20	Invertebrate tissue	x	x				1	
084	2	RG_LCUT_INV-2_2020-12-01	01-Dec-20	Invertebrate tissue	x	x				1	
085	3	RG_LCUT_INV-3_2020-12-01	01-Dec-20	Invertebrate tissue	x	x				1	
086	4	RG_LCUT_INV-4_2020-12-01	01-Dec-20	Invertebrate tissue	x	x				1	
087	5	RG_LCUT_INV-5_2020-12-01	01-Dec-20	Invertebrate tissue	x	x				1	
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Samples Relinquished to Lab By: (Minnow Employee Signature) MMS
Date: 8 Dec 2020 Time: 10:00
Shipment Method: Pacific Coastal cargo in iced cooler

Samples Received in Lab By: (Lab Employee Signature)
Date: 10 Dec 2020 Time: 08:30
Sample Condition upon Receipt: Cooler w/ frozen PKG.

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

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Telephone:(250) 595-1627
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CHAIN OF CUSTODY RECORD

Laboratory: Trich Analytics

Minnow Contact: Katharina Batchelar
Contact Email: kbatchelar@minnow.ca
Minnow Project #: 207202.0015
Date Results Required By: 18-Dec-20

Contact: Katharina Batchelar
Phone: 778-679-4350 Fax:
Report mailing list: kbatchelar@minnow.ca; Cait.Good@teck.com; Carlie.Meyer@teck.com; cwiramanaden@minnow.ca

Trich Sample ID:	Sample Number	Minnow Sample ID	Date Sampled	Matrix	Analysis Required: Moisture (Freeze Drying)	Full Metals including Hg				Number of Containers	Comments
088	1	RG_LI8_INV-1_2020-12-02	02-Dec-20	Invertebrate tissue	x	x				1	
089	2	RG_LI8_INV-2_2020-12-02	02-Dec-20	Invertebrate tissue	x	x				1	
090	3	RG_LI8_INV-3_2020-12-02	02-Dec-20	Invertebrate tissue	x	x				1	
091	4	RG_LI8_INV-4_2020-12-02	02-Dec-20	Invertebrate tissue	x	x				1	
092	5	RG_LI8_INV-5_2020-12-02	02-Dec-20	Invertebrate tissue	x	x				1	
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Samples Relinquished to Lab By: (Minnow Employee Signature) MHS — Date: 8 Dec 2020 — Time: 10:00 — Shipment Method: Pacific Coastal cargo in iced cooler

Samples Received in Lab By: (Lab Employee Signature) [signature] — Date: 10 Dec 2020 — Time: 08:30 — Sample Condition upon Receipt: Cooler w/ frozen pkg.

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

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CHAIN OF CUSTODY RECORD

Laboratory: Trich Analytics

Contact: Katharina Batchelar
Phone: 778-679-4350 Fax:
Report mailing list: kbatchelar@minnow.ca; Cait.Good@teck.com; Carlie.Meyer@teck.com; cwiramanaden@minnow.ca

Minnow Contact: Katharina Batchelar
Contact Email: kbatchelar@minnow.ca
Minnow Project #: 207202.0015
Date Results Required By: 18-Dec-20

Trich sample 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
093	1	RG_LI24_INV-1_2020-11-30	30-Nov-20	Invertebrate tissue	x	x				1	
094	2	RG_LI24_INV-2_2020-11-30	30-Nov-20	Invertebrate tissue	x	x				1	
095	3	RG_LI24_INV-3_2020-11-30	30-Nov-20	Invertebrate tissue	x	x				1	
096	4	RG_LI24_INV-4_2020-11-30	30-Nov-20	Invertebrate tissue	x	x				1	
097	5	RG_LI24_INV-5_2020-11-30	30-Nov-20	Invertebrate tissue	x	x				1	
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Samples Relinquished to Lab By: (Minnow Employee Signature) MWS	Date: 8 Dec 2020	Time: 10:00	Shipment Method: Pacific Coastal cargo in iced cooler
Samples Received in Lab By: (Lab Employee Signature)	Date: 10 Dec 2020	Time: 08:30	Sample Condition upon Receipt: Cooler w/ frozen pkg.

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

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CHAIN OF CUSTODY RECORD

Laboratory: Trich Analytics

Minnow Contact: Katharina Batchelar
Contact Email: kbatchelar@minnow.ca
Minnow Project #: 207202.0015
Date Results Required By: 18-Dec-20

Contact: Katharina Batchelar
Phone: 778-679-4350 Fax:
Report mailing list: kbatchelar@minnow.ca; Cait.Good@teck.com; Carlie.Meyer@teck.com; cwiramanaden@minnow.ca

Trich Sample ID:	Sample Number	Minnow Sample ID	Date Sampled	Matrix	Analysis Required: Moisture (Freeze Drying)	Full Metals including Hg				Number of Containers	Comments
098	1	RG_LIDCOM_INV-1_2020-12-01	01-Dec-20	Invertebrate tissue	x	x				1	
099	2	RG_LIDCOM_INV-2_2020-12-01	01-Dec-20	Invertebrate tissue	x	x				1	
100	3	RG_LIDCOM_INV-3_2020-12-01	01-Dec-20	Invertebrate tissue	x	x				1	
101	4	RG_LIDCOM_INV-4_2020-12-01	01-Dec-20	Invertebrate tissue	x	x				1	
102	5	RG_LIDCOM_INV-5_2020-12-01	01-Dec-20	Invertebrate tissue	x	x				1	
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	14										
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Samples Relinquished to Lab By: (Minnow Employee Signature) mlb — Date: 8 Dec 2020 — Time: 10:00 — Shipment Method: Pacific Coastal cargo in iced cooler

Samples Received in Lab By: (Lab Employee Signature) Gunnin HB — Date: 10 Dec 2020 — Time: 08:30 — Sample Condition upon Receipt: Cooler w/ frozen PKg.

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

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CHAIN OF CUSTODY RECORD

Laboratory: Trich Analytics

Minnow Contact: Katharina Batchelar
Contact Email: kbatchelar@minnow.ca
Minnow Project #: 207202.0015
Date Results Required By: 18-Dec-20

Contact: Katharina Batchelar
Phone: 778-679-4350 Fax:
Report mailing list: kbatchelar@minnow.ca; Cait.Good@teck.com; Carlie.Meyer@teck.com; cwiramanaden@minnow.ca

Trich sample ID:	Sample Number	Minnow Sample ID	Date Sampled	Matrix	Analysis Required: Moisture (Freeze Drying)	Full Metals including Hg				Number of Containers	Comments
103	1	RG_LIDSL_INV-1_2020-12-01	01-Dec-20	Invertebrate tissue	x	x				1	
104	2	RG_LIDSL_INV-2_2020-12-01	01-Dec-20	Invertebrate tissue	x	x				1	
105	3	RG_LIDSL_INV-3_2020-12-01	01-Dec-20	Invertebrate tissue	x	x				1	
106	4	RG_LIDSL_INV-4_2020-12-01	01-Dec-20	Invertebrate tissue	x	x				1	
107	5	RG_LIDSL_INV-5_2020-12-01	01-Dec-20	Invertebrate tissue	x	x				1	
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	14										
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Samples Relinquished to Lab By: (Minnow Employee Signature) [signature] Date: 8 Dec 2020 Time: 10:00 Shipment Method: Pacific Coastal cargo in iced cooler

Samples Received in Lab By: (Lab Employee Signature) [signature] Date: 10 Dec 2020 Time: 08:30 Sample Condition upon Receipt: Cooler w/ frozen Pkg.

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

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CHAIN OF CUSTODY RECORD

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Contact: Katharina Batchelar
Phone: 778-679-4350 Fax:

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Contact Email: kbatchelar@minnow.ca
Minnow Project #: 207202.0015
Date Results Required By: 18-Dec-20

Report mailing list: kbatchelar@minnow.ca; Cait.Good@teck.com; Carlie.Meyer@teck.com; cwiramanaden@minnow.ca

Trich sample no.

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
108 1	RG_LILC3_INV-1_2020-12-01	01-Dec-20	Invertebrate tissue	x	x				1	
109 2	RG_LILC3_INV-2_2020-12-01	01-Dec-20	Invertebrate tissue	x	x				1	
110 3	RG_LILC3_INV-3_2020-12-01	01-Dec-20	Invertebrate tissue	x	x				1	
111 4	RG_LILC3_INV-4_2020-12-01	01-Dec-20	Invertebrate tissue	x	x				1	
112 5	RG_LILC3_INV-5_2020-12-01	01-Dec-20	Invertebrate tissue	x	x				1	
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Samples Relinquished to Lab By: (Minnow Employee Signature)	Date: 8 Dec 2020	Time: 10:00	Shipment Method: Pacific Coastal cargo in iced cooler
Samples Received in Lab By: (Lab Employee Signature)	Date: 10 Dec 2020	Time: 08:30	Sample Condition upon Receipt: Cooler w/ frozen pkg.

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

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CHAIN OF CUSTODY RECORD

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Report mailing list: kbatchelar@minnow.ca; Cait.Good@teck.com; Carlie.Meyer@teck.com; cwiramanaden@minnow.ca

Trich Sample ID: ~~113~~ 114 115 116 ~~117~~ 118 cc 02/10 Dec 2020

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
1	RG_LISP24_INV-1_2020-12-02	02-Dec-20	Invertebrate tissue	x	x				1	
2	RG_LISP24_INV-2_2020-12-02	02-Dec-20	Invertebrate tissue	x	x				1	
3	RG_LISP24_INV-3_2020-12-02	02-Dec-20	Invertebrate tissue	x	x				1	
4	RG_LISP24_INV-4_2020-12-02	02-Dec-20	Invertebrate tissue	x	x				1	
5	RG_LISP24_INV-5_2020-12-02	02-Dec-20	Invertebrate tissue	x	x				1	
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Samples Relinquished to Lab By: (Minnow Employee Signature) MMA Date: 8 Dec 2020 Time: 10:00 Shipment Method: Pacific Coastal cargo in iced cooler

Samples Received in Lab By: (Lab Employee Signature) Date: 10 Dec 2020 Time: 08:30 Sample Condition upon Receipt: Cooler w/ frozen pkg.

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW

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CHAIN OF CUSTODY RECORD

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Minnow Contact: Katharina Batchelar
Contact Email: kbatchelar@minnow.ca
Minnow Project #: 207202.0015
Date Results Required By: 18-Dec-20

Trich sample ID: Number	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
118	1	RG_SLINE_INV-1_2020-11-30	30-Nov-20	Invertebrate tissue	x	x				1	
119	2	RG_SLINE_INV-2_2020-11-30	30-Nov-20	Invertebrate tissue	x	x				1	
120	3	RG_SLINE_INV-3_2020-11-30	30-Nov-20	Invertebrate tissue	x	x				1	
121	4	RG_SLINE_INV-4_2020-11-30	30-Nov-20	Invertebrate tissue	x	x				1	
122	5	RG_SLINE_INV-5_2020-11-30	30-Nov-20	Invertebrate tissue	x	x				1	
	6										
	7										
	8										
	9										
	10										
	11										
	12										
	13										
	14										
	15										

Samples Relinquished to Lab By: (Minnow Employee Signature) MMA	Date: 8 Dec 2020	Time: 10:00	Shipment Method: Pacific Coastal cargo in iced cooler
Samples Received in Lab By: (Lab Employee Signature)	Date: 10 Dec 2020	Time: 08:30	Sample Condition upon Receipt: Cooler w frozen pkg.

SUBMIT ORIGINAL TO LAB WITH SAMPLES AND RETAIN TWO PHOTOCOPIES AT MINNOW