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Technical Report Overview

Report: Elkview Operations (EVO) Local Aquatic Effects Monitoring Program (LAEMP), 2021

Overview: This report presents the 2021 results of the local aquatic effects monitoring program (LAEMP) developed for Teck's Elkview Operations (EVO). The report presents data and evaluation of current conditions and baseline data to support future evaluation of changes related to commissioning of a SRF that will be treating water from Natal West Pit and Erickson Creek.

This report was prepared for Teck by Minnow Environmental Inc.

For More Information

If you have questions regarding this report, please:

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

Elkview Operations (EVO) Local Aquatic Effects Monitoring Program (LAEMP), 2021

Prepared for:
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June 2022

Elkview Operations (EVO) Local Aquatic Effects Monitoring Program (LAEMP), 2021

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EXECUTIVE SUMMARY

The Elkview Operations Local Aquatic Effects Monitoring Program (EVO LAEMP) was designed to evaluate changes related to the commissioning of the Saturated Rock Fill (SRF). As per section 8.3.5 in permit 107517 the EVO LAEMP is focused on the immediate receiving environment downstream of the EVO SRF including Gate, Bodie, Erickson and Michel creeks. The EVO LAEMP is intended to monitor for changes in water quality, calcite, and temperature in the receiving environment and how these changes may have potential effects to the biota. After the EVO SRF trials (EVO SRF Phase 1), the EVO SRF started treating Erickson Creek water as part of Phase 2 (referred to as EVO SRF P2) on February 15, 2021. During EVO SRF P2 in 2021, water was discharged from the SRF back into Erickson Creek, with limited discharge from the SRF to Bodie and Gate creeks. Although the primary focus of the first EVO LAEMP report is related to the influence of the EVO SRF on Erickson and Michel creeks in 2021, aquatic conditions (water quality, calcite, and selenium concentrations in biota) in Gate and Bodie are also discussed.

Based on the above, the objectives for the EVO LAEMP were expressed as the following study questions (which were determined with Environmental Monitoring Committee (EMC) engagement and detailed in the approved 2021 – 2023 EVO LAEMP study design): (1) Has temperature changed in the receiving environment of Erickson Creek as the result of SRF water treatment? (2) Has calcite in the receiving environment (Erickson, Bodie, Gate, and Michel creeks) been influenced by SRF water treatment and/or calcite prevention (e.g. antiscalant) efforts? (3) Has SRF water treatment and/or calcite prevention (e.g. antiscalant) (a) decreased aqueous concentrations of selenium and nitrate and/or (b) changed other mine-related constituents in effluent and receiving environment (Erickson, Bodie, Gate, and Michel creeks)? (4) Have benthic invertebrate tissue selenium concentrations changed as a result of the SRF in Erickson, Bodie, Gate, and Michel creeks? (5) Are there changes in the benthic invertebrate community in Erickson, Bodie, Gate, and Michel creeks associated with SRF treatment (including calcite prevention)? (6) Is SRF water treatment affecting indicators of productivity (e.g. phosphorus) in the receiving environment? Many areas monitored under the EVO LAEMP have been routinely monitored under the Regional Aquatic Effects Monitoring Program (RAEMP), with additional areas around the SRF outfall (both upstream and downstream) added for additional spatial resolution in Erickson Creek. This LAEMP report details 2021 sampling in September as well as additional confirmatory sampling that occurred in December in Erickson Creek. It should also be noted that results detailed herein take into consideration the lack of fish access in Gate, Bodie, and upper portions of Erickson Creek (due to fish barriers in all three systems).

Water temperature in Erickson Creek downstream of the SRF outfall increased in 2021 in comparison to pre-EVO SRF P2 and were higher than temperatures upstream of the SRF in Erickson Creek throughout the year (~5°C). Water temperatures at the confluence of Erickson and Michel Creek, with few exceptions, met the Site Performance Objective (SPO; which went into effect on August 13, 2021) and this area, as well as those in Michel Creek, were largely within or below guidelines for critical life stages of WCT and bull trout. Calcite in the receiving environment of Gate, Bodie, Erickson and Michel creeks in 2021 was largely similar to, or lower than, previous years (pre-EVO SRF P2) based on observations from this LAEMP as well as the annual Regional Calcite Monitoring Program. The commissioning of the EVO SRF P2 has decreased concentrations of nitrate and total selenium in monitoring areas in Erickson, Gate, Bodie and Michel creeks as expected, but decreases were also noted in Erickson Creek for phosphorus, orthophosphate, and total barium. Although total selenium concentrations decreased in multiple areas of the receiving environment with the commissioning of the EVO SRF P2, both selenite and organoselenium species concentrations increased in Erickson Creek (although not in Gate, Bodie or Michel creeks). A number of other mine-related constituents also increased, with total nickel and total uranium above the interim screening value and the BCWQG, respectively, in the receiving environment of Erickson Creek (and to a lesser degree in Michel Creek below the confluence with Erickson Creek for total nickel). Acute toxicity in areas of Erickson, Gate, Bodie, and Michel creeks, and chronic toxicity testing at the compliance point in Michel Creek, showed no adverse responses to either invertebrate and fish species after exposure to site water in 2021.

Mean benthic invertebrate tissue (BIT) selenium concentrations in Gate and Bodie creeks and the upper portion of Erickson Creek that is below the SRF outfall were above the Level 1 benchmark for effects to benthic invertebrates in 2021. Furthermore, mean BIT selenium concentrations in Gate and the upper portion of Erickson Creek which is below the SRF outfall increased in relation to pre-EVO SRF P2. Selenium concentrations in benthic invertebrates in these areas were not well predicted using the regional one-step water-to-invertebrate lotic selenium accumulation model or the selenium speciation bioaccumulation tool (B-tool). This suggests that evaluations of aqueous total selenium and/or selenium speciation using these models is not sufficient in explaining the elevated BIT selenium concentrations in these areas. Additional investigations to better understand the cause of the elevated selenium concentrations in BIT in Erickson Creek (which received the majority of SRF discharge in 2021) are currently underway as part of an Adaptive Management Plan (AMP) response framework. Mean BIT selenium concentrations in Michel Creek were below the Level 1 benchmark, within the normal range, and similar to reference areas suggesting that elevated BIT selenium concentrations related to SRF discharge are localized to a small area of Erickson Creek.

Although a subset of benthic invertebrate community endpoints (including taxa richness and % EPT [Ephemeroptera, Plecoptera, and Trichoptera]) were lower than reference and below regional and/or habitat-adjusted normal ranges at areas in Erickson Creek (which was not the case for Michel Creek), spatial and temporal trends (both up- and downstream of the SRF outfall) as well as multivariate analyses of BIC composition suggest that these responses are unrelated to commissioning of the SRF. Although periphyton did not show any changes associated with the commissioning of the SRF in 2021, increases in benthic invertebrate productivity (as evident in increases in overall and taxa-specific density and, to a lesser degree, increases in biomass) were observed downstream of the SRF outfall in Erickson Creek. These increases are unlikely due to increased nutrients in the receiving environment (as decreased concentrations of nitrate, phosphorus, and orthophosphate were noted below the outfall of the SRF in Erickson Creek).

Results of the 2021 EVO LAEMP provide information that supports Teck's AMP and inform future monitoring and management efforts. Teck continues to operate the EVO SRF with adjustments to water source treated and discharge location consistent with the designed operating flexibility of the facility. The additional investigations underway to evaluate the cause of elevated selenium concentrations in BIT in Erickson Creek will be included in next year's report.

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ACRONYMS AND ABBREVIATIONS

AMP – Adaptive Management Plan

ANOVA – Analysis of Variance

BCWQG – British Columbia Water Quality Guidelines

BIC – Benthic Invertebrate Community

BIT – Benthic Invertebrate Tissue

CA – Correspondence Analysis

CCA – Canonical Correspondence Analysis

CABIN – Canadian Aquatic Biomonitoring Network

Cc – Calcite concretion

CI – Calcite Index (utilizing Cp)

CI' – Calcite Index (utilizing Cp')

CMm – Coal Mountain Mine

Cp – Calcite Presence (binary assessment)

Cp'– Calcite Presence (percent-based assessment)

CSM – Conceptual Site Model

CRC ICP-MS – Collision Reaction Cell Inductively Coupled Plasma-Mass Spectrometry

CVAFS – Cold Vapour Atomic Fluorescence Spectroscopy

DQR – Data Quality Review

EFN – Environmental Flow Needs

EMC – Environmental Monitoring Committee

ENV – British Columbia Ministry of Environment and Climate Change Strategy (formerly BCMOE)

EPT – Ephemeroptera, Plecoptera, and Trichoptera

EVO – Elkview Operation

EVWQP – Elk Valley Water Quality Plan

FRO – Fording River Operation

GC/MS – Gas Chromatography with Mass Spectrometric Detection

GHO – Greenhills Operation

GLM – Generalized Linear Model

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

ICP-MS – Laser Ablation Inductively Coupled Plasma Mass Spectrometry

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

MOD – Magnitude of Difference

P1 – Phase 1

P2 – Phase 2

PAH – Polycyclic Aromatic Hydrocarbons

PDF – Portable Document Format

QA/QC – Quality Assurance / Quality Control

RAEMP – Regional Aquatic Effects Monitoring Program

R.P. Bio. – Registered Professional Biologist

SME – Subject Matter Expert

SPO – Site Performance Objective

SRF – Saturated Rock Fill

TOC – Total Organic Carbon

WCT – Westslope Cutthroat Trout

1 INTRODUCTION

1.1 Background

Teck Coal Limited (Teck) operates four mines in the Elk River watershed to extract steel-making coal. The four mines are the Fording River Operation (FRO), Greenhills Operation (GHO), Line Creek Operation (LCO), and Elkview Operation (EVO; Figure 1.1). A fifth mine, Coal Mountain Mine (CMm), is also owned by Teck and located in the Elk River watershed; however, it is no longer in operation and has been moved into the care and maintenance designation. Discharges from the mines to the Elk River watershed are authorized by the British Columbia Ministry of Environment and Climate Change Strategy (ENV) through permits that are periodically issued under provisions of the *Environmental Management Act*. Permit 107517[1] specifies the terms and conditions associated with discharges from Teck's five Elk Valley mine operations.

Section 8.3.5 of Permit 107517 outlines the requirements for the EVO Local Aquatic Effects Monitoring Program (LAEMP) as follows:

> *"The permittee must develop and implement a LAEMP to determine the magnitude and extent of influence from EVO SRF (Saturated Rock Fill) discharge on water quality (including temperature), calcite and benthic invertebrate communities to assess what factors are contributing to the observed effects. The study design must be reviewed by the EMC[2] and submitted to the director for approval by June 30, 2021. The LAEMP must be designed to an appropriate temporal scale to capture short term, local effects to the immediate receiving environment, and must consider the possibility of impacts resulting from potential selenium speciation."*

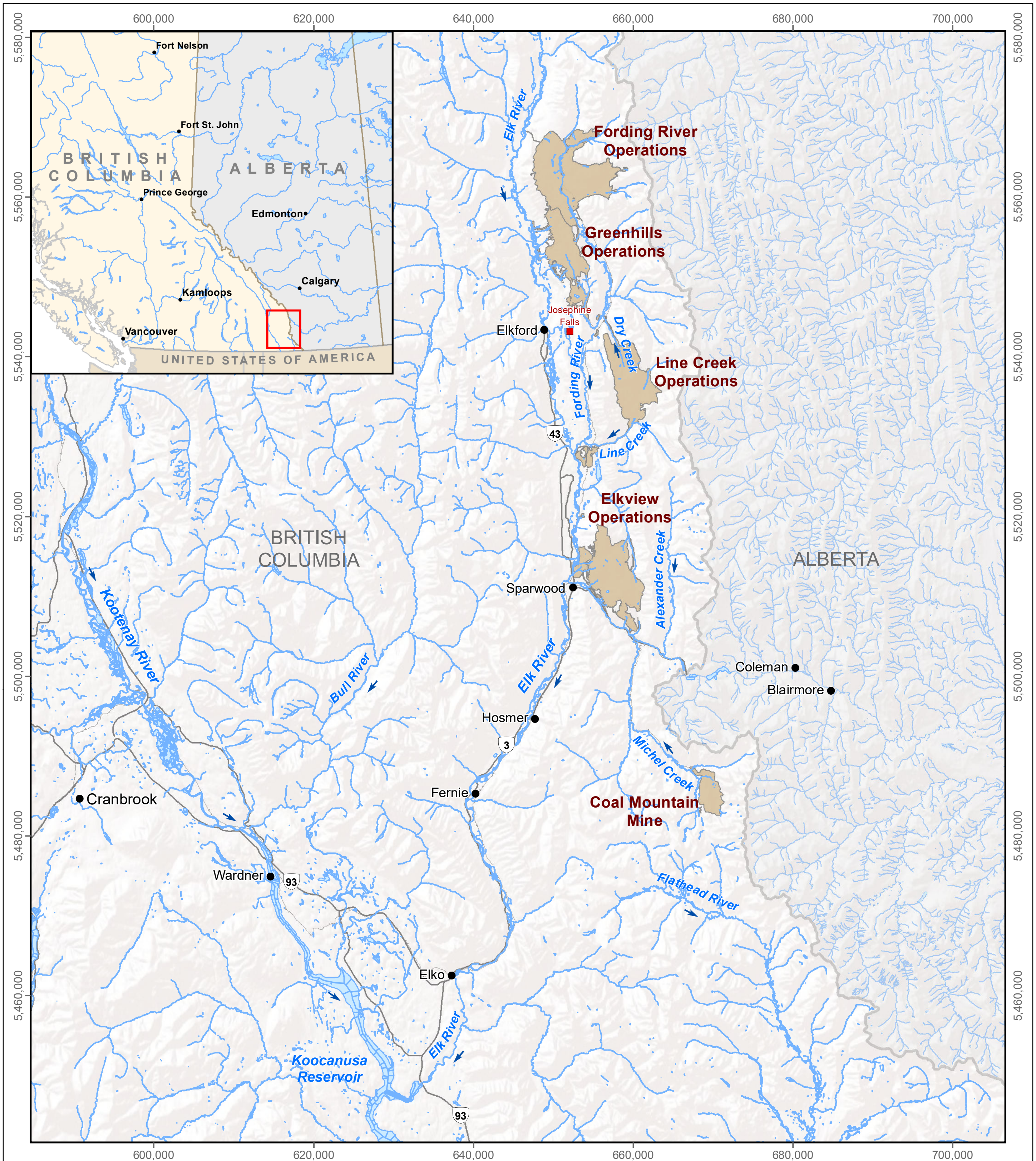
The study design was approved on October 15, 2021, and then amended on March 4, 2022[3].

Section 9.5 of Permit 107517 states:

[1] Permit 107517 was initially issued on November 19, 2014 but has been amended on numerous occasions with the most recent revisions occurring on December 1, 2021.

[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.

[3] The amended study design required sediment quality data from RG_MI3 be included in the EVO LAEMP Annual report, monthly water quality monitoring for EV_MC3a and EV_MC3, selenium bioaccumulation by benthic invertebrates for all areas included in the annual EVO LAEMP report. Additionally, monthly sampling at RG_ERCKUT was required from January to June 2022 with a statistical comparison of water quality to F2_ECIN.



LEGEND

Teck Coal Mine Operations

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

0 10 20 40 km

N E S W

Projection: North American Datum 1983 UTM Zone 11 U

Date: May 2022
Project 217202.0009

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Figure 1.1

Document Path: C:\Users\MLaPalme\Trinity Consultants, Inc\Teck - 217202.0009 - Teck 2021 EVO LAEMP\D - GIS\EVO LAEMP\21-09 Figure 1.1 Teck Coal Limited Operation.mxd

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 June 30 of each year following the data collection calendar year.

In addition to local 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). Data collected under the EVO LAEMP is incorporated into RAEMP reporting.

Teck conducts a variety of additional programs to monitor, evaluate, and/or manage the aquatic effects of mining operations, within the EVO area those include:

- Water Quality Monitoring
- Calcite Management Plan (Calcite Monitoring Program)
- Fish and Fish Habitat Management
- Chronic Toxicity Testing Program
- Tributary Management Plan
- Adaptive Management Plan
- Regional and Site-Specific Groundwater Monitoring Programs
- Environmental Flow Needs (EFN)
- Flow Accretion Studies
- Elkview Operational and Treatment Facilities Report

The EVO LAEMP assesses site-specific conditions as it relates to Saturated Rock Fill (SRF) operation on a more frequent and localized basis than the RAEMP and is spatially restricted to Erickson (upstream and downstream of the SRF Outfall), Gate (upstream and downstream of settling pond), Bodie, and Michel creeks (upstream and downstream of the confluence with Erickson Creek), as well as two upstream reference areas (located on Lower Alexander Creek and upper Michel Creek). The LAEMP will continue as required until sufficient data have been collected to evaluate the study questions and/or relevant ongoing monitoring requirements can be incorporated into the RAEMP.

1.2 SRF Operational Timeline

A key component of Permit 107517 is the incorporation of an adaptive management approach for the advancement of research on treatment technologies to both reduce contaminant loadings in the environment as well as reduce the reliance on long term active water treatment (as noted in Section 7.2 of the Permit). In accordance with this approach, Teck, in January of 2018, commenced a full-scale trial of the EVO SRF (SRF P1) for the removal of aqueous nitrate and selenium from water sourced from Natal Pit, and reported >90% removal of selenium and nitrate from influent waters with a treatment capacity of up to 10,000 m^3/d (Teck 2020a, Figure 1.2). On February 22, 2018 SRF effluent discharge commenced through the Bodie Creek Rock Drain, which then flows to either Bodie or Gate creeks (Teck 2020a). Teck initiated wet-testing of Erickson Creek intake/outfall structure on December 10, 2020, prior to the commissioning phase of EVO SRF P2, and during this time EVO SRF remained in recirculation as the facility continued the biomass growth stage in advance of moving into Erickson Creek forward flow (i.e. treating and discharging back to Erickson Creek) on February 15, 2021 (EVO SRF P2; Teck 2022a). The commissioning phase of the EVP SRF P2 was completed on August 13, 2021, and the facility transitioned to the operations phase on August 14, 2021. Natal pit was brought online as a supplemental influent source for Erickson Creek on November 9, 2021 (Teck 2022a).

The maximum treatment capacity of EVO SRF P2 is 20,000 m^3/d (Teck 2020a), which can be achieved during low flow when water from Erickson Creek is combined with water from Natal Pit for treatment (Figure 1.3) For the majority of 2021[4], treated effluent from the SRF was returned through the intake/outfall structure into the non-fish bearing reach of Erickson Creek (Figure 1.3), with limited discharge in Gate Creek and Bodie Creek through the Bodie Rock Drain. Both the Bodie and Gate Creek catchments have been considerably altered as a result of historical mining, and the original channels of significant portions of these catchments are composed of rock spoils and reclaimed slopes and are acting as rock drains (Teck 2020b). Overall, the effect of the EVO SRF P2 on the receiving environment is expected to be positive (via decreases of selenium and nitrate), however a subset of constituents (nickel, phosphorus, selenite, and organo-selenium species) as well as temperature (Figure 1.4; Erickson Creek only) could increase in the receiving environment as a result of SRF treatment (Golder 2020a, Teck 2020a).

[4] In 2021, the average throughput of the EVO SRF P2 was 12,604 m^3/day and treated a total volume of 4,033,353m^3 in 2021. EVO SRF P2 experienced 53 downtime events in 2021, with five of these events being greater than 24 hours in duration (Teck 2022a).

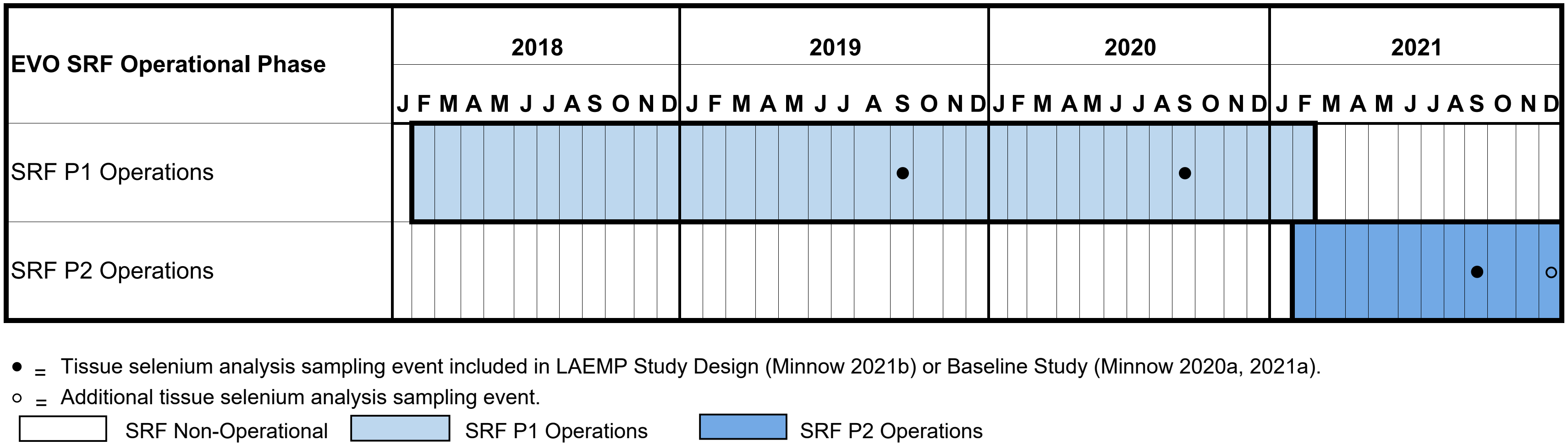
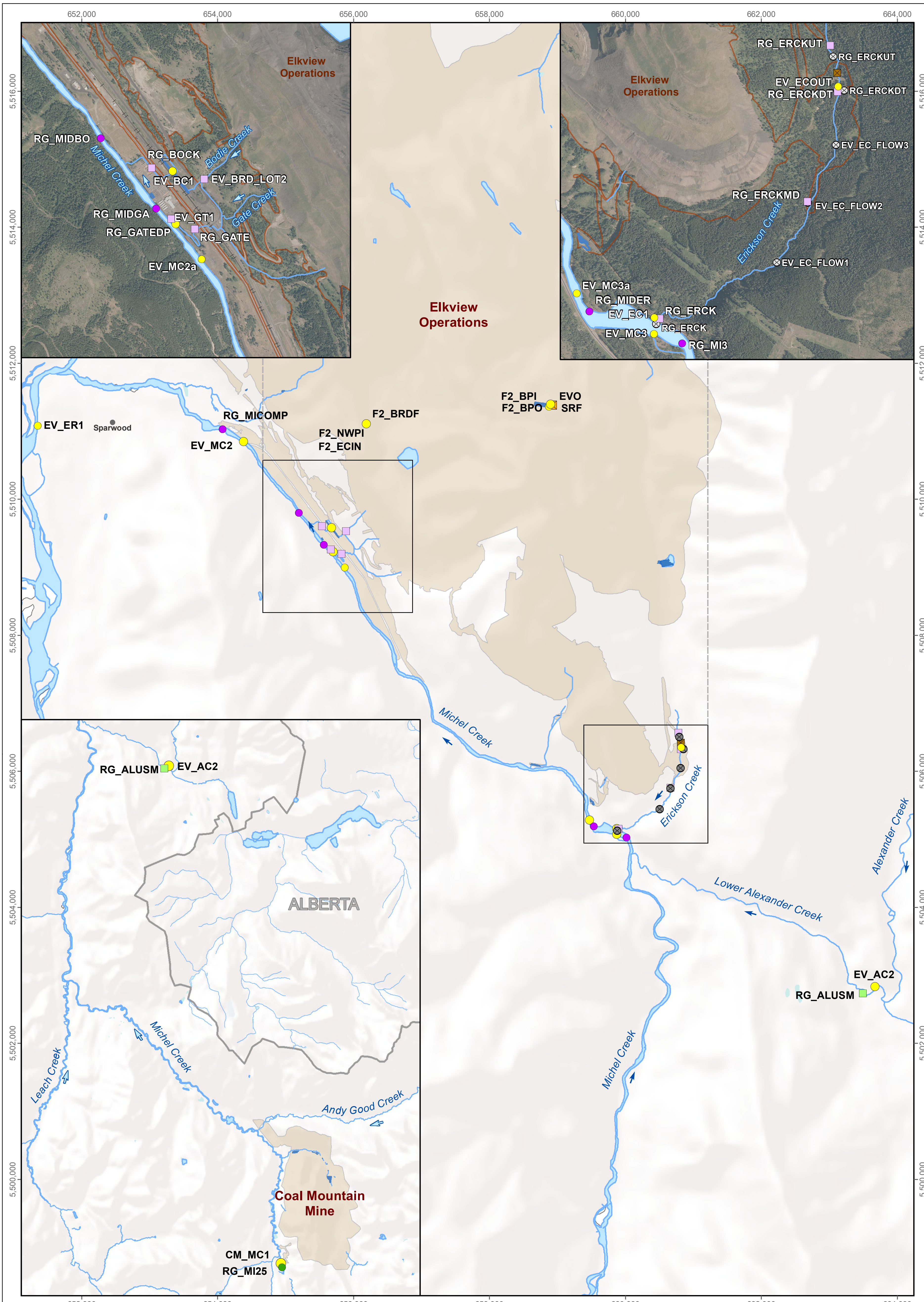


Figure 1.2: Overview of Completed Benthic Invertebrate Tissue Selenium Sampling Events in Relation to Phases of SRF Operation, 2014 to 2021

Notes: EVO = Elkview Operations; SRF = Saturated Rock Fill; P1 = Phase 1 Operations (Natal Pit to Gate and Bodie creeks); P2 Operations = Phase 2 (Erickson Creek and Natal Pit to Erickson Creek).



LEGEND

- Temperature Logger

Sampling Location

- Mine-exposed - Main Stem
- Mine-exposed - Tributary
- Reference - Main Stem
- Reference - Tributary
- Teck Water Quality Monitoring Station
- Elkview Operation Saturated Rock Fill
- SRF Discharge
- Settling Pond
- Tailings Pond
- Teck Coal Mine Operations

Note: [a] two loggers are present at RG_ERCKUT and three loggers are present at RG_ERCK.

EVO LAEMP SRF P2 Biological Monitoring Areas and Teck Water Quality Stations, 2021

0 0.75 1.5 3
km

N S W E

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Figure 1.3

Document Path: C:\Users\MLaPalme\Trinity Consultants, Inc\Teck - 227202.0012 - 2022 EVO LAEMP\D - GIS\Presentation\22-12 Figure 1.3 EVO LAEMP SRF P2 Biological Monitoring Areas and Teck WQ imagery.mxd

LEGEND

- Temperature Logger Station
- Intake/Outfall Location
- Settling Pond
- Tailings Pond
- Teck Coal Mine Operations

Temperature Logger Stations, Erickson Creek

0 0.25 0.5 1 km

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Figure 1.4

Document Path: C:\Users\MLaPalme\Trinity Consultants, Inc\Teck - 217202.0009 - Teck 2021 EVO LAEMP\D - GIS\EVO LAEMP\21-09 Figure 1.4 Temperature Logger Locations, Erickson Creek - v2.mxd

Prior to commissioning of the SRF, studies were conducted to investigate fish habitat and usage (Robinson 2009, Wilkinson 2009, Lotic 2015, and Ecofish 2020) in Gate, Bodie, Erickson, and Michel creeks. In short, results from these studies demonstrated a lack of usage and suitable habitat for fish in these areas, as Bodie and Gate creeks have established and maintained fish barriers and thus are considered non-fish bearing)[5], while upper portions of Erickson Creek (referred to as Reach 2) have a natural fish barrier (i.e., 2 m waterfall) present approximately 290 m upstream of the confluence of Michel Creek. Although fish (specifically Westslope Cutthroat (WCT) and Bull Trout) have been documented in lower portions of Erickson Creek (i.e. below the natural barrier, referred to as Reach 1), this area contains poor fish habitat and likely only provides summer foraging habitat for fish from Michel Creek (Ecofish 2020). Additional existing condition studies evaluating water and sediment quality, benthic invertebrate community, benthic invertebrate tissue (BIT) selenium concentrations, and calcite and periphyton coverage (Minnow 2020a[6], 2021a) demonstrated that these areas (Gate, Bodie, and Erickson Creek) had elevated concentrations of aqueous selenium, nitrate, and other water quality constituents greater than Elk Valley Water Quality Plan (EVWQP) benchmarks and/or British Columbia Water Quality Guidelines (BCWQGs), high calcification, and low benthic invertebrate community abundance (in Gate Creek) and richness upstream (RG_ERCKUT) and downstream (RG_ERCKDT) of the SRF outfall in Erickson Creek), as well as elevated concentrations of selenium in benthic invertebrate tissue in Gate and Bodie creeks. In Michel Creek, most water quality constituents were below relevant Elk Valley Water Quality Plan (EVWQP) benchmarks/BCWQGs and benthic invertebrate community (BIC) metrics were within regional reference normal ranges.

Sampling completed in September 2021 showed that mean tissue selenium concentrations in benthic invertebrates were elevated above Level 1 benchmarks for benthic invertebrates (for growth, reproduction, and survival) at RG_ERCKDT[7]. Confirmation sampling was conducted in December of 2021 in multiple sampling areas in Erickson Creek including RG_ERCKUT, RG_ERCKDT, and RG_ERCK. Additionally, for spatial resolution of selenium concentration in

[5] Teck also routinely conducts fish salvage efforts in Bodie and Gate creeks (which are constructed discharge channels) to manage fish exclusion from these areas (Teck 2020a)

[6] The term “baseline” was previously used when evaluating the existing conditions of the EVO area (Minnow 2020a). As mining was already established in this area, the term “baseline” has been updated to “existing conditions” to more accurately describe the nature of the data collected.

[7] Benthic invertebrate tissue selenium concentrations were also elevated above benchmark values for benthic invertebrates (for growth, reproduction and survival) in Gate Creek (RG_GATE >Level 2 benchmark and RG_GATEDP >Level 1 benchmark) and Bodie Creek (RG_BOCK >Level 3 benchmark). However, discharge of the SRF was limited in Bodie or Gate Creek in 2021, and thus elevated selenium concentrations in BIT at these areas is not believed to be caused by SRF treatment. Furthermore, concentrations in Bodie Creek (at RG_BOCK) are similar to those Pre-SRF (2015 and 2016).

BIT an additional sampling area, RG_ERCKMD (located midway between RG_ERCKDT and RG_ERCK), was also sampled in December of 2021 (Figure 1.3).

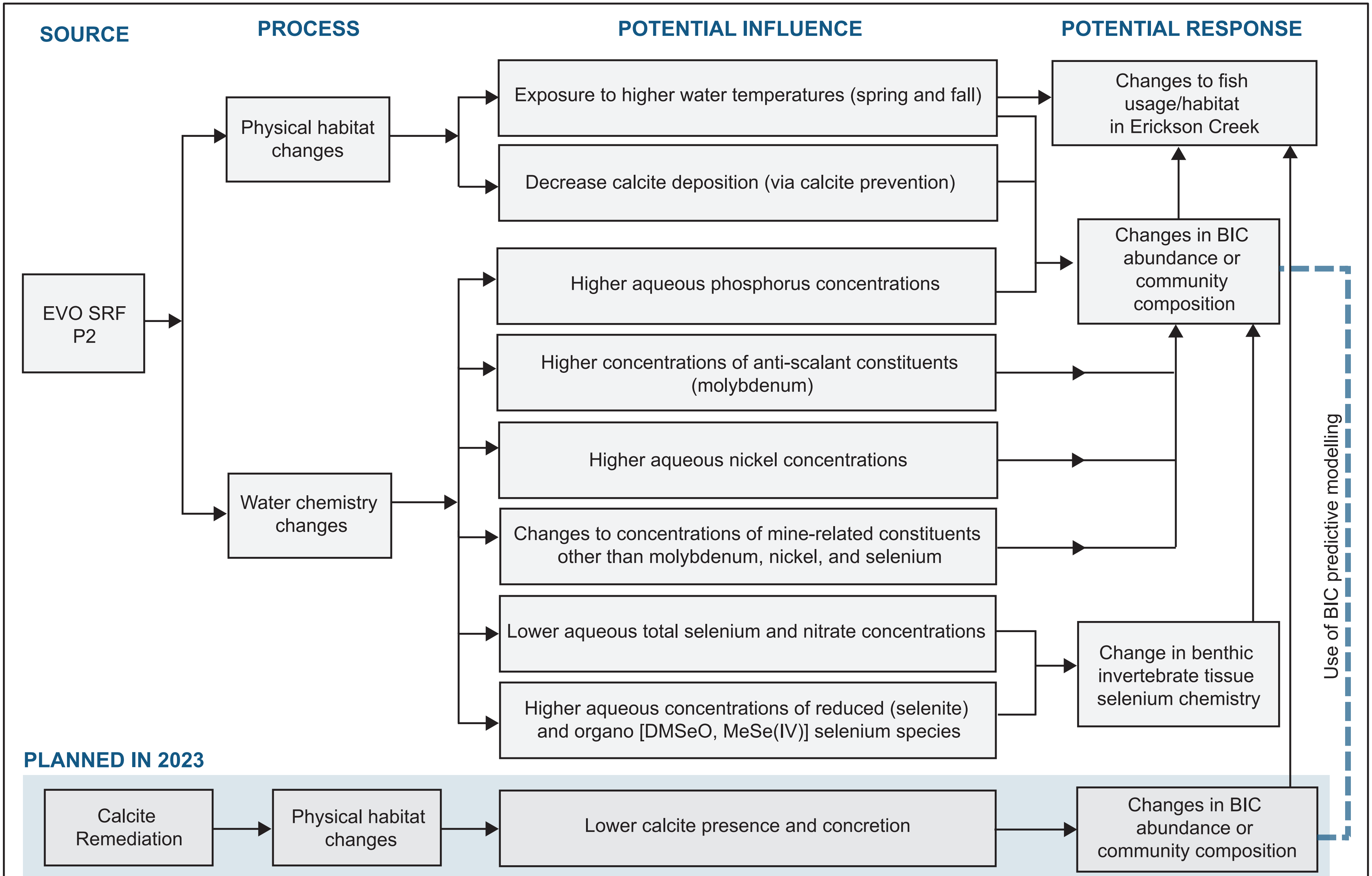
1.3 Study Questions

As illustrated by the conceptual site model (CSM; Figure 1.5), the EVO LAEMP was primarily designed to assess the magnitude and extent of influence from the EVO SRF in receiving environment (Erickson, Bodie, Gate, and Michel creeks; Figure 1.3) on water quality (including temperature (Figure 1.5), calcite, benthic invertebrate communities, and BIT selenium chemistry. The objective of the EVO LAEMP, together with the results from SRF Trial, the existing conditions studies, and EMC engagement (Minnow 2020a, Minnow 2021a) led to the development of the following study questions:

1. Has temperature changed in the receiving environment of Erickson Creek as the result of SRF water treatment?
2. Has calcite in the receiving environment (Erickson, Bodie, Gate, and Michel creeks) been influenced by SRF water treatment and/or calcite prevention (e.g. antiscalant) efforts?
3. Has SRF water treatment and/or calcite prevention (e.g. antiscalant) (a) decreased aqueous concentrations of selenium and nitrate and/or (b) changed other mine-related constituents in effluent and receiving environment (Erickson, Bodie, Gate, and Michel creeks)?
4. Have benthic invertebrate tissue selenium concentrations changed as a result of the SRF in Erickson, Bodie, Gate, and Michel creeks?
5. Are there changes in the benthic invertebrate community in Erickson, Bodie, Gate, and Michel creeks associated with SRF treatment (including calcite prevention)?
6. Is SRF water treatment affecting indicators of productivity (e.g. phosphorus) in the receiving environment?

1.4 Linkages to the Adaptive Management Plan for Teck Coal in the Elk Valley

Teck has developed an Adaptive Management Plan (AMP) to support implementation of the 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 identified six Management Questions that are re-evaluated at regular intervals as part of AMP updates throughout EVWQP implementation. Data from the RAEMP (Minnow 2020b) and the



Conceptual Site Model for Potential Mine-Related Effects on the Aquatic Ecosystem

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Project 207202.0009

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Figure 1.5

Trinity Consultants Inc/Teck - 217202.0009 - Teck 2021 EVO LAEMP\D - GIS\Graphics\EVO LAEMP Figure 1.4 Conceptual Site Model various LAEMPs (including the EVO LAEMP) 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.

Although the EVO LAEMP was primarily designed to monitor conditions associated with the SRF operation and to answer site-specific questions on an annual basis (Section 1.3). Management actions as part of an AMP response framework may be triggered at any time during the course of each annual LAEMP cycle (results are reported on June 30th of each year for the preceding calendar year) depending on the answers to site-specific LAEMP questions and on available data. For example, the EVO LAEMP Question #4 is: "Have benthic invertebrate tissue selenium concentrations changed as a result of the SRF in Erickson, Bodie, Gate, and Michel creeks?". Monitoring in September 2021 identified that despite decreased total selenium concentrations below the SRF outfall (as well as other areas downstream in Erickson Creek), tissue selenium concentrations in benthic invertebrates were elevated in the nearest sampling areas downstream of the SRF outfall, RG_ERCKDT, (as reported in Section 4 and 6, respectively). This prompted Teck to initiate further investigations in Erickson Creek as part of adaptive management, which confirmed that elevated BIT selenium concentrations were present. Teck is currently conducting additional investigations to better understand the cause of the elevated selenium concentrations in BIT in Erickson Creek using the AMP response framework with the assistance of subject matter experts (SMEs) and regulators. Finally, additional BIT sampling events have also been implemented, as part of the AMP response framework, to allow for a more detailed understanding of SRF performance and stabilization (starting in March 2022). Investigation monitoring plans and schedules will continue to adapt to findings in the field and operational needs. Teck continues to operate the EVO SRF with adjustments to water source treated and discharge location consistent with the designed operating flexibility of the facility. The additional investigations underway to evaluate the cause of elevated selenium concentrations in BIT in Erickson Creek will be included in next years report.

In addition to addressing questions specific to the EVO LAEMP on an annual basis, monitoring data from the LAEMP will contribute to the broader data set assessed every three years within the RAEMP. The RAEMP is primarily designed to evaluate Management Question #5 of the AMP (i.e., "Does monitoring indicate that mine-related changes in aquatic ecosystem conditions are consistent with expectations?"). Data from the RAEMP is also used in the evaluation of Management Question #2, (i.e., "Will aquatic ecosystem health be protected by meeting the long-term site performance objectives?) and 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, e.g., Teck 2020c). Information acquired from the EVO LAEMP will be used in conjunction with other studies in the Elk Valley area (including other LAEMPs and the RAEMP) to reduce these uncertainties and provide additional context to the ecological conditions of the Elk Valley area as a whole. Furthermore, monitoring as part of the EVO LAEMP will follow an adaptive approach under the AMP response framework, to inform whether further investigations or adjustments are required in future EVO LAEMP study designs.

The evaluation of biological triggers is incorporated into the current report as part of Management Question #5 of the AMP (Teck 2021a). Biological triggers were developed in consultation with the EMC for a subset of the biological monitoring endpoints that are effective indicators of changes at the ecosystem level. The purpose of the biological triggers is to quickly identify biological monitoring areas where unexpected biological conditions may be occurring that may require management action. In this LAEMP report, percent EPT (Ephemeroptera [mayflies], Plecoptera [stoneflies], and Trichoptera [caddisflies]) and composite-taxa BIT tissue selenium concentration in 2021 were assessed against their respective biological triggers (additional information and methods pertaining to this analysis can be found in Appendix G).

The third annual AMP report was submitted on July 31, 2021 and included monitoring data collected in 2020 (Teck 2021b). In 2020, concentrations of aqueous total selenium, nitrate, sulfate, and cadmium met the SPO (monthly average) at both the EVO Michel Creek Compliance Point (EV_MC2) and the Elk River Compliance Point (EV_ER1; Teck 2021b), which is similar to past years (Teck 2019a, 2020c). 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 2021a) and the 2020 Annual AMP report (Teck 2021b).

2 METHODS

2.1 Overview

The general approach for the EVO LAEMP (Table 2.1) includes a description 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 2021 calendar year for all endpoints. Historical data are also presented where appropriate.

Water quality and biological samples were collected from established monitoring areas in Erickson, Bodie, Gate, and Michel creeks (Figure 1.3; Tables 2.2 and 2.3). Biological monitoring areas are the same locations utilized as part of previous existing conditions evaluations to support the EVO SRF P2 (Minnow 2020a, 2021a). Biological monitoring areas include those potentially influenced by the SRF, including areas above (RG_ERCKUT) and below (RG_ERCKDT) the SRF intake/outfall structure in the non-fish bearing reach of Erickson Creek as well as above the sediment pond in Gate Creek (RG_GATE) and below the sedimentation pond in Bodie Creek (RG_BOCK), consistent with established RAEMP locations (Minnow 2021c). Four areas in Michel Creek, the receiving environment for the three potential SRF P2-influenced creeks, were also sampled. Specifically, sampling locations in Michel Creek included areas directly above (RG_MI3) and below the Erickson Creek confluence (RG_MIDER), areas further downstream below the Gate Creek (RG_MIDGA) and Bodie Creek (RG_MIDBO) confluences, and an area downstream of all EVO influence into Michel Creek (RG_MICOMP; EVO Compliance point). Two reference areas were included in Alexander Creek (RG_ALUSM) and upper Michel Creek (RG_MI25). Per request from the EMC, an additional sampling area was also added downstream of the Gate Creek sedimentation ponds (i.e. RG_GATEDP). Although concurrent water samples are taken during sampling at each of these areas, biological areas are also paired with Teck routine water quality stations (when applicable) to provide additional temporal information regarding water quality. In December 2021, an additional area was sampled for BIT and water quality to add spatial resolution of BIT selenium concentrations in Erickson Creek (RG_ERCKMD; Figure 1.3). Additional monitoring under the selenium speciation program (Golder 2021a), including selenium speciation and BIT sampling at EV_GT1 (RG_GATEDP) and EV_BC1 (RG_BOCK) from August 2021 was evaluated and is included in the current report where applicable. Continuous water temperature was also monitored at several locations in Erickson Creek, including RG_ERCKUT, RG_ERCKDT, EV_EC_FLOW3, EV_EC_FLOW2, and EV_EC_FLOW1 (Figure 1.4; Table 2.4).

To address the study questions described in Section 1.3, the 2021 EVO LAEMP included evaluation of the following components:

Table 2.1: Approach for the EVO LAEMP, 2021 to 2023

Study Questions	Water				Biological			
	Measurement Endpoint	Indicator Type	Areas[a]	Evaluation Criteria[b]	Measurement Endpoint	Indicator Type	Areas	Evaluation Criteria[b]
Study Question #1: Has temperature changed in the receiving environment of Erickson Creek as the result of SRF water treatment?	Temperature	Indirect	RG_ERCKUT, RG_ERCKDT, EV_EC_FLOW3, EV_EC_FLOW2, EV_EC_FLOW1, RG_ERCK (via data loggers)	Comparison to water quality guidelines and SPO criteria.	Benthic invertebrate community structure (abundance, richness, %EPT, %Ephemeroptera, %Chironomidae)	Direct	RG_ERCKUT, RG_ERCKDT, RG_ERCK	Comparison to results from past observations, reference areas, and reference normal ranges.
Study Question #2: Has calcite in the receiving environment (Erickson, Bodie, Gate, and Michel creeks) been influenced by SRF water treatment and/or calcite prevention (e.g. antiscalant) efforts?	Calcite	Indirect	RG_ALUSM, RG_MI25, RG_ERCKUT, RG_ERCKDT, RG_ERCK, RG_GATE[e], RG_BOCK[e], RG_MI3, RG_MIDER, RG_MIDGA, RG_MIDBO, RG_MICOMP	Comparison to results for past observations, reference areas, and to future SPO criteria. Comparison between SRF downstream and upstream areas.	Benthic invertebrate community structure (abundance, richness, %EPT, %Ephemeroptera, %Chironomidae)	Direct	RG_ALUSM, RG_MI25, RG_ERCKUT, RG_ERCKDT, RG_ERCK, RG_GATE[e], RG_BOCK[e], RG_MI3, RG_MIDER, RG_MIDGA, RG_MIDBO, RG_MICOMP	Comparison to results from past observations, reference areas, and reference normal ranges.
Study Question #3: Has SRF water treatment and/or calcite prevention (e.g. antiscalant) (a) decreased aqueous concentrations of selenium and nitrate and/or (b) changed other mine-related constituents in effluent and receiving environment (Erickson, Bodie, Gate, and Michel creeks)?	Water Quality	Indirect	RG_ALUSM, RG_MI25, RG_ERCKUT, RG_ERCKDT, RG_ERCK, RG_GATE, RG_GATEDP, RG_BOCK, RG_MI3, RG_MIDER, RG_MIDGA, RG_MIDBO, RG_MICOMP	Comparisons to results for past observations, reference areas, and to water quality guidelines and benchmarks. Comparison between SRF downstream and upstream areas.	Benthic invertebrate community structure (abundance, richness, %EPT, %Ephemeroptera, %Chironomidae)	Direct	RG_ALUSM, RG_MI25, RG_ERCKUT, RG_ERCKDT, RG_ERCK, RG_GATE[e], RG_BOCK[e], RG_MI3, RG_MIDER, RG_MIDGA, RG_MIDBO, RG_MICOMP	Comparison to results from past observations, reference areas, and reference normal ranges.
	Sediment Quality	Indirect	RG_ALUSM, RG_MI25, RG_ERCKUT, RG_ERCKDT, RG_MICOMP					
	Aqueous Toxicity[c]	Semi-direct	Acute: F2_BPO, EV_ECOUT, EV_EC1, EV_GT1, and EV_BC1 Chronic: EV_MC2	Comparison to reference areas and expectations based on aqueous concentrations of mine-related chemicals.				
Study Question #4: Have benthic invertebrate tissue selenium concentrations changed as a result of the SRF in Erickson, Bodie, Gate, and Michel creeks?	Total and dissolved selenium concentrations	Indirect	RG_ALUSM, RG_MI25, RG_ERCKUT, RG_ERCKDT, RG_ERCK, RG_GATE, RG_GATEDP, RG_BOCK, RG_MI3, RG_MIDER, RG_MIDGA, RG_MIDBO, RG_MICOMP	Comparison to results for past observations and reference areas. Comparison between SRF downstream and upstream areas.	Benthic invertebrate tissue selenium (composite taxa samples)	Indirect	RG_ALUSM, RG_MI25, RG_ERCKUT, RG_ERCKMD[f], RG_ERCKDT, RG_ERCK, RG_GATE, RG_GATEDP, RG_BOCK, RG_MI3, RG_MIDER, RG_MIDGA, RG_MIDBO, RG_MICOMP	Concentrations relative to effect benchmarks, past observations, and reference area results. Comparison to lotic bioaccumulation models.
	Selenium speciation	Indirect	RG_ALUSM, RG_MI25, RG_ERCKUT, RG_ERCKDT, RG_ERCK, RG_GATE, RG_GATEDP, RG_BOCK, RG_MI3, RG_MIDER, RG_MIDGA, RG_MIDBO, RG_MICOMP		Benthic invertebrate community structure (abundance, richness, %EPT, %Ephemeroptera, %Chironomidae)	Direct	RG_ALUSM, RG_MI25, RG_ERCKUT, RG_ERCKDT, RG_ERCK, RG_GATE[e], RG_BOCK[e], RG_MI3, RG_MIDER, RG_MIDGA, RG_MIDBO, RG_MICOMP	Comparison to results from past observations, reference areas, and reference normal ranges.
Study Question #5: Are there changes in the benthic invertebrate community in Erickson, Bodie, Gate, and Michel creeks associated with SRF treatment (including calcite prevention)?	Temperature	Indirect	See Study Question #1		Benthic invertebrate community structure (abundance, richness, %EPT, %Ephemeroptera, %Chironomidae)	Direct	RG_ALUSM, RG_MI25, RG_ERCKUT, RG_ERCKDT, RG_ERCK, RG_GATE[e], RG_BOCK[e], RG_MI3, RG_MIDER, RG_MIDGA, RG_MIDBO, RG_MICOMP	Comparison to results from past observations, reference areas, and reference normal ranges.
	Calcite	Indirect	See Study Question #2					
	Water Quality and Supporting Evidence[d]	Indirect	See Study Question #3					
Study Question #6: Is SRF water treatment affecting indicators of productivity (e.g. phosphorus) in the receiving environment?	Phosphorus and other nutrient concentrations	Indirect	RG_ALUSM, RG_MI25, RG_ERCKUT, RG_ERCKDT, RG_ERCK, RG_GATE, RG_GATEDP, RG_BOCK, RG_MI3, RG_MIDER, RG_MIDGA, RG_MIDBO, RG_MICOMP	Comparison to results from past observations, reference areas, and to available water quality guidelines.	Visual Periphyton Coverage	Direct	RG_ALUSM, RG_MI25, RG_ERCKUT, RG_ERCKDT, RG_ERCK, RG_GATE, RG_GATEDP, RG_BOCK, RG_MI3, RG_MIDER, RG_MIDGA, RG_MIDBO, RG_MICOMP	Comparison to results from past observations
					Benthic invertebrate density, biomass, and community	Direct	RG_ERCKUT, RG_ERCKDT	Comparison to results from past observations and reference areas.
					Benthic invertebrate community structure (abundance, richness, %EPT, %Ephemeroptera, %Chironomidae)	Direct	RG_ALUSM, RG_MI25, RG_ERCKUT, RG_ERCKDT, RG_ERCK, RG_GATE[e], RG_BOCK[e], RG_MI3, RG_MIDER, RG_MIDGA, RG_MIDBO, RG_MICOMP	Comparison to results from past observations, reference areas, and reference normal ranges.

Notes: SPO = Site Performance Objective. EPT = Ephemeroptera, Plecoptera, and Trichoptera. SRF = Saturated Rock Fill.

[a] Areas listed under 'Water' include only those taken for the purposes of the EVO LAEMP (i.e. sampling conducted concurrently with biological sampling). Additional information regarding Teck's routine water quality monitoring is shown in Table 2.3.

[b] Comparison to past observations refers to comparison of results during SRF operation to results prior to SRF operation.

[c] Aqueous acute and chronic toxicity are evaluated as part of permit 107517 through the Annual Water Quality Monitoring Program and Annual Chronic Toxicity Testing Program, respectively. Results from these studies are used to support the water quality results collected for the EVO LAEMP.

[d] Supporting evidence includes sediment quality and aqueous acute and chronic toxicity.

[e] Benthic invertebrate community structure and calcite were not evaluated at RG_GATE or RG_BODIE in 2021 as suitable riffle habitat was not identified, which is consistent with CABIN protocols.

[f] RG_ERCKMD was added in December 2021 to add spatial resolution to selenium concentrations in benthic invertebrate tissue in Erickson Creek.

Table 2.2: Sampling Design for EVO SRF P2 LAEMP Monitoring in 2021

Area	Biological Area Code	UTMs		September 2021								Additional Sampling - December 2021		
				Water[a]					Benthic Invertebrates			Water		
		Easting	Northing	Selenium Speciation	Water Quality	Sediment Quality	Calcite Index[b]	Periphyton Visual Coverage Score	Kick Sampling (Community)	Hess Sampling (Density, Biomass, Community)	BIC Tissue Selenium Sampling	Selenium Speciation	Water Quality	BIC Tissue Selenium Sampling
Reference	RG_ALUSM	663516	5502707	n=1 (✓)	n=1 (✓)	n=3 (✓)	n=3 (✓)	n=5 (✓)	n=3 (✓)	-	n=3 (✓)	-	-	-
	RG_MI25	668195	5482814	n=1 (✓)	n=1 (✓)	n=3 (✓)	n=3 (✓)	n=5 (✓)	n=3 (✓)	-	n=3 (✓)	-	-	-
Mine-exposed	RG_ERCKUT	660791	5506595	n=1 (✓)	n=1 (✓)	n=5 (✓)	n=3 (✓)	n=5 (✓)	n=3 (✓)	n=10 (✓)	n=5 (✓)	n=1	n=1	n=5
	RG_ERCKDT	660816	5506325	n=1 (✓)	n=1 (✓)	n=5 (✓)	n=3 (✓)	n=5 (✓)	n=3 (✓)	n=10 (✓)	n=5 (✓)	n=1	n=1	n=5
	RG_ERCKMD	660662	5505759	-	-	-	-	-	-	-	-	n=1	n=1	n=5
	RG_ERCK	659748	5505095	n=1 (✓)	n=1 (✓)	n=5[e]	n=1 (✓)	n=5 (✓)	n=1 (✓)	-	n=1 (✓)	n=1	n=1	n=3
	RG_GATE	655845	5509206	n=1 (✓)	n=1 (✓)	-	n=0[d]	n=5 (✓)[f]	n=0[d]	-	n=3 (✓)	-	-	-
	RG_GATEDP[c]	655654	5509261	n=1 (✓)	n=1 (✓)	-	-	n=1 (✓)[f]	-	-	n=3 (✓)	-	-	-
	RG_BOCK[c]	655417	5509642	n=1 (✓)	n=1 (✓)	-	n=0[d]	n=1[f]	n=0[d]	-	n=3 (✓)	-	-	-
	RG_MI3	660022	550524	n=1 (✓)	n=1 (✓)	n=4[e]	n=3 (✓)	n=5 (✓)	n=3 (✓)	-	n=3 (✓)	-	-	-
	RG_MIDER	659591	5505157	n=1 (✓)	n=1 (✓)	n=5[e]	n=3 (✓)	n=5 (✓)	n=3 (✓)	-	n=3 (✓)	-	-	-
	RG_MIDGA	660022	5505024	n=1 (✓)	n=1 (✓)	-	n=3 (✓)	n=5 (✓)	n=3 (✓)	-	n=3 (✓)	-	-	-
	RG_MIDBO	655225	5509758	n=1 (✓)	n=1 (✓)	-	n=3 (✓)	n=5 (✓)	n=3 (✓)	-	n=3 (✓)	-	-	-
	RG_MICOMP	654308	5510897	n=1 (✓)	n=1 (✓)	n=5 (✓)	n=5 (✓)	n=5 (✓)	n=5 (✓)	-	n=5 (✓)	-	-	-

Notes: (✓) = target sample size met, "-" = no sampling expected, BIC = Benthic Invertebrate Composite-Taxa, LAEMP = local aquatic environmental monitoring program, TBD = to be determined (new sampling). Target sample size is shown. RG_ERCKMD was added in December 2021 for additional spatial resolution of benthic invertebrate tissue selenium concentrations in Erickson Creek.

[a] Water sampling does not include sampling conducted by Teck.

[b] In the initial study design, calcite index was to be evaluated once at each area. To be consistent with CABIN protocols (and other LAEMP projects and the RAEMP), calcite was evaluated at each riffle that kick sampling (community) was evaluated.

[c] Benthic invertebrate tissue and selenium speciation sampling at RG_GATEDP and RG_BOCK also occurred in August 2022 as part of the Selenium Speciation program.

[d] RG_GATE and RG_BOCK were not evaluated using kick and sweep sampling for benthic invertebrate community monitoring or calcite index as the sampling reach did not have a "well-established riffle or straight run" present (which is a requirement for CABIN sampling [Environment Canada 2012a]).

[e] Sediment sampling was conducted as part of the RAEMP at RG_ERCK, RG_MI3, and RG_MIDER.

[f] Visual periphyton monitoring is part of the CABIN protocol and thus only expected to occur if benthic invertebrate community evaluations and other CABIN protocols are conducted. Although CABIN protocols did not occur at RG_GATE, RG_GATEDP, and RG_BOCK, periphyton visual scores were still utilized. In the study design, RG_BOCK was to be evaluated at five areas, but to the limited habitat and area of study only one visual inspection was conducted.

Table 2.3: Summary of Water Quality Monitoring for EVO LAEMP SRF per Permit 107517

Stream (Location Description)	Biological Station Code	Teck Water Station Code	EMS Number	UTM (NAD83, 11U)		Water Quality Samples					
				Easting	Northing	Area Type	Field Parameters[a]	All Other Parameters Required Under Mine Permits[b]	Selenium Speciation	Toxicity[c]	
										Acute[d]	Chronic[e]
Alexander Creek	RG_ALUSM	EV_AC2	-	663482	5502718	Reference	S	S	-	-	-
Michel Creek (upstream of Coal Mountain Operations)	RG_MI25	CM_MC1	E258175	668209	5482832	Reference	W/M	W/M	-	-	-
Natal West Pit Intake	-	F2_NWPI	E321791	656193	5511083	Influent	D	M	W	-	-
Erickson Creek Intake	-	F2_ECIN[f]	E321811	656195	5511082	Influent	D	M	W	-	-
Effluent Retention Pond Outlet	-	F2_BPO	E321812	658874	5511362	Effluent	D	M	W	Q	-
Erickson Creek Outfall	-	F2_ECF	E321813	660812	5506372	Effluent	C	-	-	-	-
Bodie Rock Drain	-	F2_BRDF	E321815	656185	5511108	Effluent	-	-	-	-	-
Erickson Creek upstream of SRF Outfall	RG_ERCKUT[f]	-	-	660811	5506509	Mine-exposed	S	S	S	-	-
Erickson Creek downstream of SRF Outfall	RG_ERCKDT	EV_ECOUT	E321814	660816	5506325	Mine-exposed	W/M	M	S	Q	-
Midpoint in Erickson Creek	RG_ERCKMD[g]	--	--	660659	5505736	Mine-exposed	S	S	S	-	-
Erickson Creek at Mouth (discharge to Michel Creek)	RG_ERCK	EV_EC1	0200097	659909	5505172	Mine-exposed	W/M	M	S	Q	-
Gate Creek (upstream of settling pond)	RG_GATE	--	--	655824	5509196	Mine-exposed	S	S	S	-	-
Gate Creek Sedimentation Pond Decant	RG_GATEDP	EV_GT1	E206231	655654	5509261	Mine-exposed	W/M	W/M	S	Q	-
Bodie Creek Sedimentation Pond Decant	RG_BOCK	EV_BC1	E102685	655536	5509605	Mine-exposed	W/M	W/M	S	Q	-
Michel Creek upstream of Erickson Creek	RG_MI3	EV_MC3[h]	200203	660032	5505022	Mine-exposed	W/M	W/M	M	-	-
Michel Creek downstream of Erickson Creek	RG_MIDER	EV_MC3a[i]	E327471	659482	5505234	Mine-exposed	M	M	M	-	-
Michel Creek upstream of Gate Creek	-	EV_MC2a	E310168	655871	5508994	Mine-exposed	W/M	M	M	-	-
Michel Creek downstream of Gate Creek	RG_MIDGA	-	-	655565	5509332	Mine-exposed	S	S	S	-	-
Michel Creek downstream of Bodie Creek	RG_MIDBO	-	-	655194	5509803	Mine-exposed	S	S	S	-	-
Michel Creek downstream of Hwy #3 Bridge (Compliance Point)	RG_MICOMP	EV_MC2[j]	E300091	654367	5510857	Mine-exposed	W/M	W/M	M	-	Q/SA
Elk River downstream of Michel Creek at C.P.R. Roadhouse	-	EV_ER1	200393	651354	5511080	Mine-exposed	W/M	W/M	-	-	-

Notes: "-" = sampling will not be completed at this area, UTM = Universal Transverse Mercator, EVO = Elkview Operations, SRF = Saturated Rock Fill, C = Continuous Monitoring (Temperature Only), D = daily, M = monthly, W = weekly, W/M = weekly during freshet (March 15 to July 15), monthly otherwise, Q = quarterly, S = September (once), SA = semi-annual. Sampling frequency is currently managed through the permit.

[a] Dissolved oxygen, water temperature, specific conductance, pH.

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

[c] Aqueous acute and chronic toxicity are evaluated as part of permit 107517 through the Annual Water Quality Monitoring Program and Annual Chronic Toxicity Testing Program, respectively. Results from these studies are used to support the water quality results collected for the EVO LAEMP.

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

[e] 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.

[f] Routine water quality from Erickson Creek Intake (i.e. Influent) will be paired with the biological sampling area, RG_ERCKUT.

[g] RG_ERCKMD was added in December 2022 to add additional spatial resolution to selenium concentrations in benthic invertebrate tissue in Erickson Creek.

[h] The location of the Teck Compliance station, EV_MC3, is different than the biological sampling area (RG_MI3). The UTMs for EV_MC3 are 659833E and 5505234N.

[i] Monthly sampling at EV_MC3a was added to the EVO LAEMP study design on March 4, 2022 and will be paired with RG_MIDER.

[j] The location of the Teck Compliance station, EV_MC2, is different than the biological sampling area (RG_MICOMP). The UTMs for EV_MC2 are 655871E and 5508994N.

Table 2.4: Temperature Data Logger Locations in Erickson Creek, 2021

Logger ID	Location Description	UTM (NAD83, 11U)	
		Easting	Northing
RG_ERCKUT[a]	Temperature upstream of Intake/ Outfall	660794	5506508
RG_ERCKDT	Temperature downstream of Intake/ Outfall	660851	5506333
EV_EC_FLOW3	Temperature ~450 m downstream of Intake/ Outfall	660809	5506052
EV_EC_FLOW2	Temperature ~800 m downstream of Intake/ Outfall	660662	5505759
EV_EC_FLOW1	Temperature ~1,250 m downstream of Intake/ Outfall	660502	5505446
RG_ERCK[b]	Temperature ~50 m upstream of Erickson Creek confluence with Michel Creek	659866	5505130

Note: UTM = Universal Transverse Mercator.

[a] The UTMs shown are those for the temperature logger furthest upstream and the logger that was part of the initial study design. The other logger location is roughly 35 m downstream of this location (UTM: 660817E, 5506482N).

[b] The UTMs shown are those for the temperature logger at RG_ERCK that was part of the initial study design. An additional temperature logger, which is within ~25 m of the initial logger (UTM: 659872, 5505089) was utilized for contingency purposes. EV_EC1 temperature logger (UTM: 659867, 5505170) is in a similar vicinity but upstream of both of the RG_ERCK temperature loggers.

- Water temperature in Erickson Creek recorded continuously with data loggers;
- Concentration of total selenium and other constituents (i.e. those listed in Section 2.2.2) in sediment;
- Calcite presence and concretion in receiving environment;
- Concentrations of nutrients, total selenium, selenium species, and other constituents (i.e. those listed in Section 2.3.1) in water, based on concurrent and routine water quality monitoring;
- Acute toxicity of SRF retention pond outlet effluent (F2_BPO) and four surface water locations from Erickson (EV_ECOUT [RG_ERCKDT] and EV_EC1 [RG_ERCK]), Bodie (EV_BC1 [RG_BOCK]), and Gate (EV_GT1 [RG_GATEDP]), as well as chronic toxicity of surface water from the compliance point EV_MC2 (RG_MICOMP);
- Periphyton visual coverage scores; and
- Benthic invertebrate density, biomass, community, and composite-taxa tissue selenium concentrations.

Water quality monitoring and acute and chronic water toxicity testing results presented in this report include requirements specified under Permit 107517. Biological sampling in 2021 was completed in September in accordance with the 2021 to 2023 EVO LAEMP study design (Minnow 2021b), with confirmatory sampling of water quality and BIT selenium concentrations conducted in Erickson Creek in December 2021. As noted in Section 1.2, no fish habitat and usage is present in upstream portions of Erickson Creek as well as Gate and Bodie creeks[8] and thus, fish tissue monitoring was not conducted as part of the 2021 EVO LAEMP[9].

[8] Westslope cutthroat trout, bull trout, eastern brook trout, mountain whitefish, longnose sucker, and longnose dace are present in Michel Creek and may access the lowermost portion of Erickson Creek (Ecofish 2020). Although fish (specifically Westslope Cutthroat and Bull Trout) have been documented in Reach 1 of Erickson Creek (i.e. below the natural barrier), this area contains poor fish habitat and likely only provides summer foraging habitat for fish from Michel Creek. Both Bodie and Gate Creeks have established and maintained fish barriers and thus are considered non-fish bearing. In Erickson Creek, a natural fish barrier (i.e., 2 m waterfall) is present approximately 290 m upstream of the confluence of Michel Creek. The area upstream of this barrier (referred to as Reach 2) in Erickson Creek is non-fish bearing.

[9] Fish sampling was conducted at the compliance point in Michel Creek (EV_MC2 [RG_MICOMP]), results for this work (and corresponding biological trigger analysis) will be discussed as part of the RAEMP.

2.2 Physical Habitat and Supporting Measures

2.2.1 Temperature and Dissolved Oxygen

2.2.1.1 Sampling Overview

To evaluate potential temperature-related effects associated with the SRF discharge, instream continuous data loggers (TidbiT v2 Temp [UtBI-001]) were deployed at six locations (RG_ERCKUT, RG_ERCKDT, EV_EC_FLOW3, EV_EC_FLOW2, EV_EC_FLOW1, and RG_ERCK) in Erickson Creek in December 2020 (Figure 1.4; Table 2.4). Temperature data from these loggers was downloaded three times in 2021 (April, June, and October/November). Loggers were deployed in sets of two[10] to confirm logger accuracy and for contingency purposes. Two additional temperature loggers were installed at RG_ERCKUT and RG_ERCK on June 29th, 2021. The additional logger at RG_ERCKUT was installed to better understand temperature gradient upstream of the SRF, while the additional logger at RG_ERCK was added for contingency purposes due to the high calcification in the area, a lack of structures to anchor temperature loggers, as well as substantial flows in the area during freshet. Data from previously established temperature loggers monitored by Teck at F2_ECF (SRF effluent), EV_ECOUT (RG_ERCKDT), and EV_EC1 (RG_ERCK) were also included. Temperature loggers were downloaded onto a base station and uploaded to a computer for analysis. Following download, the loggers were placed back at the same depth for continued monitoring. Temperature and dissolved oxygen for fish-bearing areas (EV_EC1 [RG_ERCK]), Michel Creek (EV_MC3 [RG_MI3]), EV_MC2a [RG_MIDER], EV_MC2 [RG_MICOMP]), were collected per Permit 107517. This information was downloaded from Teck's EQuIS database and included both routine monitoring results collected by Teck and samples collected concurrently with biological sampling.

2.2.1.2 Data Analysis

Temperature and dissolved oxygen data from Teck routine water monitoring in fish-bearing areas of Erickson Creek (EV_EC1 [RG_ERCK]), Michel Creek (EV_MC3 [RG_MI3]), EV_MC2a [RG_MIDER], EV_MC2 [RG_MICOMP]), and the Elk River (EV_ER1) were evaluated relative to British Columbia water quality guidelines[11]. 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

[10] The replicate logger at RG_ERCK was lost during collection on June 3rd, 2021.

[11] Air temperature at these areas was also considered in the interpretation of water temperature results.

(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).

Maximum daily temperature from temperature loggers at EV_EC1 (RG_ERCK) were compared directly to the SPO (which is based largely on the optimum temperatures for fish noted above) per Permit 107517[12]. Tabulated maximum daily temperature values via routine Teck monitoring in relation to the SPO was performed in Microsoft Excel and plots of temperature logger data were generated using R (R Core Team 2022).

2.2.2 Sediment Quality

2.2.2.1 Sampling Overview

Sediment quality samples were collected using collection procedures consistent with those outlined in the British Columbia Field Sampling Manual (BCMOECCS 2020a). Three replicate sediment samples from both reference areas (RG_ALUSM and RG_MI25) were collected, while five replicate sediment samples were collected immediately upstream (RG_ERCKUT) and downstream of the SRF outfall (RG_ERCKDT) in Erickson Creek as well as at the compliance point in Michel Creek (RG_MICOMP; Figure 1.3; Table 2.2). Additional sediment samples were also collected at RG_MI3 (n=4), RG_ERCK (n=5), and RG_MIDER (n=5) as part of the 2021 to 2023 RAEMP study design (Minnow 2021c). Sediment samples were collected using a stainless-steel spoon and transferred into glass jars for analysis of polycyclic aromatic hydrocarbons (PAHs), and into polyethylene bags for all other analyses (i.e., metals, moisture content, total organic carbon, and particle size distribution). Surficial sediment was collected by slowly and carefully placing the spoon on the sediment surface in a manner that minimized disturbance and inserting the spoon into the sediment to capture sediment to a depth of 1 to 2 cm, where possible. The spoon was slowly lifted to the surface to avoid sample washout. The content of each spoonful was inspected to confirm that it is predominantly fine sediment (i.e., no pieces of vegetation, woody debris, or rocks), and, if acceptable, was placed into a clean plastic tub. It is important to note that these sediments and associated grain size did not reflect the general substrate in areas (riffles) where biological (benthic invertebrate) samples were collected. Substrates in riffles consisted primarily of cobble with some sand, gravel, and boulders, while the sediment collected consisted of smaller particles. This procedure was repeated to form a composite sample with sufficient material for analysis, and the stainless-steel

[12] The SPOs for temperature per Permit 107517 went into effect on August 13, 2021. The SPO at EV_EC1 (RG_ERCK) from January 1 to April 30 and November 1 to December 31 is <7°C, while from May 1 to August 31 it is <13°C, and September 1 to October 31 it is <10°C.

spoon was used to homogenize the sediment. Sampling equipment was rinsed with site water between stations. Details pertaining to the samples (e.g., depth, substrate characteristics, colour, texture, presence of aquatic vegetation) were recorded on field sheets to support the sediment results.

2.2.2.2 Laboratory Analysis

Sediment samples were analyzed by ALS Environmental in Calgary, Alberta. The laboratory thoroughly homogenized each sample prior to analysis. Methods used were consistent with the British Columbia Environmental Laboratory Manual (BCMOECCS 2020b), where applicable, and include analyses of physical parameters (e.g., moisture content, particle size, total organic carbon [TOC], metals and metalloids, and polycyclic aromatic hydrocarbons (PAHs; Table 2.5).

Sediment samples were analyzed using the following methods:

- metals by Collision Reaction Cell Inductively Coupled Plasma-Mass Spectrometry (CRC ICP-MS; EPA 200.2/6020A);
- mercury by Cold Vapour Atomic Fluorescence Spectroscopy (CVAFS; EPA 200.2/245.7);
- TOC by combustion method (Carter and Gregorich 2008); and
- PAHs by rotary extraction using hexane/acetone (EPA 3570/8270) followed by capillary column gas chromatography with mass spectrometric detection (GC/MS).

Particle size distribution was determined by dry sieving (coarse particles), wet sieving (sand), and the pipette sedimentation method (fine particles). Moisture content was determined gravimetrically by drying the sample at 105°C. Upon completion of the laboratory analyses, data reports were provided to Minnow and Teck electronically as Adobe Acrobat Portable Document Format (PDF) and Microsoft Excel files (Appendix H).

2.2.2.3 Data Analysis

Upon receipt of the analytical data, a data quality review (DQR) was completed, which included a review of data completeness, achieved laboratory report limits (LRLs), laboratory precision and accuracy, and field precision. Following the completion of the DQR, results for each constituent were summarized by area by calculating mean, median, standard deviation, minimum and maximum concentrations. Sediment concentrations from each area in 2021 (as well as previous years) were then evaluated, tabulated, and plotted relative to (1) the regional reference normal range as determined in the RAEMP report (Minnow 2020b), and (2) the British Columbia Working Sediment Quality Guidelines (BCWSQGs; BCMOECSS 2021a,b). Constituents in sediment from mine-exposed areas that exceeded both the BCWSQG and the regional reference normal range (when available) for 2021 were the focus of data interpretation. Tabulated sediment

Table 2.5: Water and Sediment Quality Parameters Associated with the EVO LAEMP, 2021

Category	Water Quality Parameters (as required under Permit 107517[a])
Field Parameters	water temperature, specific conductance, dissolved oxygen, pH
Conventional Parameters	specific conductance, total dissolved solids, total suspended solids, hardness, alkalinity, dissolved organic carbon, total organic carbon, and turbidity
Major Ions	bromide, fluoride, calcium, chloride, magnesium, potassium, sodium, sulphate
Nutrients	ammonia, nitrate, nitrite, total Kjeldahl nitrogen, orthophosphate, total phosphorus
Total and Dissolved Metals	total and dissolved concentrations of: 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, and zinc
Category	**Sediment Quality Parameters**
Physical Tests	moisture, pH, particle size, texture, total organic carbon (TOC)
Total Metals	aluminum, antimony, arsenic, barium, beryllium, bismuth, boron, cadmium, calcium, chromium, cobalt, copper, iron, lead, lithium, magnesium, manganese, mercury, molybdenum, phosphorus, potassium, nickel, sodium, selenium, silver, strontium, sulfur, thallium, tin, titanium, tungsten, uranium, vanadium, zinc, zirconium
Polycyclic Aromatic Hydrocarbons (PAHs)	acenaphthene, acenaphthylene, acridine, anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(b,j)fluoranthene, benzo(b,j,k,)fluoranthene, benzo(e)pyrene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-c,d)pyrene, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, perylene, phenanthrene, pyrene, quinoline

Notes: EVO = Elkview Operations. LAEMP = Local Aquatic Environmental Monitoring Program.

[a] Parameters are consistent with those outlined in Table 18 of Permit 107517.

quality screening against BCWSQG was performed in Microsoft Excel and plots were generated using R (R Core Team 2022). Quality assurance and control results (e.g. duplicate samples, etc.) associated with sediment samples collected concurrently with biological samples are discussed in greater detail in the DQR in Appendix B (see Appendix H for applicable laboratory reports).

2.2.3 Calcite and CABIN Measures

2.2.3.1 Sampling Overview

Consistent with the requirements of the Canadian Aquatic Biomonitoring Network (CABIN) sampling protocol, supporting habitat information (e.g., water velocity and depth, *in situ* water quality [temperature, dissolved oxygen, specific conductivity, pH], canopy cover, and substrate characteristics [100 pebble count]) was documented concurrent with benthic invertebrate community samples (Environment Canada 2012a)[13]. Visual scores of periphyton coverage were recorded in accordance with the CABIN method (and are discussed in greater detail in Section 2.4).

In addition to the CABIN requirements, measurements of calcite presence and concretion were conducted on 100 particles (pebbles) at each biological sampling location concurrent with (and using the same particles as) the 100-pebble count. Calcite presence (Cp) has historically been a binary assessment (i.e., presence [score = 1] or absence [score = 0]; Teck 2016, Lotic 2021). In 2021, an additional method for assessing calcite presence in lotic environments was included (Cp, Lotic 2021, Zathey et al. 2021) that scored the proportion of the particle surface area covered by calcite as a decimal to the nearest 10th percentile (0.1, 0.2, 0.3, etc.)[14]. The degree of concretion (Cc) was assessed by determining if the particle was removed with negligible resistance (not concreted; score = 0), noticeable resistance but removable (partially concreted; score = 1), or immovable (fully concreted; score = 2). If distinct particles were not visible due to heavy calcification, values of 1 (for presence) and 2 (for concretion) were recorded. If fines were encountered and calcite presence could not be visually confirmed, values of 0 (for presence) and 0 (for concretion) were recorded. If rocks were visible under fine material, the rock was selected for calcite measurements.

[13] As benthic invertebrate community sampling was not conducted at RG_GATE and RG_BOCK (as discussed in more detail in Section 2.5.4 and Section 7.6), the 100-pebble count was also not conducted. As such calcite for these areas is based on information provided by the 2021 Regional Calcite Monitoring Program (Robinson et al. 2022).

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

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

CI = Cp + Cc or CI' = Cp' + Cc

Where:

$$CI \text{ or } CI' = Calcite\ Index$$[15]

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

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

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

2.2.3.2 Data Analysis

Calcite measurements made among 40 reference areas sampled in 2015 were used to characterize the regional reference normal range as part of the 2015 to 2016 RAEMP report (Minnow 2018a), and the upper limit of the normal range (97.5th percentile) is defined as a calcite index of 1.0. Calcite index calculated for stations within the EVO LAEMP study area were tabulated, plotted, and compared to the upper limit of the normal range and the future site performance objective (SPO; by December 31, 2024: Cc ≤ 0.5). Tabulation of calcite index measurements was performed in Microsoft Excel and plots were generated using R (R Core Team 2022).

2.3 Water Quality and Toxicity

2.3.1 Water Quality

2.3.1.1 Sampling Overview

Water quality data assessed as part of the EVO LAEMP included data for routine monitoring managed by Teck and single surficial water samples collected at the biological monitoring stations concurrently with biological sampling in September and December (Figure 1.3; Table 2.3). Water samples included analysis of constituents stipulated in Permit 107517 as well as selenium speciation (Table 2.5). Sample collection procedures were consistent with those outlined in the British Columbia Field Sampling Manual (BCMOE 2013). Dissolved metals, dissolved organic carbon, and dissolved mercury were field filtered using a 0.45 µm filter. After concurrent sample collection, samples were kept on ice in the field, then stored in a

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

refrigerator at approximately 4°C until they were transported overnight in coolers with ice packs to the analytical laboratory.

2.3.1.2 Laboratory Analysis

Water quality samples were analyzed by ALS Environmental in Calgary, AB for the analytes listed in Permit 107517 except for selenium species (Table 2.5). Analysis of selenium species was performed by Brooks Applied Labs in Bothell, WA. Methods used were consistent with the British Columbia Environmental Laboratory Manual (BCMOECCS 2020b) where applicable. Upon completion of the laboratory analyses, data reports were provided to Minnow and Teck electronically as Adobe Acrobat PDF and Microsoft Excel files (Appendix H) and were uploaded to Teck's EQuIS database.

2.3.1.3 Data Analysis

Upon receipt of the analytical data, a DQR was completed, which included a review of data completeness, achieved LRLs, laboratory precision and accuracy, and field precision. Water quality data collected routinely (by Teck) and concurrently with biological sampling were stored in Teck's EQuIS™ database, and relevant data was downloaded from the database in Excel format for analysis. Analyses of water quality data were completed using the following approaches (see Appendix A for detailed methodology):

- Tabular and graphical comparison to applicable benchmarks, SPOs, interim screening values, and BCWQGs (Appendix Table A.1);
- Evaluation of temporal changes between SRF2 (or 2021) compared to the early phase (or the earlier year) of selected water concentrations at all areas[16] were conducted using 2 two approaches: (i) temporal differences relative to reference (Relative change model) where the percentage of data below the laboratory reporting limit was less than 80% for both the mine-exposed and reference area, and (ii) temporal changes at the mine-exposed area alone (Temporal change model) where the reference area % LRL was greater than 80%, but the mine-exposed was not. In both cases, temporal differences were tested using a censored regression ANOVA (Analyses of Variance) with $\alpha = 0.05$. *Post hoc* comparisons were corrected for the number of tests using a Tukey's Honestly Significant Difference Test. If both the exposed and reference area were above 80 % LRL no tests were conducted.

[16] Due to limited data pre-SRF P2 as well as increased variability in constituent concentrations in 2021 associated with the SRF frequently non-operational at EV_ECOUT (RG_ERCKDT), visual observations in combination with the aforementioned statistical analysis were conducted at this area.

Quality assurance and control results (e.g. field blanks, duplicate samples, etc.) associated with water samples collected concurrently with biological samples are discussed in greater detail in the DQR in Appendix B (see Appendix H for applicable laboratory reports).

2.3.2 Acute Toxicity

Acute toxicity tests were conducted on a quarterly basis at five stations in the EVO LAEMP as discussed in the Annual Water Quality Report (Table 2.3; Teck 2022b):

- Effluent retention pond outlet (F2_BPO);
- Downstream of outfall in Erickson Creek (EV_ECOUT);
- Erickson Creek at confluence of Michel Creek (EV_EC1);
- Gate Creek discharge monitoring location (EV_GT1); and
- Bodie Creek discharge monitoring location (EV_BC1).

Acute toxicity consisted of two bioassays as per Permit 107517:

- 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).

2.3.3 Chronic Toxicity

Aqueous chronic toxicity was monitored, analyzed, and interpreted under the Regional Chronic Toxicity Testing Program (Golder 2022), details of the methods and analysis employed as part of that program are described in short below. Chronic toxicity tests were completed on water samples collected quarterly and semi-annually at compliance point EV_MC2 (RG_MICOMP) as per the Permit 107517 (Table 2.3). The quarterly and semi-annual tests which were evaluated under the Regional Chronic Toxicity Testing Program include:

Quarterly tests:

- 72-hour growth/inhibition test using the 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).

Semi-annual tests - Q2 and Q4:

- 28-day water-only test of growth and survival using the amphipod, *Hyalella azteca,* using methods adapted from US EPA (2000); and
- 30-day early life stage toxicity tests using rainbow trout, *Oncorhynchus mykiss,* 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 semi-annually (i.e., in summer and winter) using methods: EPA-712-C-96-121; US EPA 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'.[17] Toxicity tests and associated quality assurance and quality control (QA/QC) measures were completed by an accredited 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 2022b, Golder 2022). Applicable results (i.e., for monitoring stations associated with the EVO LAEMP) are summarized in this report.

2.4 Periphyton

2.4.1 Sampling Overview

Periphyton sampling for the purpose of assessing productivity involved visual scoring as specified in the CABIN method for benthic invertebrate sampling (Environment Canada 2012a).

The assessment of periphyton was completed prior to initiation of other sampling activities to avoid disturbance of the periphyton cover within the sampling area, and was based on the categories stipulated by the CABIN protocol (Environment Canada 2012a)[18]:

1. Rocks not slippery, no obvious colour (<0.5 mm thick);

[17] 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.

[18] Visual periphyton monitoring is part of the CABIN protocol and thus only expected to occur if benthic invertebrate community evaluations and other CABIN protocols are conducted. Although benthic invertebrate community and calcite monitoring did not occur at RG_GATE, RG_GATEDP, and RG_BOCK periphyton visual scores were still completed.

2. Rocks slightly slippery, yellow-brown to light green colour (0.5 to 1 mm thick);
3. Rocks have noticeable slippery feel, patches of thicker green to brown algae (1 to 5 mm thick);
4. Rocks are very slippery, numerous clumps (5 to 20 mm thick); and
5. Rocks mostly obscured by algae mat, may have long strands (>20 mm thick).

Although only a single score is required per area under the CABIN protocol, scores were recorded for five stations (a minimum of 5 metres apart) in each area as part of the EVO LAEMP, except for RG_BOCK and RG_GATEDP which had limited sampling area and thus only one score for the area was recorded. The collection of periphyton coverage data from a larger area allowed for a more representative evaluation of periphyton in the area sampled for benthic invertebrate productivity and community and allowed for comparisons among areas and over time. Photos were also taken to document current conditions of not only periphyton conditions but also bryophytes, which are prominent in the Erickson Creek area.

2.4.2 Data Analysis

Periphyton coverage was evaluated spatially and temporally in conjunction with other measures of productivity, including temporal/spatial trends of phosphorus and other nutrients (Section 4.1), as well as measurements of density and biomass of benthic invertebrates upstream and downstream of the SRF intake/outfall structure in Erickson Creek (Section 6.2.1) to better understand the influence of the SRF on productivity. Tabulated periphyton scores was performed in Microsoft Excel.

2.5 Benthic Invertebrates

Benthic invertebrate samples were collected to address study questions related to benthic invertebrate tissue (BIT) selenium bioaccumulation (Section 2.5.1), productivity (as determined via Hess sampling; Section 2.5.2), and community structure (as determined via CABIN sampling; Section 2.5.3). Consistent with other LAEMPs and the RAEMP (Minnow 2021c,d, Minnow and Lotic 2021), benthic invertebrate sampling was completed in September. As noted in Section 2.3.1, individual water samples for routine water quality analysis (Tables 2.5) and selenium speciation analysis were collected from each monitoring area during the sampling event, concurrently with the collection of biological samples.

2.5.1 Tissue Selenium

2.5.1.1 Sampling Overview

Benthic invertebrate tissue (BIT) samples for selenium analysis were collected using the kick and sweep sampling method (which is described in greater detail in Section 2.5.4), except that sampling was not timed. Three replicate samples were collected in September from each reference area (RG_ALUSM and RG_MI25) and each mine-exposed area (Table 2.2), with the exception of five replicate samples collected per area at RG_ERCKUT, RG_ERCKDT, and RG_MICOMP[19], and one replicate sample collected at RG_ERCK. In December 2021 (as part of confirmation sampling), five replicate samples were taken from three areas in Erickson Creek, RG_ERCKUT, RG_ERCKDT, and RG_ERCKMD[20], while three replicate samples were taken from RG_ERCK[21].

Upon collection of the sample using the kick and sweep sampling method at each replicate station, organisms were carefully removed from sample debris using tweezers until approximately 0.5 g of wet tissue was obtained. Field crews paid particular attention to proportions of annelids in kick and sweep collections, as these organisms are known to hyperaccumulate some metals resulting in potentially biased composite results (Golder 2021b). If annelids occurred at a proportion greater than 5% of the total sample biomass at a given replicate station, then these organisms were included in the composite sample (at that same proportion). Additionally in this scenario, a separate 'annelid only' sample was collected for analysis from the replicate station. If the proportion of annelids represented less than 5% of the sample biomass for a given station, these organisms were not included in the composite-taxa sample.

Each BIT sample was photographed to document taxa composition, placed into a labelled vial, and stored in a cooler with ice packs until transfer to a freezer later in the day.

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[19] As noted in the 2021 to 2023 EVO Study Design (Minnow 2021b), additional replication at RG_ERCKUT and RG_ERCKDT, located upstream and downstream of the SRF intake/outfall structure, respectively, allowed for more robust statistical power (Minnow 2015) to detect changes between upstream and downstream related to the SRF, while the five replicates at RG_MICOMP are a requirement of the RAEMP (Minnow 2021c). Furthermore, the limited sample collection at RG_ERCK was a function of the limited suitable habitat for sampling (e.g. one riffle area).

[20] Sampling completed in September 2021 showed that mean tissue selenium concentrations in benthic invertebrates was elevated above Level 1 benchmarks for benthic invertebrates (for growth, reproduction, and survival) at RG_ERCKDT, RG_GATEDP, and RG_GATE. Confirmation sampling was conducted in December of 2021 in multiple sampling areas in Erickson Creek including RG_ERCKUT, RG_ERCKDT, and RG_ERCK. Additionally, for spatial resolution of selenium concentration in benthic invertebrate tissue an additional sampling area, RG_ERCKMD (located midway between RG_ERCKDT and RG_ERCK), was also evaluated in December of 2021 (Figure 1.3).

[21] Although the location of replicates did not conform to CABIN protocols as locations were not 50 meters apart (Environment Canada 2012a), three replicates were taken at RG_ERCK to better understand the variability of selenium concentrations in BIT at this area.

2.5.1.2 Laboratory Analysis

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

2.5.1.3 Data Analysis

Analyses of composite-taxa BIT selenium data were completed using the following approaches (see Appendix A for detailed methodology):

- Graphical comparison of tissue selenium concentrations relative to applicable benchmarks (Appendix Table A.2) and the regional reference normal range;
- Evaluation of spatial differences among areas in tissue selenium concentrations for each sampling event in 2021, using a one-way ANOVA.
- Evaluation of the potential effects of SRF operational phases on tissue selenium concentrations from mine-exposed areas relative to reference using a Before-After-Control-Impact ANOVA;
- Comparison of observed tissue selenium concentrations to those predicted using selenium bioaccumulation tools (one-step water-to-invertebrate selenium bioaccumulation model and selenium speciation bioaccumulation tool [B-tool; de Bruyn, A. and S.N. Luoma. 2021]); and
- Comparison of the relationship between observed and predicted selenium concentrations using bioaccumulation models (one-step water-to-invertebrate selenium bioaccumulation model and B-tool model) to other areas in the Elk Valley using a linear mixed-model approach.

2.5.2 Hess Sampling (Density, Biomass, and Community)

2.5.2.1 Sample Overview

Benthic invertebrate community samples were collected using a Hess sampler with 500 µm mesh, which allowed for evaluation of density, biomass, and community structure of the area sampled. Ten single-Hess samples were collected at each of two mine-exposed areas, one immediately upstream (RG_ERCKUT) and one downstream of the SRF outfall (RG_ERCKDT), with the replicate sampling locations a minimum of 5 m apart (Figure 1.3; Table 2.2).

Each sample was collected by carefully inserting the base of the Hess sampler into the substrate to a depth of approximately 5 to 10 cm, after which the gravel and cobble contained within the sampler was carefully rubbed, allowing the current to carry dislodged organisms into the mesh collection net. Organisms collected into the net were carefully rinsed into a labelled wide-mouth plastic jar. Samples were preserved to a nominal concentration of 10% buffered formalin in ambient water so that biomass was not lost through predation or decomposition of tissues before sample sorting at the laboratory. Water depth and velocity measurements were also collected at each Hess sampling station.

2.5.2.2 Laboratory Analysis

Hess samples for benthic invertebrate analysis were shipped to ZEAS Inc. (lead taxonomist Danuta Zaranko) in Nobleton, Ontario, for analysis. At the laboratory, preserved organisms in each sample were sorted from the debris and identified and weighed at the family-level of taxonomy. Each family group of organisms was gently placed onto a fine cloth or paper towel to drain excess preservative before being weighed to the nearest 0.1 mg. Total and family-level density and biomass of organisms were reported for each sample.

2.5.2.3 Data Analysis

To understand the influence of the SRF on productivity measures of biomass and density of benthic invertebrates were evaluated (as well as evaluations of periphyton coverage and water quality as discussed in earlier sections). Overall biomass and density of benthic invertebrates as well as taxa-specific measures (specifically EPT, Ephemeroptera alone, Plectoptera alone, Trichoptera alone, and Chironomidae alone) of these endpoints, determined via Hess sampling, were converted to number of organisms per square metre based on the area sampled. A spatial comparison between areas upstream (RG_ERCKUT) and downstream (RG_ERCKDT) of SRF water treatment were conducted and further information for these analyses can be found in Appendix A.

2.5.3 CABIN Sampling (Community)

2.5.3.1 Sampling Overview

Benthic invertebrate samples were collected using a kick and sweep method to allow evaluation of community structure. Similar to the RAEMP (Minnow 2020b), three replicate samples were collected from each reference area (RG_ALUSM and RG_MI25) and each mine-exposed area (Table 2.2), with the exception of RG_MICOMP where five replicate samples were collected to support the RAEMP study design requirements (Minnow 2021c). Replicate samples were collected at locations that were established in 2019 (Minnow 2020c) and were spaced a minimum of 50 m apart (where habitat allows, and where sampling could be completed safely) or in separate riffles. As noted in the 2021 to 2023 EVO Study Design (Minnow 2021b), one sample was taken from RG_ERCK (replication not possible due to the presence of a single riffle habitat), while no samples were taken at RG_GATEDP due to lack of riffle habitat[22]. Similar conditions (i.e. a lack of suitable sampling habitat [riffles]) were noted at RG_GATE and RG_BOCK during the September sampling event, and thus benthic invertebrate community were not evaluated in these areas in 2021 (further information regarding the lack of suitable sampling habitat is discussed in Section 7.6).

Benthic invertebrate community sampling followed the CABIN protocol, which involved a 3-minute travelling kick to dislodge benthic invertebrates from the substrate (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. The net (consisting of a triangular aperture measuring 36 cm per side and equipped with 400 μm mesh) was 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, and the kick-net was subsequently rinsed with water to move debris and invertebrates into the collection cup at the bottom of the net. The collection cup was then removed, and the contents poured into a labelled plastic jar and preserved to a concentration of 10% buffered formalin solution in ambient water.

2.5.3.2 Laboratory Analysis

Benthic invertebrate community samples were sent to Cordillera Consulting[23] (lead taxonomist Scott Finlayson), in Summerland BC, for sorting and taxonomic identification. Organisms were identified to the lowest practical level (LPL; typically genus or species).

At the beginning of the sorting process, each sample was examined and evaluated to estimate total invertebrate numbers. If the total number was estimated to be greater than 300, then samples were sub-sampled for sorting and enumeration. A minimum of 5% of each sample was

[22] As specified in the CABIN protocol – "The habitat type where invertebrate samples are collected in CABIN is the erosional zone (riffle, straight run, or rapid). A reach that does not have a well-established riffle or straight run should not be used for CABIN sampling." (Environment Canada 2012a).

[23] Similar to other LAEMPs and the RAEMP (Minnow 2021c,d, Minnow and Lotic 2021), two different laboratories are utilized to measure benthic invertebrate community samples (Cordillera Consulting) and Hess samples (Zeas Inc). These samples are evaluated by different laboratories for two reasons (1) methodology differences (subsampling is utilized for benthic community analysis using the CABIN protocols, while Hess sampling requires the analysis of the complete sample) and (2) lab capacity and timeframe for analysis.

sorted, consistent with requirements specified by Environment Canada (2012b, 2014). Sorting efficiency and sub-sampling accuracy and precision was also quantified using methods outlined by Environment Canada (2012b, 2014) and can be found in the DQR (Appendix B).

2.5.3.3 Data Analysis

Benthic invertebrate community endpoints were evaluated via kick and sweep sampling, and included total abundance, LPL richness, and the total and relative abundances of major taxonomic groups (e.g., Ephemeroptera [mayflies], Plecoptera [stoneflies], Trichoptera [caddisflies], EPT [Ephemeroptera, Plecoptera, and Trichoptera] and Chironomidae [midges]). Community data for kick and sweep samples were plotted to show changes over time, changes relative to regional reference normal ranges[24] and changes relative to habitat-adjusted normal ranges[25] as defined in the RAEMP (Minnow 2020b) using R (R Core Team 2022). In previous existing condition evaluations of benthic invertebrate community structure (Minnow 2020a, 2021a), single replicates were evaluated for some of the areas studied: RG_ERCK, RG_GATE, RG_BOCK, RG_MIDGA, and RG_MIDBO, consistent with the requirements under the 2018 to 2020 RAEMP study design (Minnow 2018b). The limited replication in these previous evaluations was treated with caution when interpreting temporal and spatial trends. Benthic invertebrate community structure was also assessed using multivariate ordination techniques including correspondence analysis (CA) and canonical correspondence analysis (CCA) to further understand community structure as part of the EVO LAEMP, further information regarding these analyses can be found in Appendix A.

[24] The reference normal range as presented in the RAEMP represents the 2.5th and 97.5th percentiles of the 2012 to 2019 (Minnow 2020b).

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

3 PHYSICAL HABITAT AND SUPPORTING MEASURES

3.1 Temperature and Dissolved Oxygen

Although the SRF does not utilize heating or cooling, the effluent (or treated water) being discharged from the effluent retention pond was expected to be influenced by seasonally elevated air temperatures when compared to water upstream of the SRF outfall which is consistently between 5°C and 6°C (Golder 2020c, Teck 2020a). As such, water temperatures were measured by continuous data loggers in Erickson Creek upstream of the SRF (RG_ERCKUT) were consistent throughout 2021 at approximately 5°C, while water temperatures downstream of the SRF (RG_ERCKDT) showed more seasonality, with minimum temperatures in winter months (December to February) typically ranging from 4 to 6 °C and in summer having a maximum temperature of 15.1°C (observed in July), with temperatures being similar or lower downstream (EV_EC_FLOW3, EV_EC_FLOW2, EV_EC_FLOW1). Annual range of temperatures at RG_ERCKDT as well as lower downstream were also in close alignment with effluent temperature when the SRF was operating (F2_ECF; Figure 3.1). As the SRF was non-operational on multiple events in 2021, temperature variability downstream of the SRF outfall at RG_ERCKDT (specifically during summer) was more pronounced. On several occasions, temperatures at EV_EC1 (RG_ERCK) were higher than upstream areas, likely due to the lack of canopy cover and shallower water in that area. Starting August 13, 2021 (when the permit SPO came into effect), maximum daily temperature from loggers at EV_EC1 (as well as the RG_ERCK temperature loggers) were compared to the SPO and the total number of daily temperature exceedances was measured (Figure 3.1; Appendix Table C.1). The SPO was only exceeded at EV_EC1 in September for 15 days, with no other exceedances throughout 2021. The exceedances at EV_EC1 have been investigated and subsequent information regarding those exceedances can be found in the 2021 Annual Water Treatment Performance Report (Teck 2022a). The two temperature loggers installed at RG_ERCK (Logger 1 and Logger 2) for the EVO LAEMP (i.e., not utilized for compliance purposes), showed similar findings as the EV_EC1 temperature logger as the maximum daily temperature was greater than the SPO temperature on 18 and 16 days in September, respectively (as well as three and one days in August, respectively; Figure 3.1, Appendix Table C.1). The two RG_ERCK temperature loggers were deployed slightly further downstream from EV_EC1 (Figure 1.4) and represent a different microhabitat (decreased canopy cover, differences in flow rate, and/or lower water depth) when compared to habitat where the EV_EC1 logger is located, which likely explains the slightly higher temperatures observed with the RG_ERCK loggers in comparison to the EV_EC logger. Increased management and engineering measures are currently under consideration by Teck to

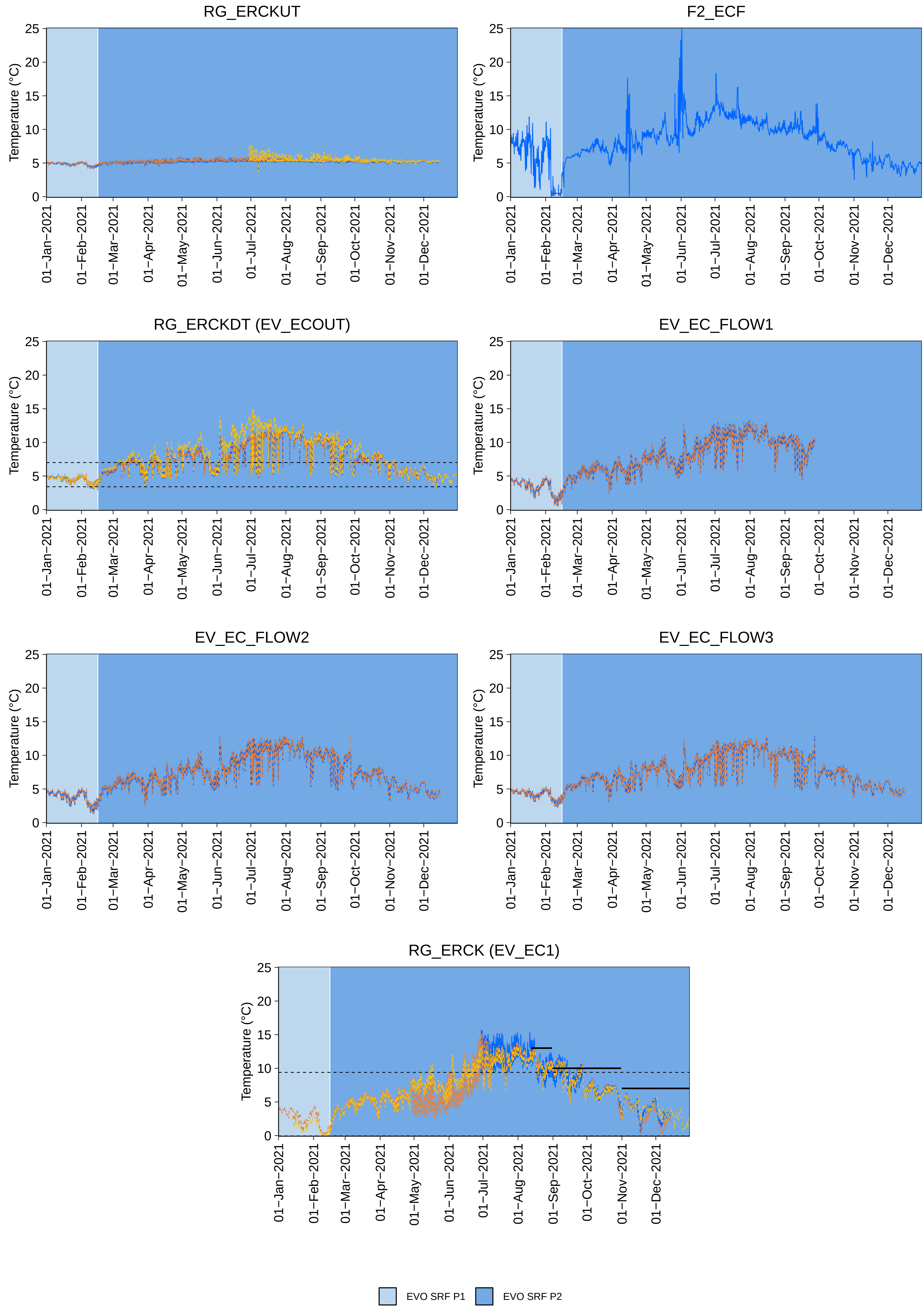

Figure 3.1: Water Temperature Recorded by Temperature Loggers, EVO LAEMP, 2021

Note: Solid black horizontal lines indicate the maximum daily temperature as specified in Permit 107517, which came into effect August 13, 2021. Dashed horizontal lines indicate the minimum and maximum average hourly temperature from 2018 to 2020. Temperatures outside of the range (0 to 25°C) were considered to be erroneous data for F2_ECF, so were removed as indicated by a red line. Different colours indicate replicate loggers. Temperature data from the loggers at RG_ERCKUT, RG_ERCKDT, EV_EV_FLOW1, EV_EC_FLOW2, EV_EV_FLOW3, and RG_ERCK is reported up until the last date when data was retrieved.

better understand and manage the influence of the SRF on the water temperature of Erickson Creek (Teck 2022a).

In situ water temperature measurements at fish-bearing areas of Erickson and Michel Creek were also compared to British Columbia guidelines[26], which are defined as a maximum ± 1º C change from the optimum temperature range for spawning, incubation, and alevin / rearing temperature guidelines for both WCT and bull trout (BCMOE 2001). Temperatures in Erickson Creek (EV_EC1 [RG_ERCK]) were within or below the optimum temperature ranges specified for both species, throughout the year, with the exception of one event in September which was above the optimum threshold (Figure 3.2). Temperatures were largely comparable between Erickson Creek and those further downstream in Michel Creek (EV_MC3 [RG_MI3], EV_MC2a, EV_MC2 [RG_MICOMP]) and the Elk River (EV_ER1). Michel Creek and the Elk River generally had lower temperatures than Erickson Creek in the spring, fall and winter, but higher temperatures in the summer (Figure 3.2). Although temperatures were elevated above the WCT threshold for incubation in a few events between July and August in areas of Michel Creek and the Elk River, similar temperatures were apparent at EV_MC3 (RG_MI3; Figure 3.2), which is upstream of the confluence of the Erickson and Michel Creek, suggesting that elevated temperatures in Michel Creek and the Elk River during this time was not related to SRF discharge. Decreased canopy cover and increased distance from groundwater or melt water sources is known to be a natural cause of increased temperatures as water moves from lower order streams (such as Erickson Creek) to high order streams (such as Michel Creek and the Elk River; Vannote and Sweeney 1980). Overall, these results suggest that the SRF has little effect on temperature in fish-bearing areas of Erickson Creek, Michel Creek, or the Elk River.

In situ dissolved oxygen measurements in fish-bearing areas of Erickson and Michel Creek were compared to provincial dissolved oxygen guidelines, which are based on the minimum concentration of dissolved oxygen required to protect aquatic life, specifically for the protection of WCT and bull trout during spawning, incubation, and alevin rearing stages (BCMOE 1997). *In situ* measures of dissolved oxygen concentrations in Erickson Creek (EV_EC1 [RG_ERCK]) showed similar patterns to temperature, as dissolved oxygen remained within or above the optimum dissolved oxygen ranges specified for both fish species, throughout the year, with the exception of one event in September (Figure 3.3). Concentrations of dissolved oxygen were within or above respective guidelines in spring, early fall, and winter in Michel Creek and the Elk River, with the exception of a few events at EV_MC2 (RG_MICOMP) between July and October, as noted with temperature this is unlikely related to SRF discharge, as dissolved oxygen

[26] As noted in Section 1.2, upper portions of Erickson Creek and both Bodie and Gate Creek have been confirmed to be non-fish bearing.

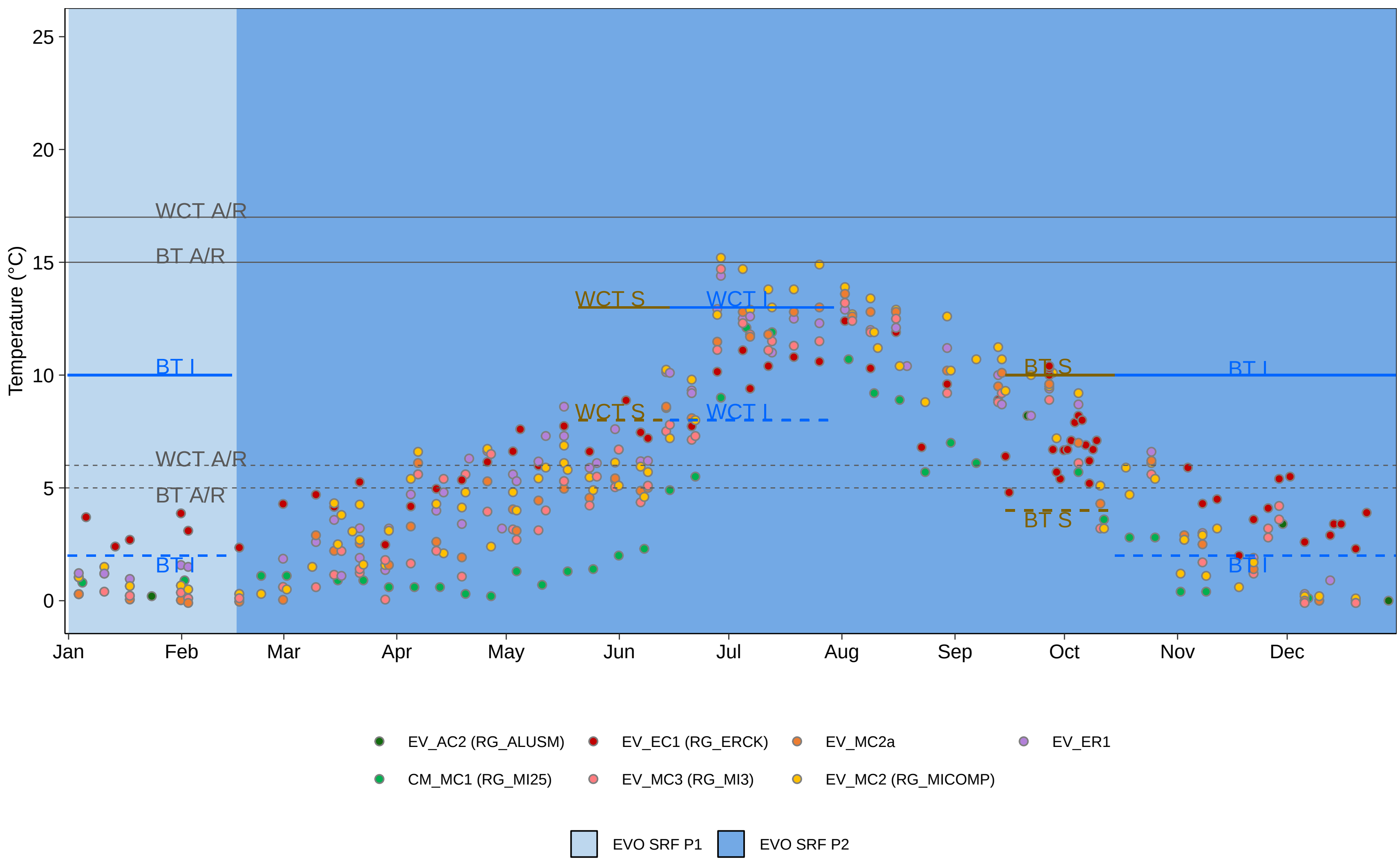

Figure 3.2: Water Temperatures at Fish Bearing Monitoring Areas for the EVO LAEMP in 2021 Relative to BCMOE (2001b) Guidelines for Maximum (Solid Lines) and Minimum (Dotted Lines) Temperatures for Protection of Westslope Cutthroat Trout and Bull Trout

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). Green symbols represent reference areas.

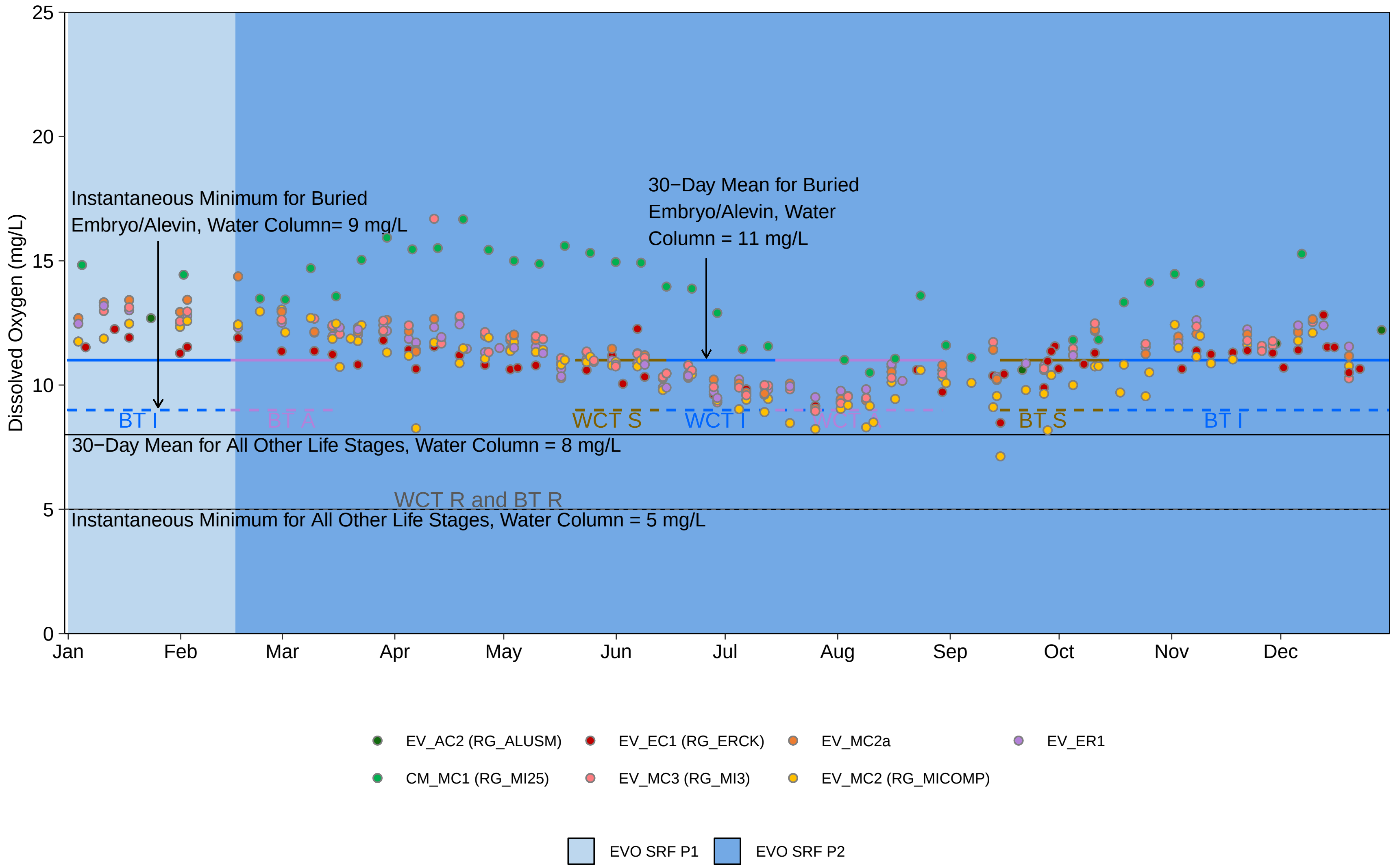

Figure 3.3: Dissolved Oxygen Concentrations at Fish-Bearing Monitoring Areas for the EVO LAEMP in 2021, Relative to the BCMOE (1997) Criteria for the Protection of Fish Life Stages

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. Green symbols represent reference areas.

concentrations further upstream were above or within guidelines in Erickson Creek (EV_EC1 [RG_ERCK]) as well as an upstream area of Michel Creek (EV_MC2a). Similar to temperature, the results suggest that the SRF has little influence on dissolved oxygen concentrations on fish-bearing areas of Erickson Creek, Michel Creek, or the Elk River.

3.2 Sediment Quality

In September 2021, both RG_ERCKUT and RG_ERCKDT (upstream and downstream of the SRF outfall, respectively) had similar mean TOC values (8.57% and 9.42%, respectively), which were higher than those from the next downstream area, RG_ERCK (2.72%). The higher TOC in upper Erickson Creek (RG_ERCKUT and RG_ERCKDT) t could be a result of additional detritus from decaying bryophytes that are not as abundant at RG_ERCK. The mean particle size of sediment collected from RG_ERCKDT, had a higher composition of silt-sized particles (66.4%) when compared to the upstream area, RG_ERCKUT (33.1%) or the next downstream area, RG_ERCK (24.7%), which both had a higher composition of sand-size particles (59.7% and 70.9%, respectively; Appendix Table C.2). Sediments from RG_MIDER and RG_MICOMP (both below the Erickson and Michel Creek confluence) were also predominately silt-size particle based (48.8% and 53.9% silt, respectively) and had correspondingly higher TOC values (4.49 and 5.13%, respectively), when compared to RG_MI3 (which is upstream of the Erickson Creek confluence) where a higher proportion of sand-size particles (63.5%) and lower TOC (2.30%) was observed. Slight differences in silt-sized particle ratios and TOC contents were also noted between the reference areas, as RG_ALUSM had a higher silt-sized particle ratio and organic content (mean silt: 52.1%, mean TOC: 5.21%) when compared to RG_MI25 (mean silt: 41.9%, mean TOC: 1.91%) highlighting the natural variability in the Elk Valley.

The mean concentrations of seven metals (arsenic, cadmium, iron, manganese, nickel, selenium, and zinc) and eleven PAHs (acenaphthene[27], acenaphthylene, benz(a)anthracene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, fluorene, 2-methylnaphthalene, naphthalene, phenanthrene, and pyrene) in sediment were above the lower BCWSQG at RG_ERCKDT, with six of those constituents (cadmium, manganese, nickel, fluorene, 2-methylnapthalene, and phenanthrene) also above the upper BCWSQG (Appendix Figure C.1; Appendix Table C.2). For nearly of all of these constituents (excluding benzo(a)anthracene), mean concentrations in sediment were highest at RG_ERCKDT when compared to the other mine-exposed areas evaluated (RG_ERCKUT, RG_ERCK, RG_MI3, RG_MIDER, and RG_MICOMP; Appendix Figure C.1; Appendix Table C.2). Furthermore, a majority of these constituents

[27] Although acenaphthene was not detected in any replicate at RG_ERCKDT (and was not detected in a majority of EVO areas samples (~88%), due to the high detection limit associated with this compound uncertainty remains regarding the presence as well the possible concentration of this compound.

at RG_ERCKDT (with the exceptions of iron, manganese, and acenaphthylene) had mean concentrations above the regional reference normal range (Appendix Figure C.1). Mean concentrations in sediment for arsenic, cadmium, nickel, zinc, benz(a)anthracene, benzo(a)pyrene, chrysene, fluorene, 2-methylnaphthalene, naphthalene, phenanthrene, and pyrene were more than two-fold higher at RG_ERCKDT in 2021 when compared to 2020 (Figure 3.4).

At RG_ERCKUT (which is upstream of the SRF outfall), only selenium and dibenz(a,h)anthracene exceeded sediment quality guidelines (BCWQG or EVWQP benchmarks) and the regional reference normal range of Elk Valley and even then both were similar to pre-EVO SRF P2 concentrations (Figure 3.4; Appendix Table C.2). Similar results were observed for RG_ERCK, as only nickel and selenium exceeded these criteria (Figure 3.4; Appendix Table C.2). At both RG_ERCKUT and RG_ERCK, a majority of sediment constituent concentrations have been stable or decreasing when comparing concentrations of 2021 to past results (2019 and 2020), with exception of benz(a)anthracene at RG_ERCKUT and nickel at RG_ERCK which showed slight increases in 2021 (Figure 3.4).

Mean sediment constituent concentrations in the area upstream of the Erickson Creek confluence with Michel Creek, RG_MI3, and both areas downstream of the confluence, RG_MIDER and RG_MICOMP, were either below the BCWSQG or the regional reference normal range of the Elk Valley, and/or similar to results pre-EVO SRF P2 (Figure 3.4; Appendix Table C.2). Metal concentrations that exceeded the BCWSQG in these areas (such as arsenic, cadmium, nickel, and a few PAHs) also commonly exceeded guidelines in a reference area (RG_MI25 and/or RG_ALUSM) suggesting that these constituents are naturally elevated in the Elk Valley (Figure 3.4). Overall, sediment metal and PAH concentrations in lower Erickson and Michel Creek were largely similar pre- and post-EVO SRF P2 suggesting a minimal influence of the SRF on these constituents.

In summary, although a number of constituents at RG_ERCKDT had concentrations in sediment that exceeded the BCWSQG and the regional reference normal range of the Elk Valley, the elevated sediment metal and PAH concentrations appeared localized to directly below the SRF outfall. The cause of the elevated sediment constituent concentrations at RG_ERCKDT (when comparing results from 2019 and 2020 to 2021) is currently being evaluated as part of the AMP response framework (in conjunction with the investigation into the cause of elevated BIT selenium concentrations downstream of the SRF outfall [see Section 6.1]) , it should be noted that a spill event occurred earlier in 2021. On May 26, 2021, Teck completed scheduled maintenance work on the Erickson Creek effluent line. Upon restarting the treatment of Erickson Creek water, it was noted that the effluent being discharged (directly upstream of RG_ERCKDT)

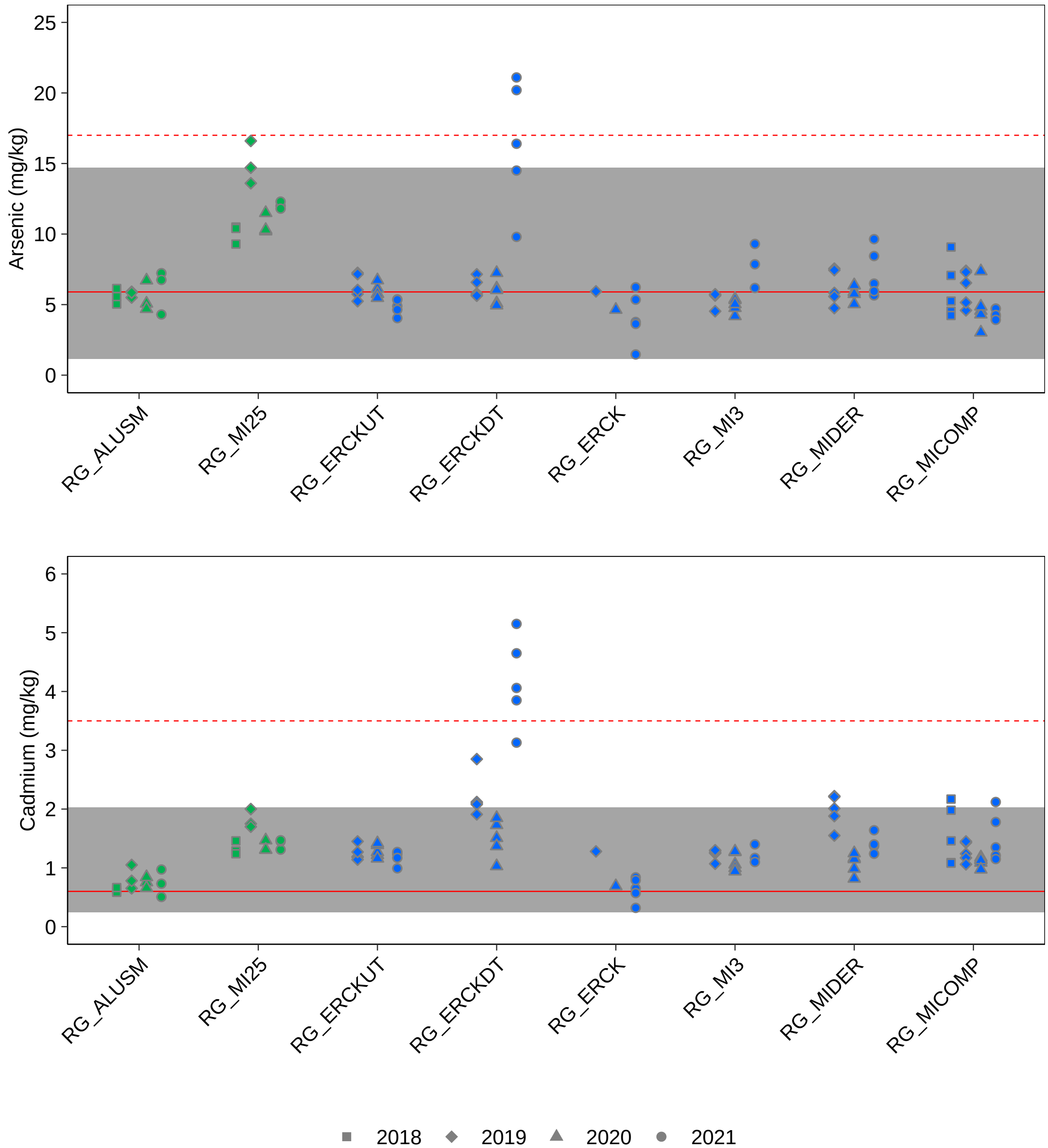

Figure 3.4: Selected Sediment Metal and Polycyclic Aromatic Hydrocarbon (PAH) Concentrations, EVO LAEMP, 2018 to 2021

Notes: Green symbols represent reference areas and blue symbols represent exposed areas. Solid red line = Lower BC WSQG; broken red line = Upper BC WSQG. BC WSQG = British Columbia Working Sediment Quality Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b). Shading represents the normal range which represents the 2.5th to 97.5th percentiles of 2017 and 2020 regional reference area data. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL value. Constituents shown are those where the mean concentration exceeded an available guideline value and the normal range (when available).

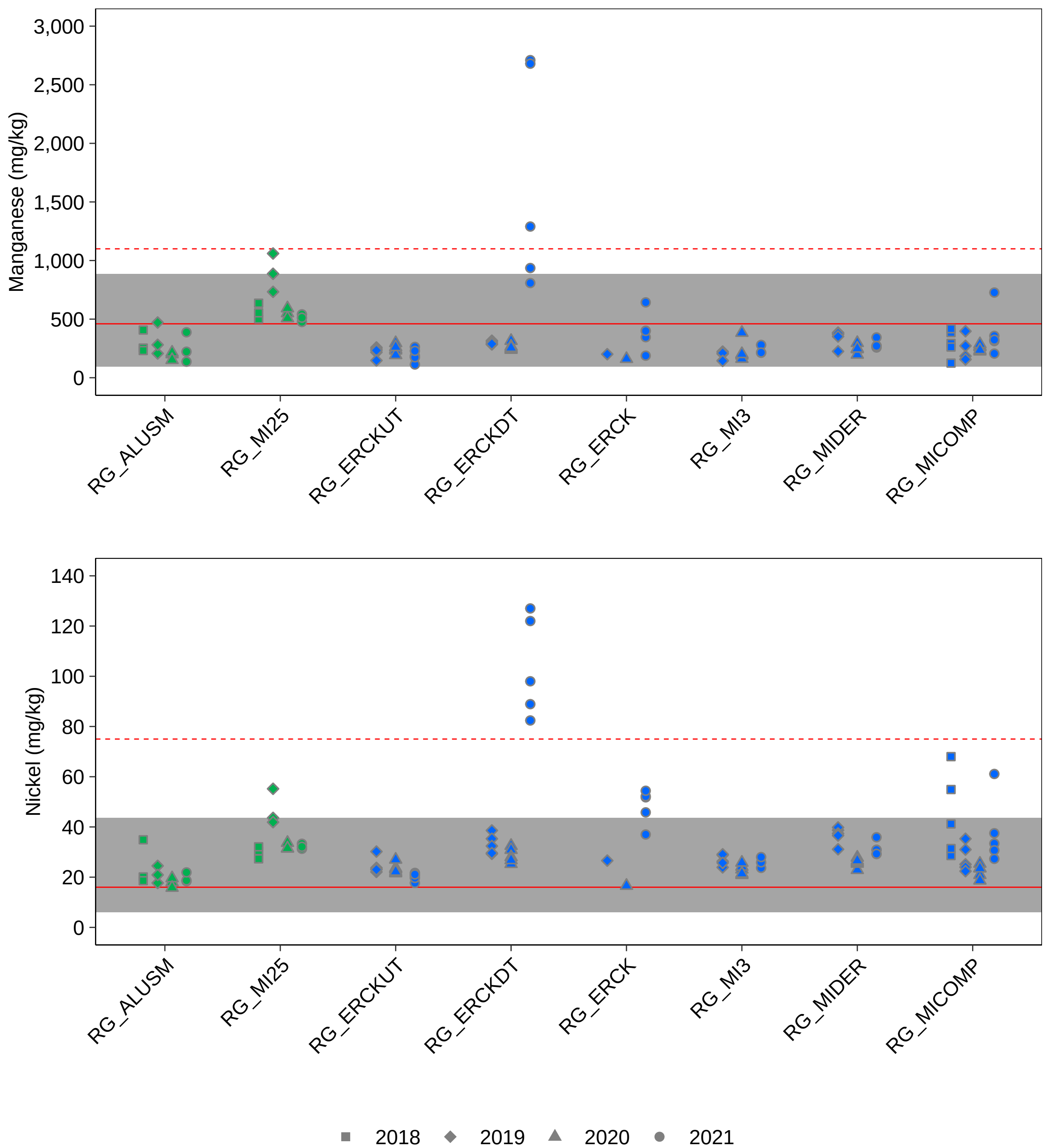

Figure 3.4: Selected Sediment Metal and Polycyclic Aromatic Hydrocarbon (PAH) Concentrations, EVO LAEMP, 2018 to 2021

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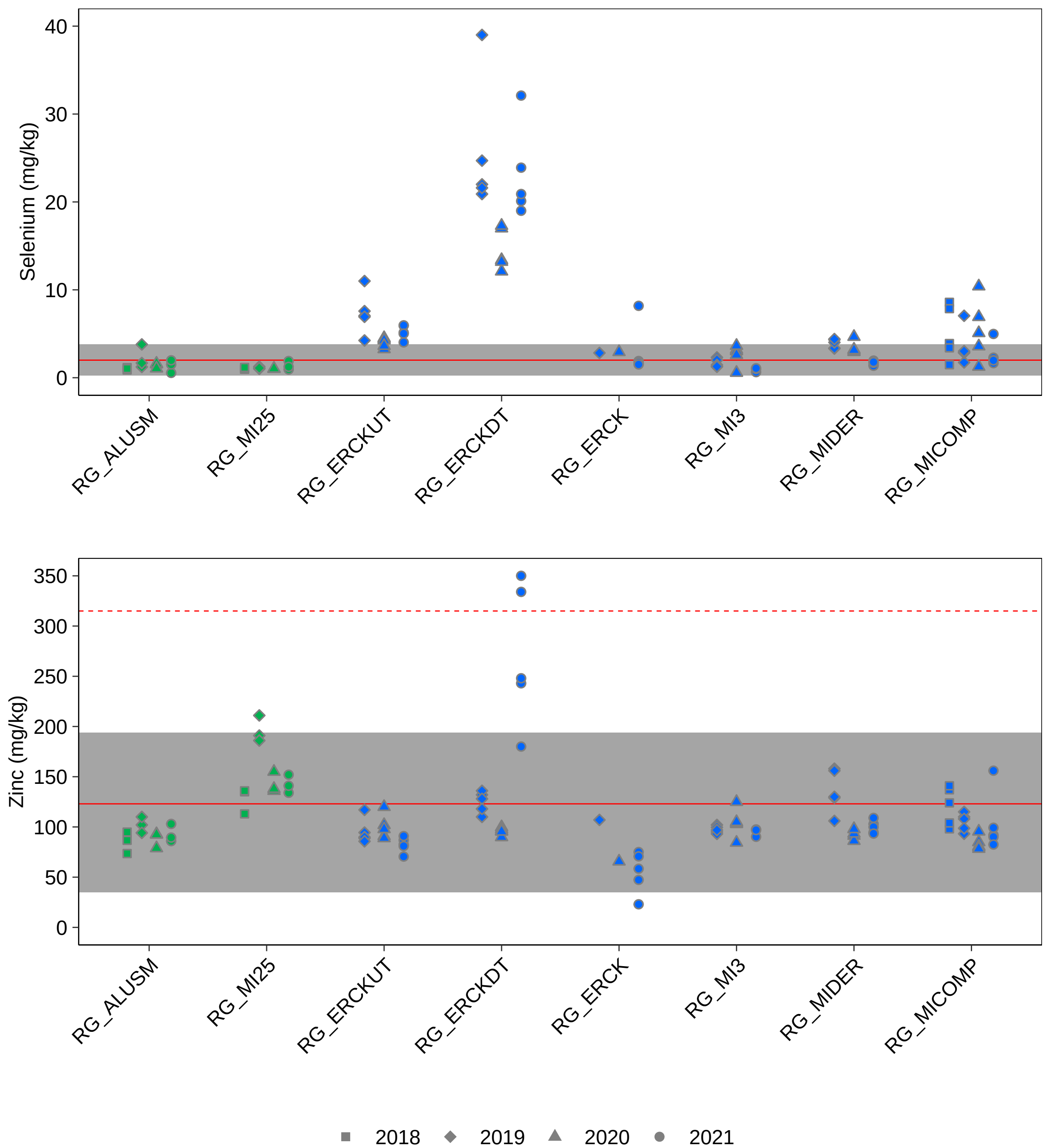

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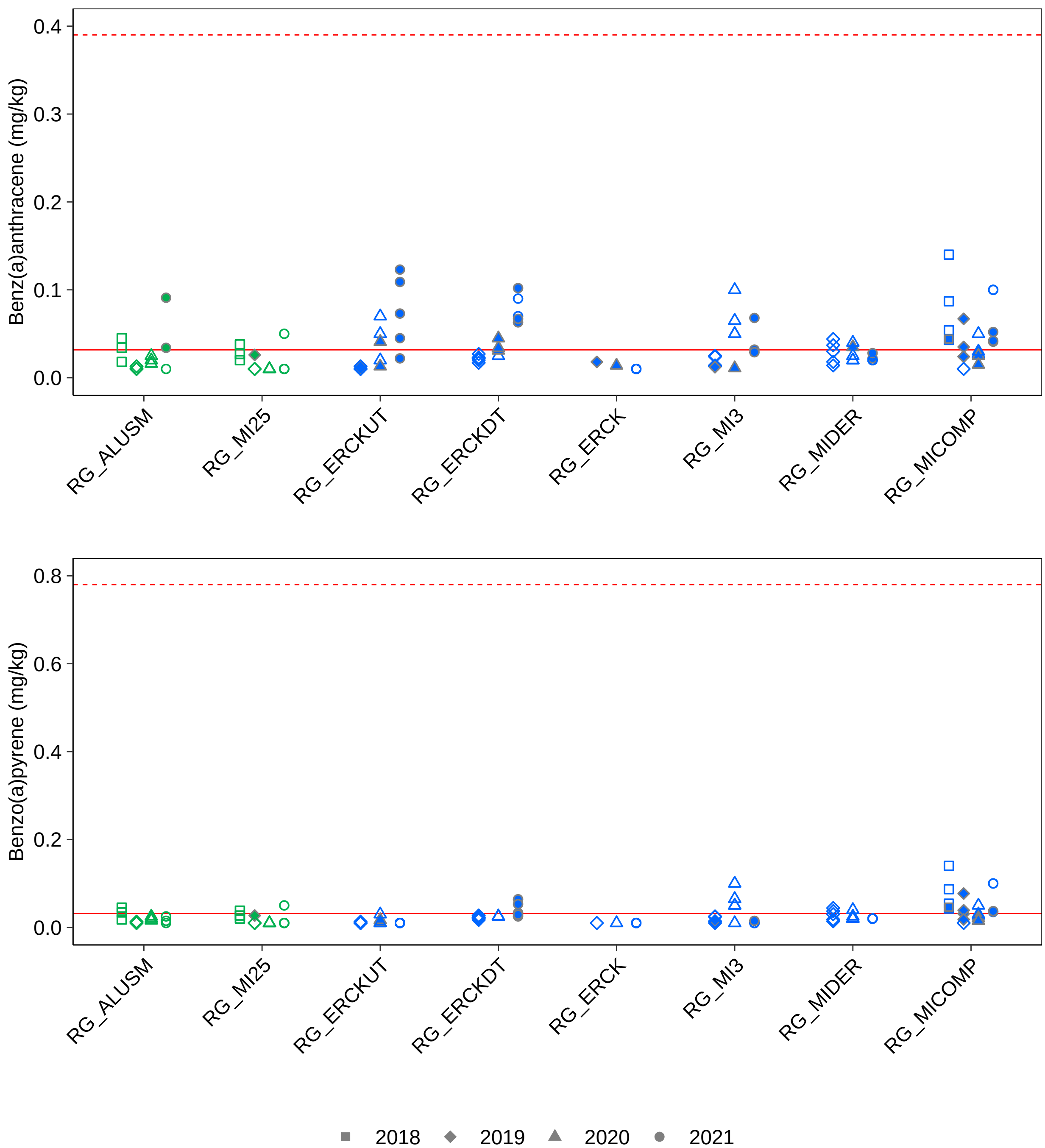
Notes: Green symbols represent reference areas and blue symbols represent exposed areas. Solid red line = Lower BC WSQG; broken red line = Upper BC WSQG. BC WSQG = British Columbia Working Sediment Quality Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b). Shading represents the normal range which represents the 2.5th to 97.5th percentiles of 2017 and 2020 regional reference area data. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL value. Constituents shown are those where the mean concentration exceeded an available guideline value and the normal range (when available).



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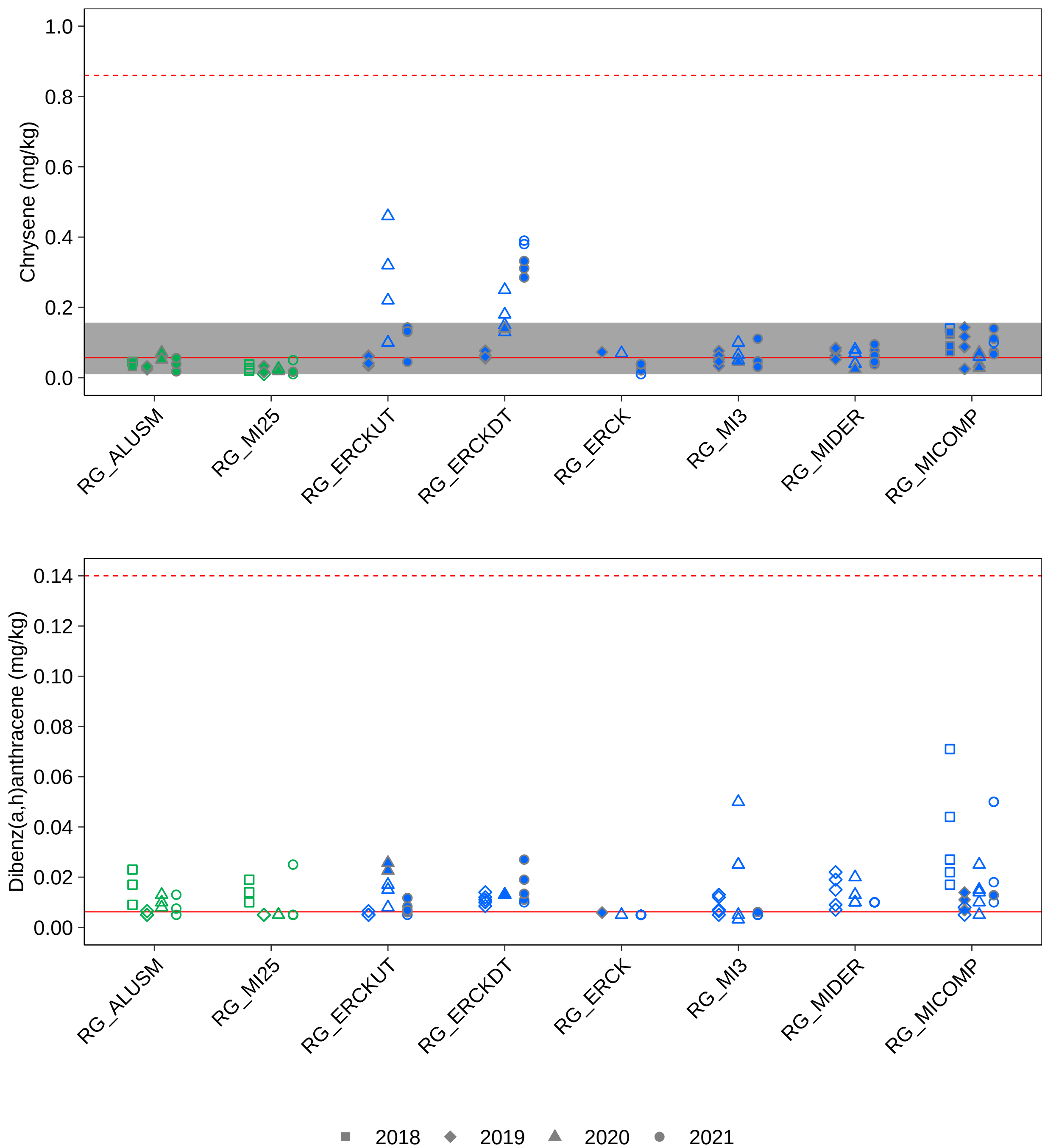

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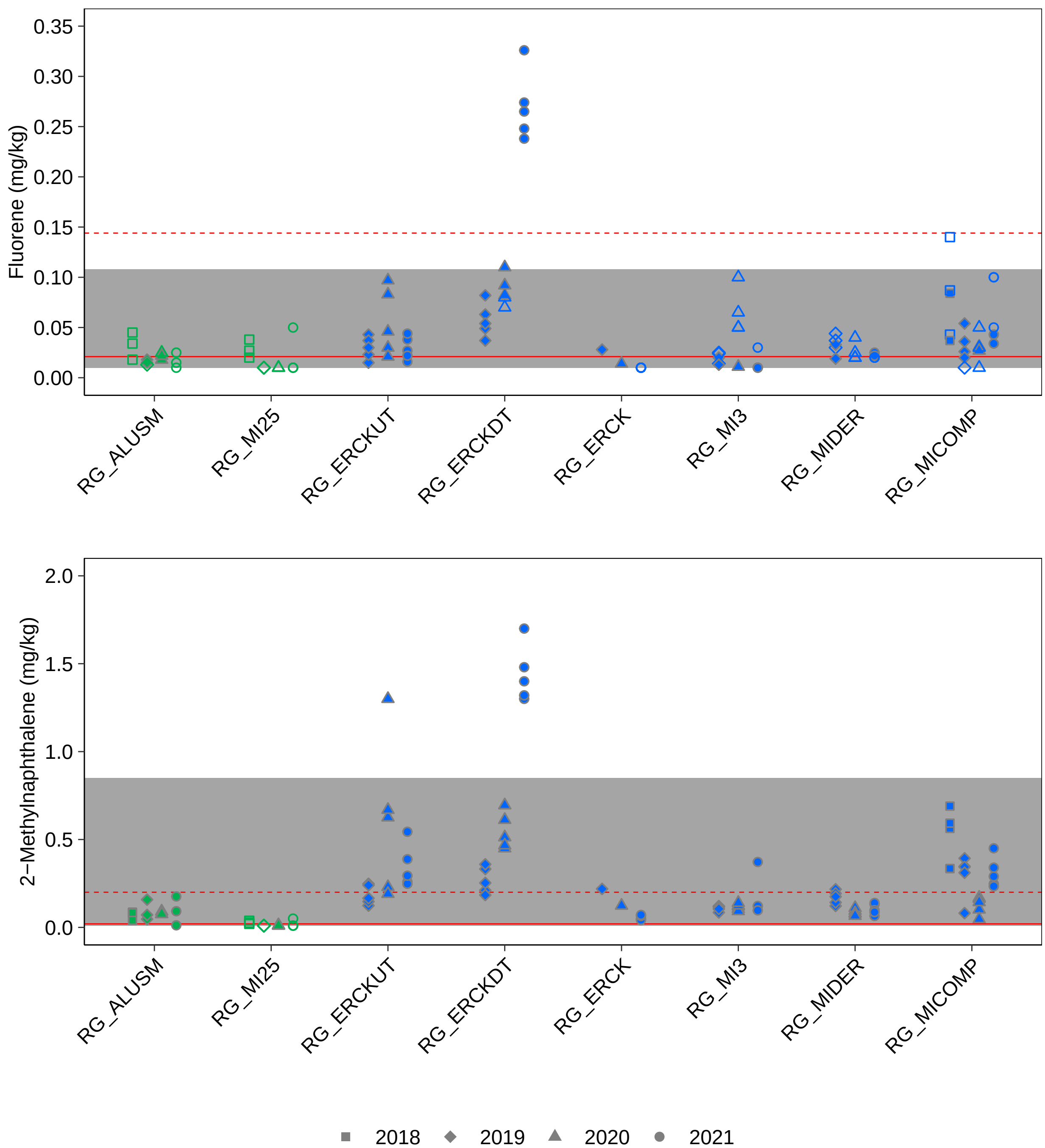

Figure 3.4: Selected Sediment Metal and Polycyclic Aromatic Hydrocarbon (PAH) Concentrations, EVO LAEMP, 2018 to 2021

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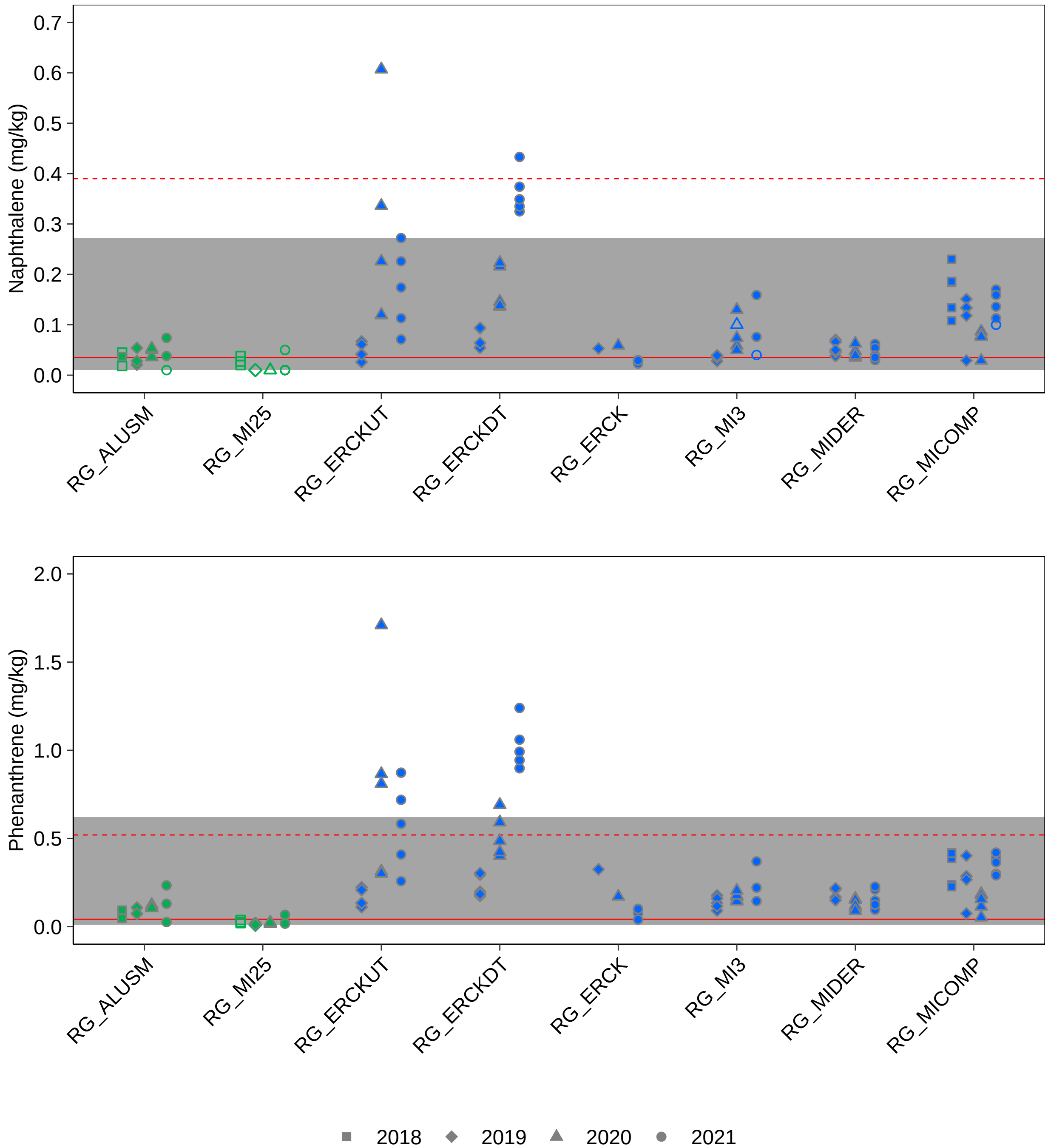

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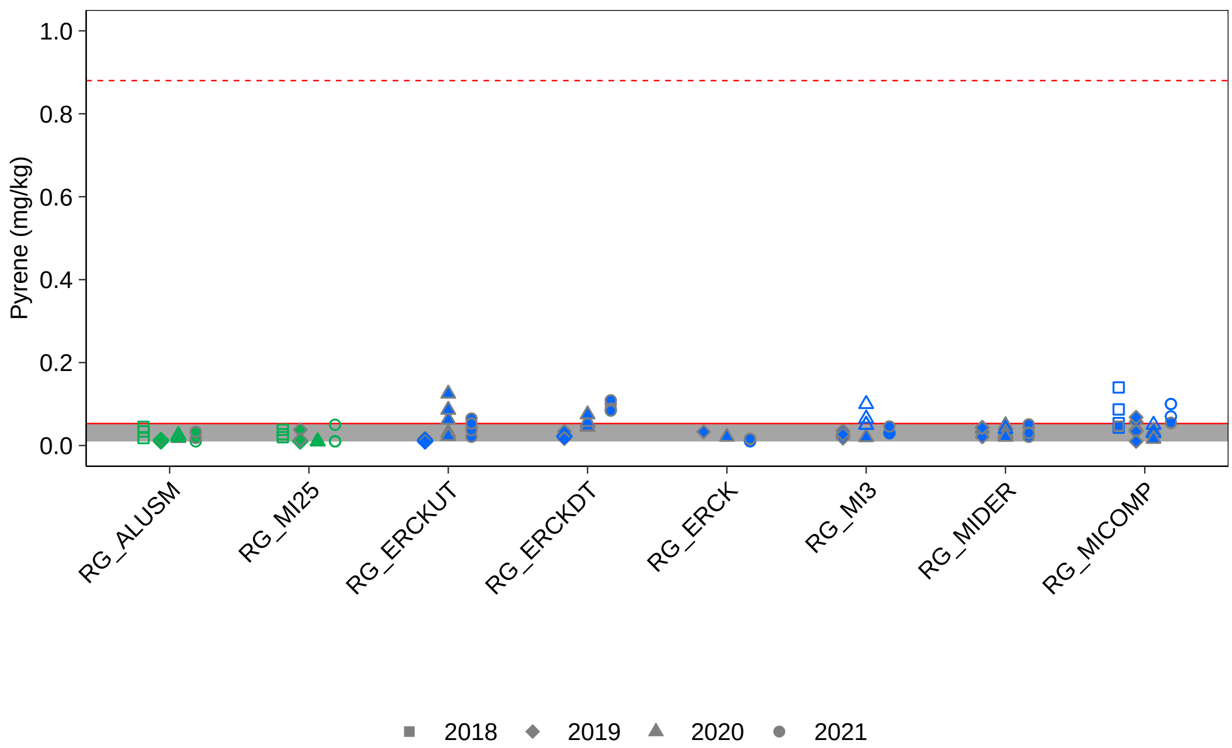

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was abnormal in colour and the system was immediately shut down (within seven minutes of discharge commencing). It was determined that iron precipitate in the effluent line was disturbed during startup and this event resulted in a release of 24,000 L of treated effluent into Erickson Creek which was turbid and orange in color (Teck 2022a). The influence of this release on constituent concentrations in sediment downstream is currently unknown. Concentrations of metals and PAHs at the mouth of Erickson Creek (RG_ERCK) and in Michel Creek (RG_MIDER and RG_MICOMP) that were above BCWQG were within the regional reference normal range, and/or similar to past years suggesting elevated sediment concentrations were localized to immediately downstream of the SRF outfall (ERCKDT) and that the SRF had minimal influence on sediment concentrations in lower Erickson and Michel Creek.

3.3 Calcite and other CABIN Supporting Measures

Calcite accumulation has the potential to negatively affect aquatic habitat through changes to stream substrate characteristics (Barrett et al. 2016; Hocking et al. 2020). Calcite concretion can adversely affect fish via reduced suitability of habitat for spawning, egg incubation, and overwintering, or via effects to benthic invertebrates that are important prey for adult and juvenile fish (Robinson 2010; Barrett et al. 2016; Wright et al. 2018; Hocking et al. 2020; Minnow 2022). As many of the areas assessed in the EVO LAEMP are non-fish bearing (Gate, Bodie, and upper portions of Erickson Creek), the potential effects of calcite on fish is limited to lower portions of Erickson (specifically RG_ERCK) and in Michel Creek. Regardless, direct effects to benthic invertebrates in all of the study areas were considered.

Benthic invertebrate sampling targeted riffle habitat during September sampling and calcite measurements and other CABIN supporting information were collected concurrently (Figure 3.5; Appendix Tables C.3 to C.9). Mean CI values[28] in 2021 for both reference areas (RG_ALUSM [0.29 to 0.63] and RG_MI25 [0]) were either similar or lower than previous years (2015 to 2020; Figure 3.5; Appendix Tables C.3). While the reference areas showed consistent CI temporal trends, mean CI values at RG_ERCKUT (above the SRF outfall; ranging from 0.17 to 0.25) and RG_ERCKDT (below the SRF outfall; ranging from 0.54 to 0.88) were notably lower than previous years (2019 to 2020; RG_ERCKUT: ranging from 0.96 to 1.56, RG_ERCKDT: ranging from 1.14 to 1.90). The area further downstream, RG_ERCK, had a mean CI value of 2.20 in 2021, which was slightly higher than previous years (2018 to 2020; ranging from 1.58 to 1.89). Calcite index values at each of these Erickson Creek areas were lower than those reported in the 2021 Regional Calcite Monitoring Program (which were evaluated between August and October;

[28] CI values discussed are those which used a binary evaluation for calcite presence as all data pre-EVO SRF P2 used this method. CI’ values in 2021 (which uses a proportion rather than a binary evaluation for calcite presence) were as expected lower than CI values.

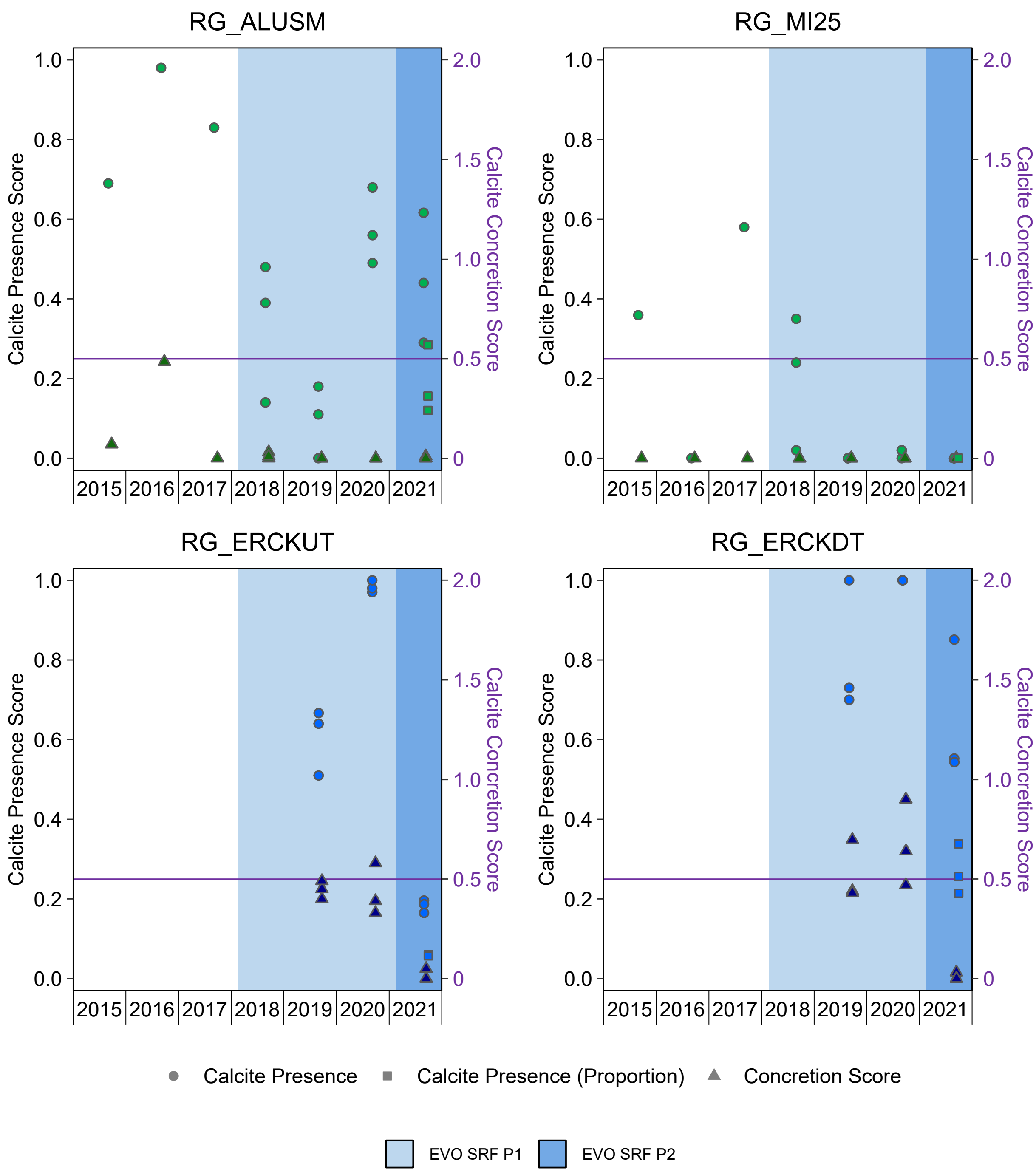
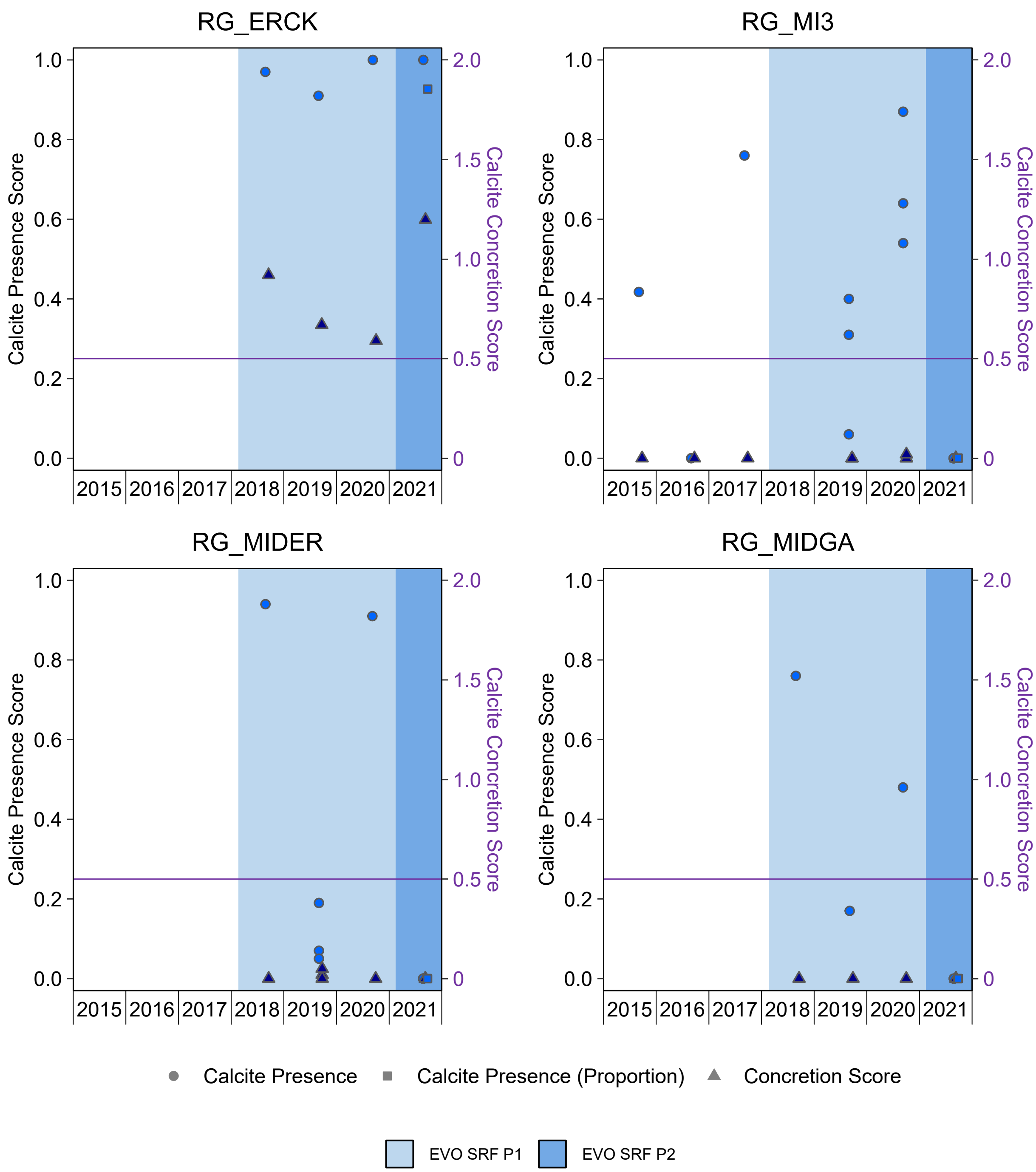


Figure 3.5: **Calcite Proportion and Concretion Score, EVO LAEMP, 2015 to 2021**

Notes: Green symbols represent reference areas and blue symbols represent exposed areas. The horizontal purple line represents the future SPO (i.e., by December 31st, 2024 Calcite Concretion Score = 0.5). In 2021 Calcite Presence was measured using both a presence absence and proportional method. RG_GATE and RG_BOCK were not evaluated for calcite index as the sampling reach did not have a "well−established riffle or straight run" present (which is a requirement for CABIN sampling [Environment Canada 2012a]).



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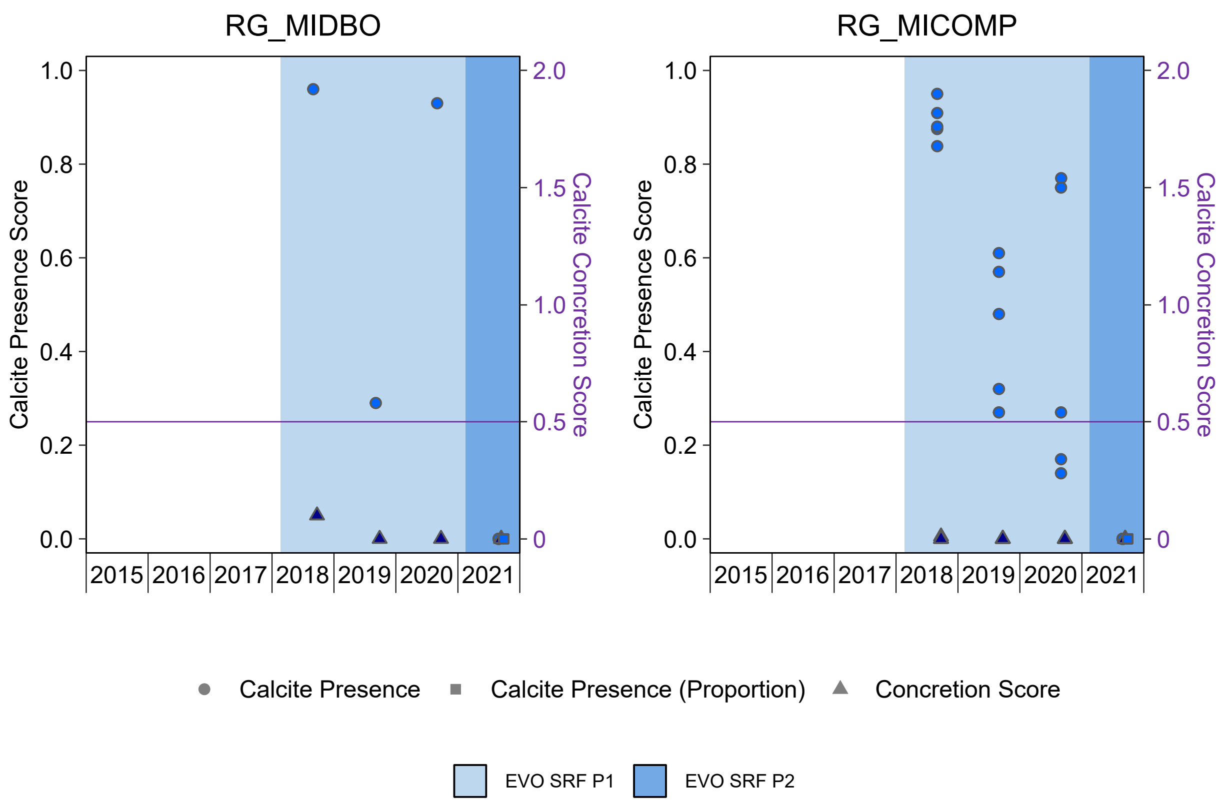

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Notes: Green symbols represent reference areas and blue symbols represent exposed areas. The horizontal purple line represents the future SPO (i.e., by December 31st, 2024 Calcite Concretion Score = 0.5). In 2021 Calcite Presence was measured using both a presence absence and proportional method. RG_GATE and RG_BOCK were not evaluated for calcite index as the sampling reach did not have a "well−established riffle or straight run" present (which is a requirement for CABIN sampling [Environment Canada 2012a]).

Robinson et al., 2022); the mean 2021 CI score for the Erickson Creek area above the SRF outfall was 1.42 and below the outfall and further downstream in Erickson Creek ranged from 2.71 to 2.94. Results from the 2021 Regional Calcite Monitoring Program report suggest that pre-EVO SRF P2 calcite presence and concretion in the Erickson Creek area above (CI values: 1.68 to 1.73) and below the outfall (CI values: 2.46 to 2.96) were largely similar to or lower than 2021. Although the cause for the differences between the Erickson Creek calcite scores is currently unknown it is likely due to the high presence of bryophytes in the area (which is a unique habitat characteristic in the Elk Valley as well as a different sampling method between the programs[29], see supporting CABIN measurements for further details Appendix Tables C.4 to C.9) which makes assessment of calcite difficult.

Although CI was not evaluated in Bodie and Gate Creek at part of this study (see Section 2.2.3), the CI for these areas was evaluated as part of the 2021 Regional Calcite Monitoring Program (Robinson et al., 2022). The mean CI in Bodie (1.22 [below the settling pond] and 2.55 [above the settling pond]) and Gate Creek (1.46 [above the settling pond]) were in alignment with observations from previous years (Robinson et al., 2022). As noted in the 2021 Regional Calcite Monitoring Program, areas in Bodie and Gate Creek (as well as Erickson Creek [including the above the SRF outfall] currently have Cc scores that are greater than the future SPO (December 31, 2024: Cc ≤ 0.5). All four Michel Creek areas downstream of the Erickson Creek and Michel Creek confluence (RG_MIDER, RG_MIDGA, RG_MIDBO, and RG_MICOMP) and the area above the confluence (RG_MI3) had no reportable calcite presence or concretion in the current study (resulting in a CI of 0; Figure 3.5; Appendix Table C.3) and were overall lower than results from 2020 (as well as below the future SPO). Similar low CI values in Michel Creek study areas (and decreases in comparison to 2020 data) were also reported in the 2021 Regional Calcite Monitoring Program, as the mean CI ranged from 0.02 to 0.29 in area of Michel Creek (Robinson et al., 2022).

3.4 Summary

Results pertaining to physical habitat and CABIN supporting measurements included analysis of temperature, dissolved oxygen, sediment quality, and calcite and other CABIN supporting measures. Overall, this information was directly used to address Study Questions #1 (SRF influence on temperature) and #2 (SRF influence on calcite), and indirectly used in addressing Study Questions #4 (SRF influence on selenium BIT concentrations), #5 (SRF influence on benthic community structure), and #6 (SRF influence on productivity).

[29] The 2021 Regional Calcite Monitoring Program (Robinson et al., 2022) assesses calcite for a given reach, while calcite as part of the EVO LAEMP was evaluated in the riffles where benthic invertebrate community monitoring was conducted per CABIN protocols (Environment Canada 2012a).

Further information regarding the indirect influence of changes to the physical habitat and CABIN supporting measurements (as influenced by the operation of the SRF) on selenium BIT concentrations, benthic community structure, and productivity is discussed in greater detail in Section 6 (Benthic Invertebrates).

As water temperature above the SRF outfall (RG_ERCKUT) is consistently ~5°C, the increase in water temperature downstream of the outfall (at RG_ERCKDT) was expected, as the process of treating Erickson Creek water requires the source water from Erickson Creek to be drawn into the treatment system from the watershed and instantaneously replaced with treated effluent. Although water temperature was higher in areas below the SRF outfall compared to pre-EVO SRF P2 (or upstream), water temperatures at the confluence of Erickson Creek and Michel Creek (EV_EC1 [RG_ERCK]) largely met the SPO in 2021. Additional evaluations of temperature at routine water quality stations at fish-bearing areas of the EVO LAEMP confirmed that water temperatures were within or below guidelines for critical life stages of WCT and bull trout and that the influence of the SRF on water temperature in the receiving environment is minimal.

The calcite index in Gate and Bodie creeks (which both received limited discharge from the SRF in 2021), as well as Erickson Creek in 2021 was either similar to or lower than previous years (pre-EVO SRF P2), with the exception of RG_ERCK which showed a slight increase. The decreases in calcite upstream (RG_ERCKUT) and downstream (RG_ERCKDT) of the SRF outfall in 2021 compared to previous years conflicts with findings from the annual Regional Calcite Monitoring Program which suggested similar calcite levels in 2021 when compared to past evaluations. The small increase in CI noted at RG_ERCK (which is area at the confluence of Erickson Creek and Michel Creek in the current study) was not observed in the Regional Calcite Monitoring Program (i.e., showed no change over time). Understanding calcite deposition in Erickson is complex because its unique habitat characteristics (i.e., high bryophyte presence in the area) and the potential high spatial variability of calcite in the creek. Calcite presence and concretion in areas of Michel Creek (which receives water from Gate, Bodie, and Erickson creeks) had scores in 2021 of zero, which was similar to findings in the annual Regional Calcite Monitoring Program. Overall, the SRF does not appear to have increased the overall calcite presence and concretion in the receiving environment of Gate, Bodie, Erickson or Michel creeks.

4 WATER QUALITY

4.1 Nutrients

The EVO SRF was effective in decreasing the aqueous concentrations of phosphorus and orthophosphate (Table 4.1, Appendix Table D.1 and D.2; Appendix Figures D.1, D.2, and D.3), as concentrations were lower at EV_ECOUT (RG_ERCKDT) when compared to pre-EVO SRF P2 concentrations or concentrations upstream of the SRF outfall (RG_ERCKUT). Decreased concentrations further downstream in Erickson Creek, at the confluence with Michel Creek (EV_EC1 [RG_ERCK]) were also observed in 2021 when compared to pre-EVO SRF P2 concentrations. Concentrations of these constituents in Gate Creek (EV_GT1 [RG_GATEDP]) and RG_GATE), Bodie Creek (EV_BC1 [RG_BOCK]), and Michel Creek (downstream of the Erickson and Michel Creek confluence: EV_MC2a, RG_MIDER, RG_MIDGA, RG_MIDBO, and EV_MC2 [RG_MICOMP]) had similar or lower concentrations in 2021 when compared to pre-EVO SRF P2 (Table 4.1, Appendix Figures D.1, D.2, and D.3). The only area where an increase in orthophosphate concentrations was observed relative to pre-EVO SRF P2 was at EV_MC3 (RG_MI3), located in Michel Creek upstream of the confluence with Erickson Creek (Table 4.1, Appendix Figure D.3), and not influenced by the SRF.

One function of the EVO SRF P2 is to decrease nitrate loads in the receiving environment. In 2021, the EVO SRF P2 removed 55,574 kg of nitrate (Teck 2022a), and in doing so decreased the concentration in the receiving environment of Erickson Creek (EV_ECOUT and EV_EC1 [which are associated with biological stations RG_ERCKDT and RG_ERCK, respectively]) when compared to upstream concentrations at F2_ECIN (which is associated with biological station RG_ERCKUT) and is analogous to pre-EVO SRF P2 conditions (Table 4.1, Appendix Table D.1 and D.2; Appendix Figures D.1 and D.4). Nitrate concentrations in Gate and Bodie creeks were either similar (RG_GATE) or lower (EV_GT1 [RG_GATEDP] and EV_BC1 [RG_BOCK]) than pre-EVO SRF P2 concentrations. Although concentrations decreased in a majority of areas in Erickson, Gate, and Bodie creeks, concentrations were still higher than the long-term BCWQG (which is equivalent to the EVWQP Level 1 Benchmark for this operational unit) at these areas (with the exception of a few sampling events at EV_ECOUT [RG_ERCKDT] and EV_EC1 [RG_ERCK]; Table 4.1, Appendix Table D.2). Further downstream in Michel Creek, nitrate concentrations were either similar (RG_MIDGA) or lower (EV_MC2a, RG_MIDER, RG_MIDBO, and EV_MC2 [RG_MICOMP]) during EVO SRF P2 operation when compared to pre-EVO SRF P2 concentrations, while concentrations of nitrate at EV_MC3 (RG_MI3), which is above the confluence of Erickson Creek with Michel Creek, in 2021 was similar to previous years (2018 to 2020; Appendix Figures D.1 and D.4).

Table 4.1: Temporal Trends and Guideline Assessment of Key Constituents, EVO LAEMP, 2021

Constituent	Did constituent concentration increase with initiation of SRF P2?[a]																	
	Erickson Creek						Gate Creek		Bodie Creek		Michel Creek							
	n>BCL or BM1	F2_ECIN[b] (RG_ERCKUT)	n>BCL or BM1	EV_ECOUT[c] (RG_ERCKDT)	n>BCL or BM1	EV_EC1 (RG_ERCK)	n>BCL or BM1	EV_GT1 (RG_GATEDP)	n>BCL or BM1	EV_BC1 (EV_BOCK)	n>BCL or BM1	EV_MC3 (RG_MI3)	n>BCL or BM1	EV_MC2a	n>BCL or BM1	EV_MC2 (RG_MICOMP)	n>BCL or BM1	EV_ER1
Nitrate (as N)	99%	ns	87%	decrease*	84%	decrease	100%	decrease	100%	ns	0%	ns	0%	decrease	1%	decrease	19%	ns
Nitrite (as N)	0%	nt	0%	ns	0%	nt	2%	ns	8%	ns	0%	ns	0%	ns	0%	ns	2%	increase
Phosphorus (P)-Total	-	ns	-	decrease	-	decrease	-	ns	-	ns	-	ns	-	ns	-	ns	-	ns
Orthophosphate	-	increase	-	decrease*	-	decrease	-	ns	-	ns	-	increase	-	ns	-	ns	-	ns
Sulphate	100%	increase	100%	increase	100%	ns	100%	ns	100%	ns	0%	ns	0%	ns	0%	ns	0%	ns
Total Dissolved Solids	99%	increase	100%	increase	100%	increase	98%	decrease	96%	ns	0%	ns	0%	ns	0%	ns	0%	ns
Antimony (Sb)-Total	0%	increase	0%	increase	0%	increase	0%	decrease	0%	decrease	0%	ns	0%	ns	0%	ns	0%	ns
Barium (Ba)-Total	0%	increase	0%	decrease*	0%	decrease	0%	ns	0%	ns	0%	ns	0%	ns	0%	ns	0%	ns
Boron (B)-Total	0%	increase	0%	increase	0%	increase	0%	decrease	0%	ns	0%	ns	0%	ns	0%	ns	0%	nt
Iron (Fe)-Total	0%	ns	0%	increase*	0%	nt	0%	increase	0%	ns	2%	ns	2%	ns	3%	ns	3%	ns
Lithium (Li)-Total	-	increase	-	increase	-	increase	-	decrease	-	decrease	-	ns	-	ns	-	ns	-	ns
Manganese (Mn)-Total	0%	ns	0%	increase	0%	increase	0%	ns	0%	increase	0%	ns	0%	increase	0%	increase	0%	ns
Molybdenum (Mo)-Total	0%	ns	0%	increase	0%	increase	0%	decrease	0%	decrease	0%	ns	0%	increase	0%	increase	0%	ns
Nickel (Ni)-Total	0%	ns	73%	increase	88%	increase	100%	decrease	100%	decrease	2%	ns	0%	increase	1%	increase	0%	ns
Selenium (Se)-Total	100%	ns	93%	decrease	97%	decrease	100%	ns	100%	ns	0%	ns	0%	decrease	1%	ns	0%	ns
Uranium (U)-Total	65%	increase	90%	increase	88%	increase	55%	decrease	90%	decrease	0%	ns	0%	increase	0%	ns	0%	ns
Zinc (Zn)-Total	0%	nt	0%	increase*	0%	nt	0%	ns	0%	increase	2%	ns	0%	nt	1%	ns	0%	ns
Cadmium (Cd)-Dissolved	0%	increase	0%	increase	0%	increase	0%	ns	0%	ns	0%	increase	0%	ns	0%	ns	0%	ns
Cobalt (Co)-Dissolved	-	nt	-	increase*	-	increase	-	decrease	-	decrease	-	nt	-	nt	-	nt	-	nt
Selenium (Se)-Dissolved	0%	ns	0%	decrease	0%	decrease	0%	ns	0%	ns	0%	ns	0%	decrease	0%	ns	0%	ns

Notes: BCL = Long-term average BCQWG for the Protection of Aquatic Life; BM1 = EVWQP Level 1 Benchmark; ns = no significance, nt = not tested (due to low detection limit in sample); "-" = no data; " * " = trends determined not significant via BACI analysis, but were confirmed to be either decreasing/increasing via visual confirmation.

[a] For each key constituent (i.e. primarily those with early warning triggers), concentrations for each area during SRF P2 were compared relative to pre-SRF P2 conditions using a Relative change model (BACI) or Temporal change model at exposed area alone when the reference area % LRL was greater than 80%. A trend (increase or decrease) was identified based on the magnitude of difference between SRF P2 and pre-SRF P2 (when year interaction was not significant) or between 2021 vs 2020 or between 2021 vs all historical years (when year interaction was significant).

[b] Due to a lack of pre-SRF P2 data the strength of the BACI analysis is reduced.

[c] Due to a lack of pre-SRF P2 data as well as the variability of the SRF operating in 2021, determination of increases and/or decreases were based on visual comparison as well as the BACI analysis.

Aqueous concentrations of nitrite downstream of the outfall (F2_ECIN [RG_ERCKUT]) were similar to concentrations upstream of the outfall (EV_ECOUT [RG_ERCKDT]; Appendix Figure D.5), while total ammonia showed subtle increases downstream of the outfall (Appendix Figure D.6). Regardless, concentrations of nitrite and ammonia in Erickson and Michel Creek as well as the reference areas (RG_MI25 and RG_ALUSM) were below the lower BCWQG throughout all of 2021 and were largely similar to pre-EVO SRF P2 concentrations (Appendix Table D.2; Appendix Figures D.5 and D.6). Concentrations of nitrite and ammonia were also below the long-term BCWQG in Bodie Creek and Gate creeks as well in most samples (<10% of samples exceeded the respective BCWQG; Appendix Tables D.2).

4.2 Selenium and Selenium Speciation

In 2021, EVO SRF P2 removed 548 kg of selenium (Teck 2022a). The removal of total selenium was evident as decreased concentrations in the receiving environment of Erickson Creek (EV_ECOUT [RG_ERCKDT] and EV_EC1 [RG_ERCK]) as well the upper portion of Michel Creek (EV_MC2a); Figure 4.1; Table 4.1; Appendix Figure D.7) when compared to upstream concentrations at RG_ERCKUT. The SRF, however, was not operational during multiple sampling events in 2021,[30] which led to variability in measured aqueous selenium concentrations (as well as other constituents) throughout the year (Figure 4.2; Appendix Figure D.8 [using SRF flow as a proxy for operational status]). Aqueous total selenium concentrations above the SRF outfall (F2_ECIN [RG_ERCKUT]) were above the EVWQP Level 2 benchmark during all sampling events in 2021 (Figure 4.1; Appendix Table D.2), while only 66% of samples directly below the SRF outfall (EV_ECOUT [RG_ERCKDT]) exceeded this threshold (with 7% being lower than the EVWQP Level 1 benchmark). Concentrations further downstream at EV_EC1 (RG_ERCK) had fewer selenium EVWQP Level 2 benchmark exceedances (39%) than those upstream in Erickson Creek. Aqueous total selenium concentrations at Gate and Bodie Creek study areas (RG_GATE, EV_GT1 [RG_GATEDP], and EV_BC1 [RG_BOCK]), which were increasing prior to EVO SRF P2[31], decreased with the commissioning of EVO SRF P2 (Figure 4.1) but remained above the EVWQP Level 2 benchmark throughout 2021 (Appendix Table D.2). These decreases in selenium at Gate and Bodie, however, were unlikely related to the SRF as limited discharge from the SRF occurred in these areas in 2021. Aqueous total selenium concentrations at all study areas in Michel Creek and the Elk River, (with the exception of 1% of

[30] In 2021, the EVO SRF P2 experienced 53 downtime events, with five of these events being greater than 24 hours in duration (Teck 2022a).

[31] Increases in constituent concentrations (namely selenium and sulfate) in Gate (EV_GT1) and Bodie creeks (EV_BC1) from 2018 to 2020 (which have stabilized or declined in 2021) are likely related to a change in pit dewatering in the area (Teck 2022b).

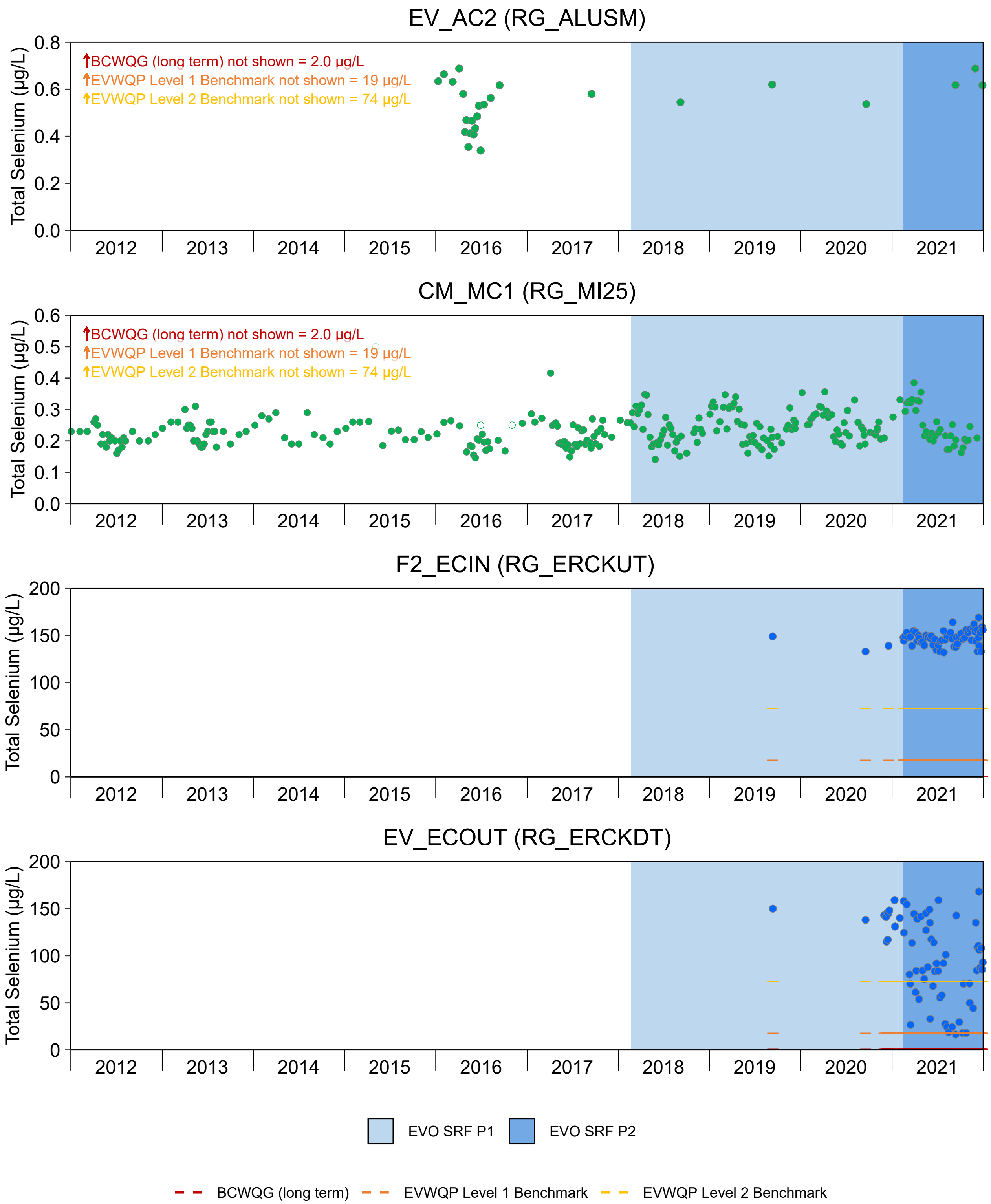
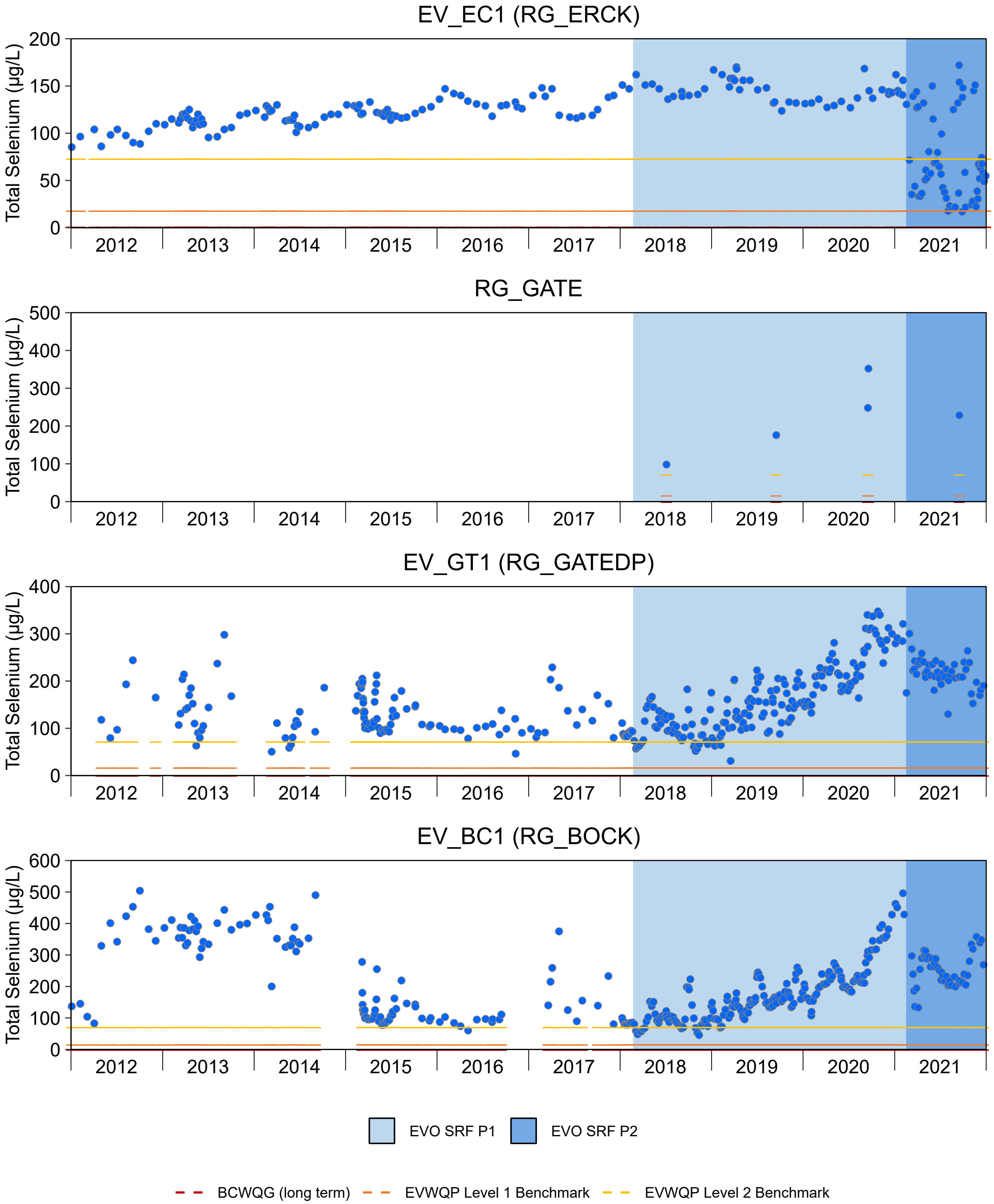


Figure 4.1: Time Series Plots for Total Selenium from EVO LAEMP Areas, 2012 to 2021

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).



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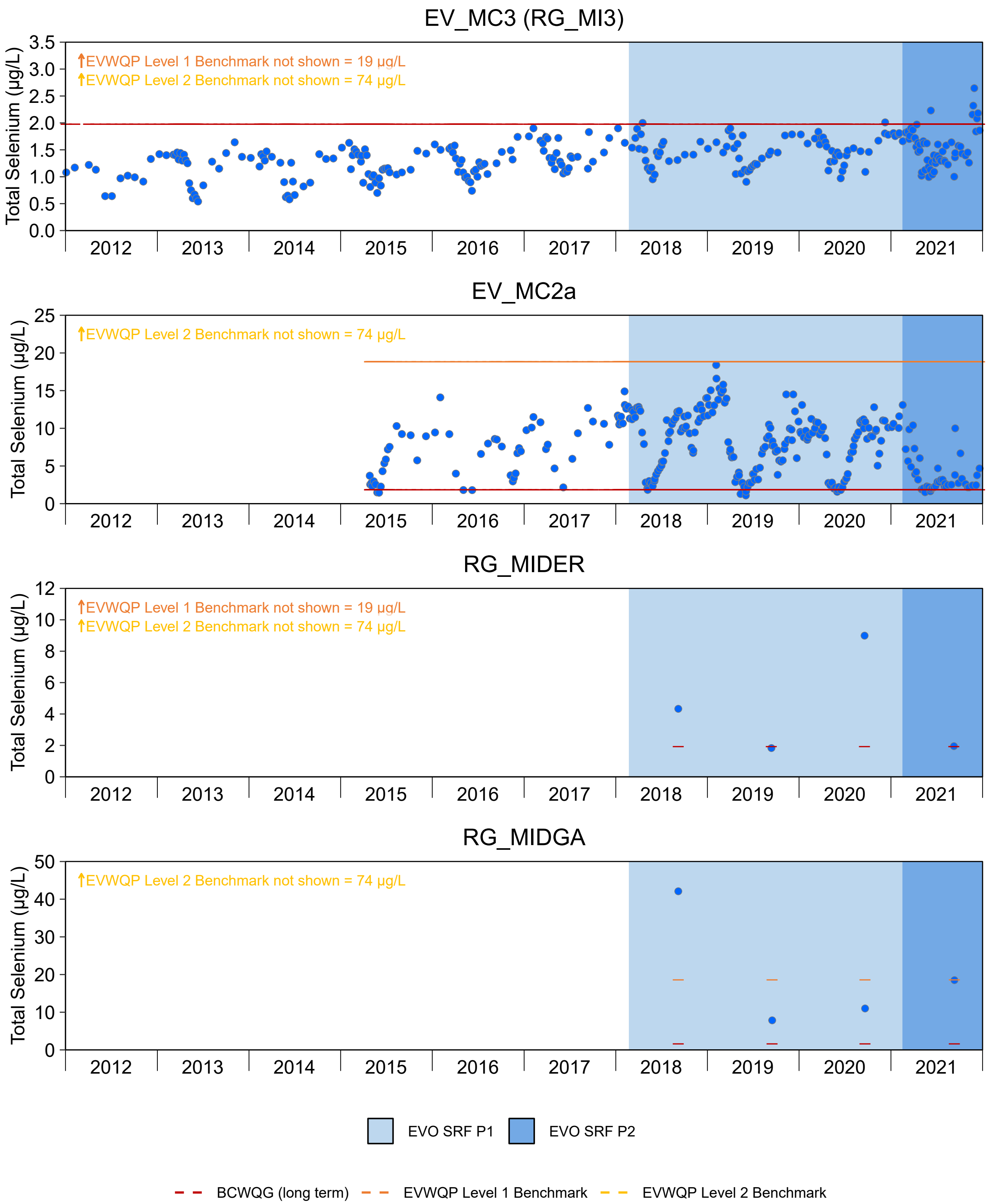

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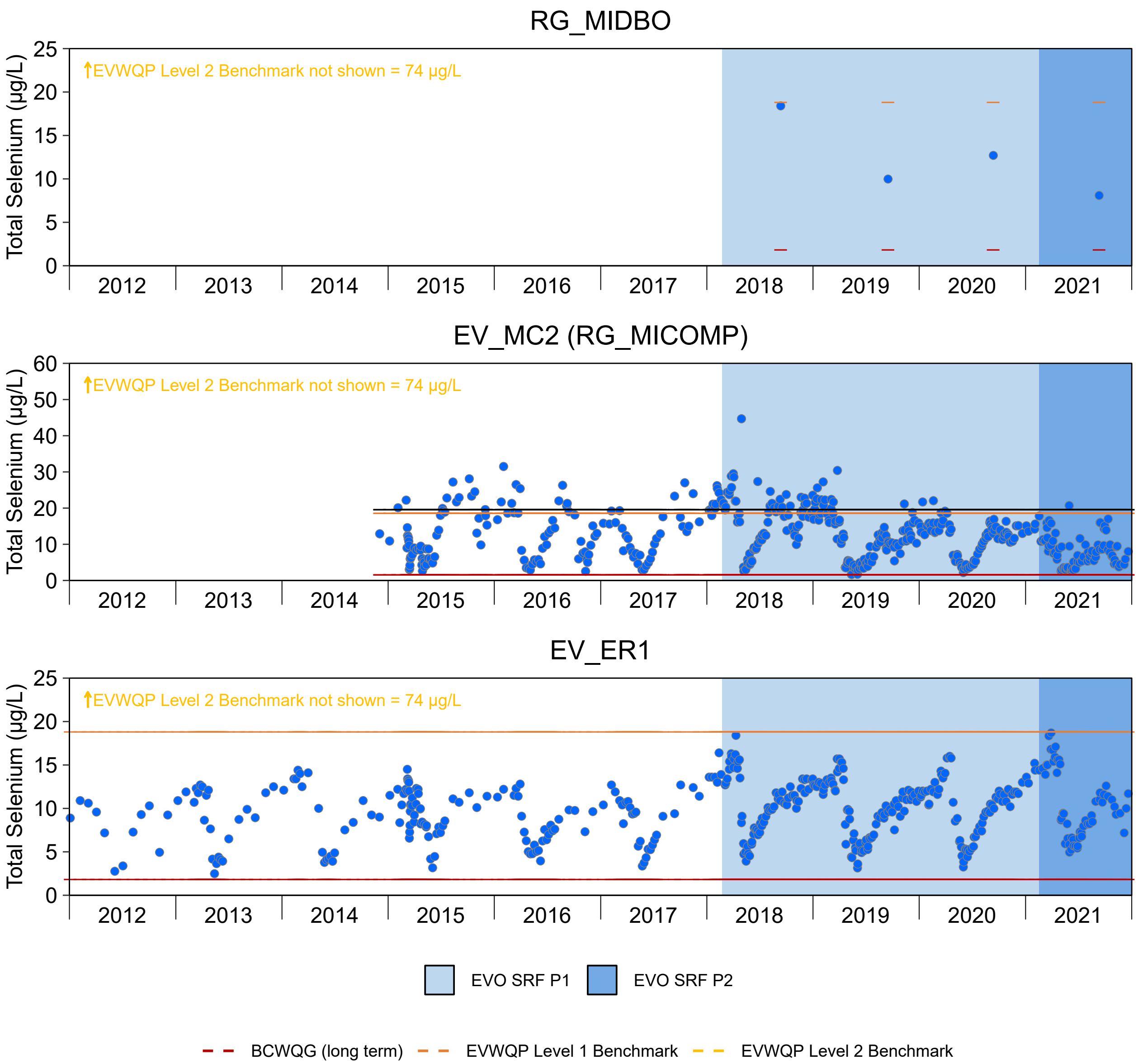

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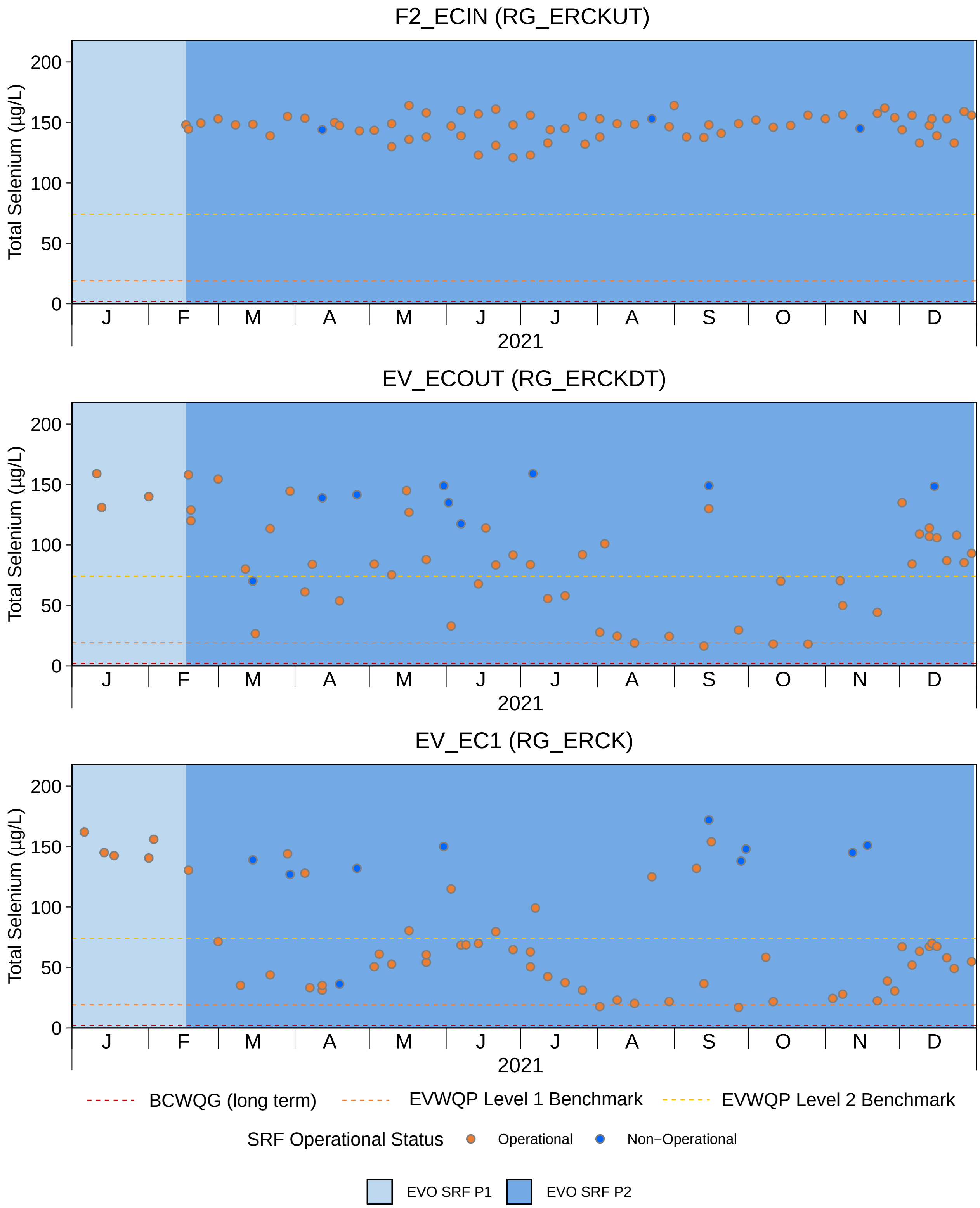


Figure 4.2: Total Selenium Concentrations Compared to SRF Operational Status, EVO LAEMP, 2021

Note: SRF = Saturated Rock Fill.

samples at EV_MC2) were below the EVWQP Level 1 benchmark (Appendix Table D.2) and were similar or lower than previous years (pre-EVO SRF P2) at all Michel Creek study areas (Figure 4.1; Table 4.1).

Although total and dissolved selenium concentrations (including selenate, the predominant selenium species, Appendix Figure D.9) decreased in the receiving environment after the commissioning of the SRF in Erickson Creek, the concentrations of selenite and some organoselenium species increased (Figure 4.3; Appendix Figures D.10 to D.17). While the maximum aqueous concentration of selenite at F2_ECIN (RG_ERCKUT) in 2021 was 0.29 µg/L, the maximum aqueous concentrations of selenite at areas below the SRF outfall in Erickson Creek, specifically EV_ECOUT (RG_ERCKDT) and EV_EC1 (RG_ERCK), was 1.9 and 1.4 µg/L, respectively (Appendix Table D.3). Similarly, while organoselenium species were largely undetected prior to EVO SRF P2 and upstream of the SRF (F2_ECIN [RG_ERCKUT]) in 2021 (with the exception of a few detectable concentrations of selenosulfate and unknown selenium species), dimethylselenoxide (DMSeO), methylselenoinic acid (MeSe(IV)), and selenocyanate (SeCN) were observed on multiple occasions in Erickson Creek areas downstream of the SRF outfall in 2021 (Figure 4.3; Appendix Figure D.11 to D.17). Although limited discharge from the EVO SRF occurred in these areas in 2021, a similar increase in aqueous selenite and organoselenium species was not observed in Gate and Bodie Creek as these constituents had either similar or lower concentrations in 2021 when compared to pre-EVO SRF P2 concentrations (Figure 4.3; Appendix Figure D.11 to D.17). Selenite concentrations in Michel Creek in 2021 were consistent with previous years (pre-EVO SRF P2), and organoselenium species were generally not detected in these areas. Aqueous concentrations in in Gate (RG_GATE and EV_GT1 [RG_GATEDP]) and Bodie creeks (EV_BC1 [RG_BOCK]) were above the draft screening value for a subset of organoselenium species[32] (i.e. 0.025 µg/L expressed as the sum of DMSeO and MeSe(IV); ADEPT 2022) for all samples collected. Meanwhile, concentrations of these organoselenium were less frequently above this draft screening value in Erickson Creek (EV_ECOUT [RG_ERCKDT]: 14% of samples and EV_EC1 [RG_ERCK]: 47% of samples) and were below this screening value in all evaluated areas of Michel Creek (EV_MC3 (RG_MI3), EV_MC2a, RG_MIDER, RG_MIDGA, RG_MIDBO, EV_MC2 (RG_MICOMP) or the Elk River (EV_ER1; Figure 4.3; Appendix Figure D.11 and D.13).

[32] As noted in the 2021 Selenium Speciation Monitoring Program (ADEPT, 2021), "Patterns of bioaccumulation support a draft screening value of 0.025 µg/L (expressed as the sum of DMSeO and MeSe(IV)) to indicate conditions that might cause an incremental increase in bioaccumulation relative to the normal range of variation in monitoring data." The sum of DMSeO and MeSe(IV) in each water sample was calculated by substituting zero for organoselenium results that were below detection (i.e., <LRL = 0).

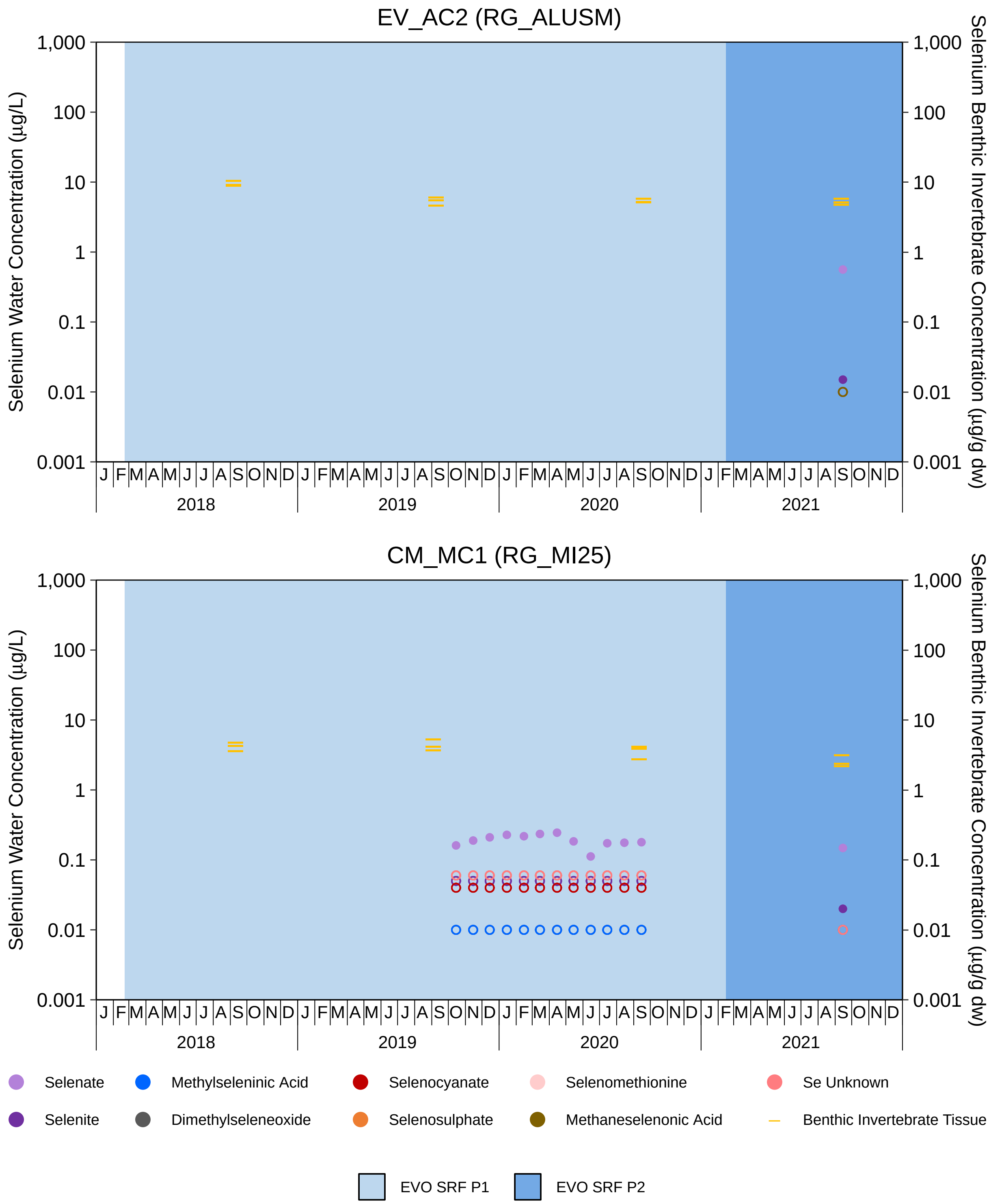
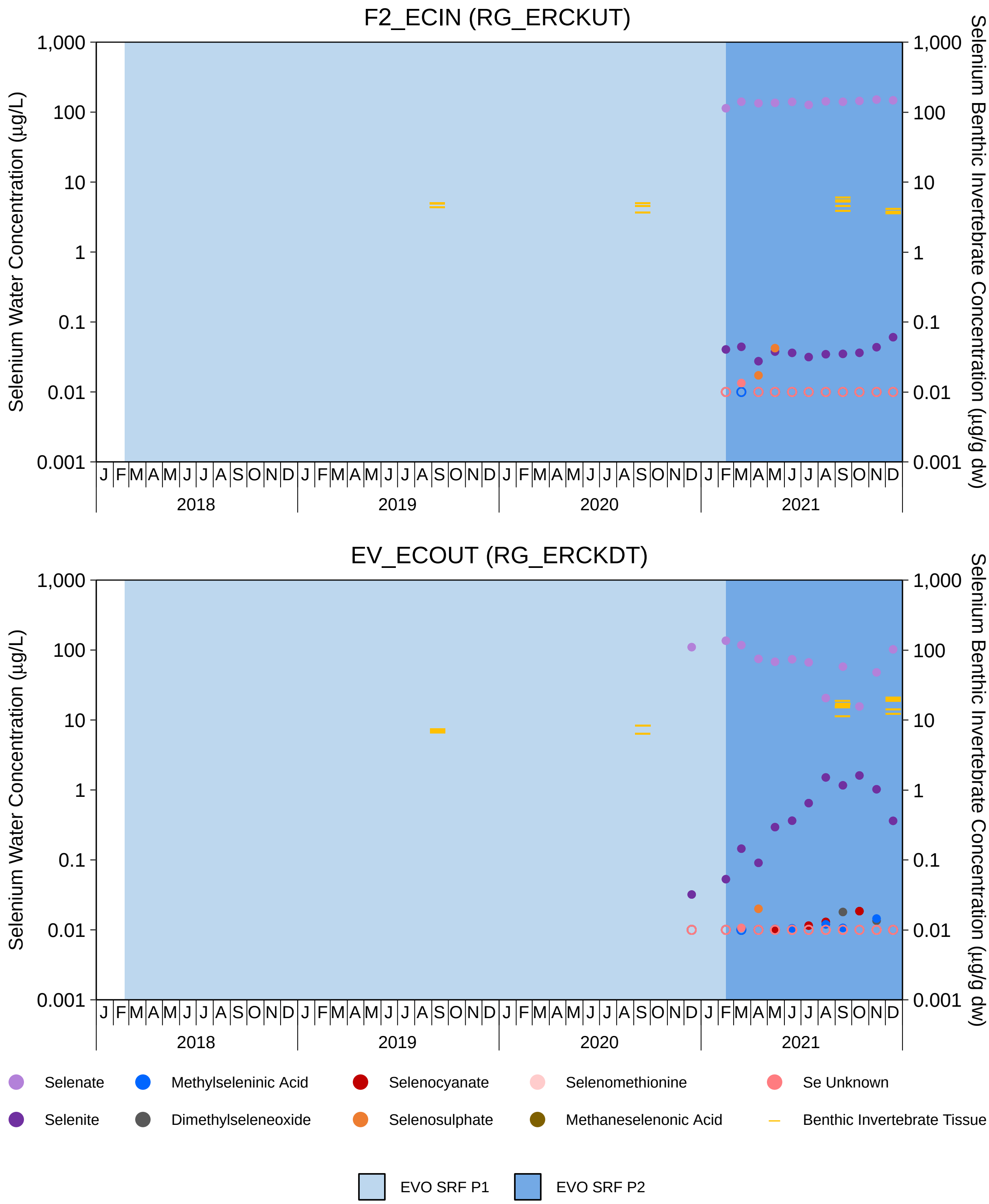


Figure 4.3: Monthly Mean Selenium Species and Benthic Invertebrate Tissue Selenium at Mine−Exposed and Reference Stations, EVO LAEMP, 2018 to 2021

Note: Samples at the laboratory reporting limit (LRL) are plotted with open symbols.



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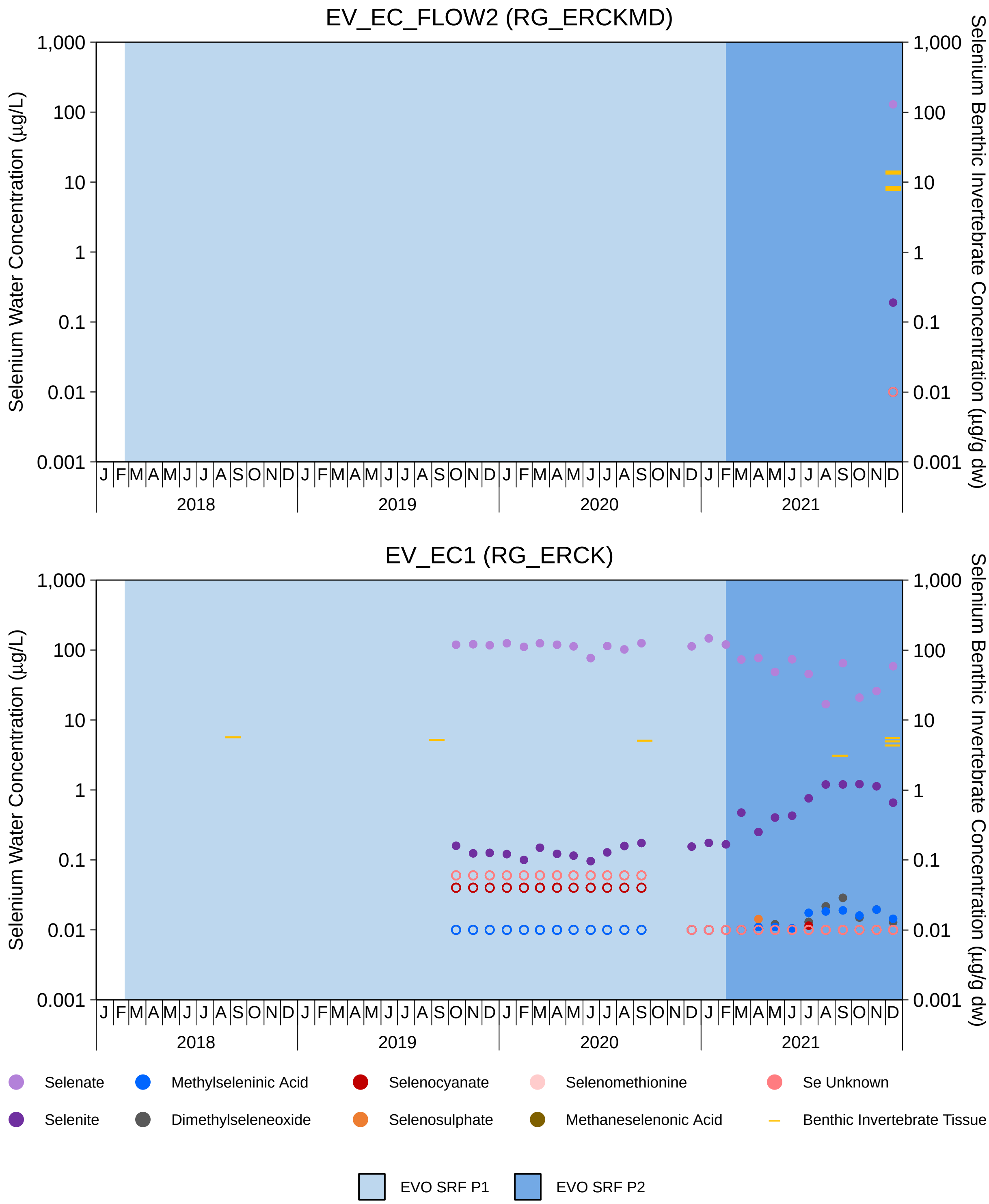

Figure 4.3: Monthly Mean Selenium Species and Benthic Invertebrate Tissue Selenium at Mine−Exposed and Reference Stations, EVO LAEMP, 2018 to 2021

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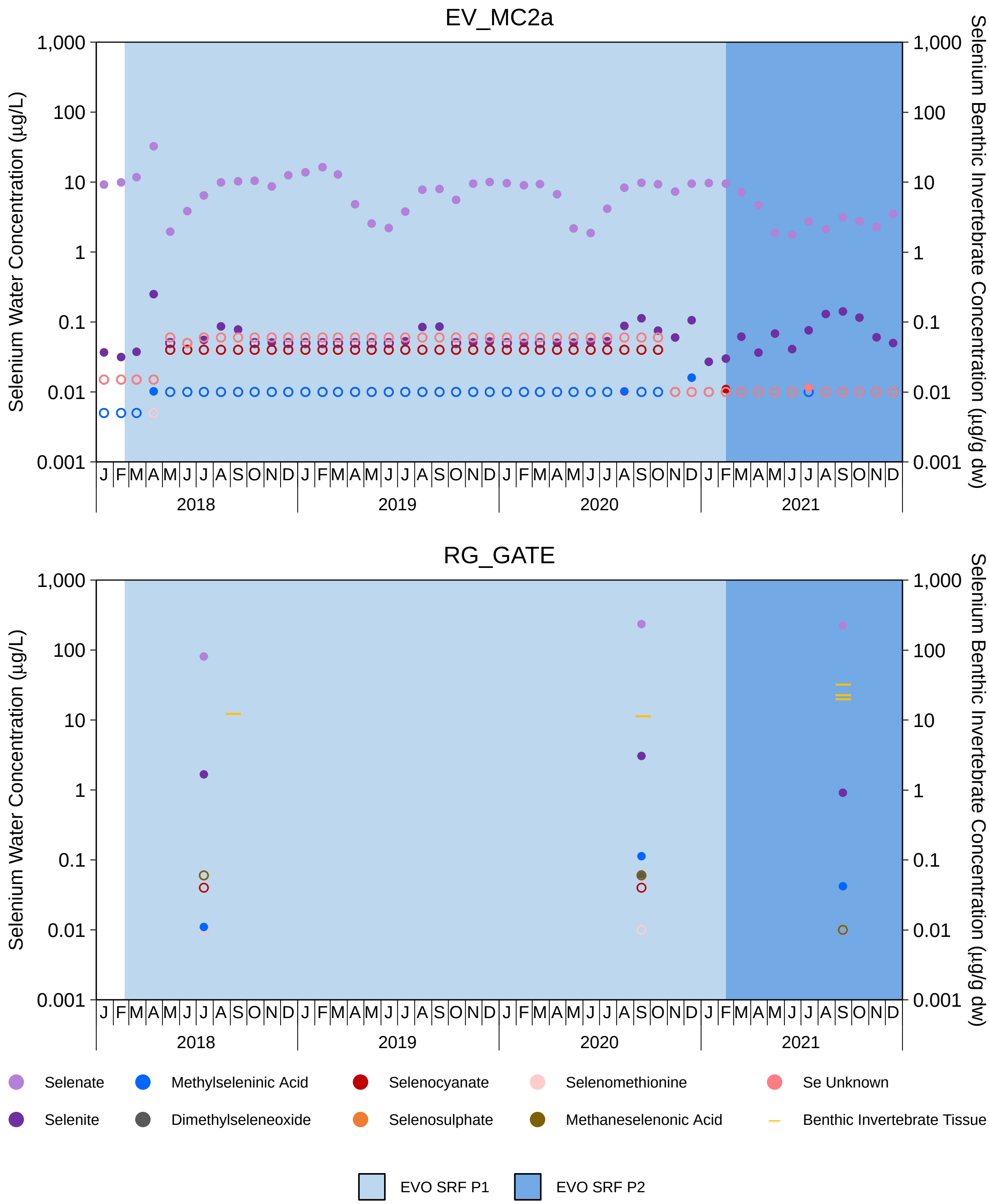

Figure 4.3: Monthly Mean Selenium Species and Benthic Invertebrate Tissue Selenium at Mine−Exposed and Reference Stations, EVO LAEMP, 2018 to 2021

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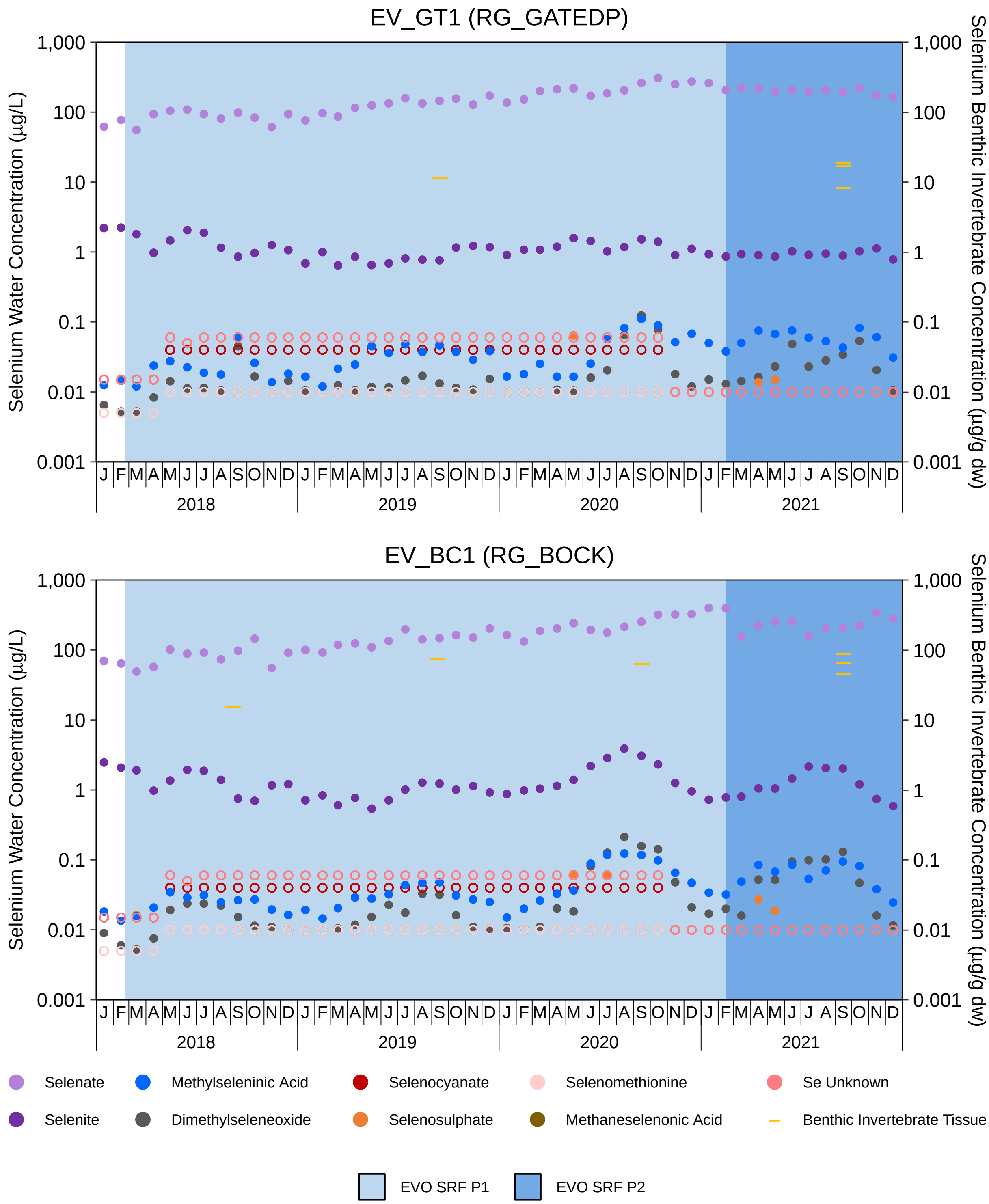

Figure 4.3: Monthly Mean Selenium Species and Benthic Invertebrate Tissue Selenium at Mine−Exposed and Reference Stations, EVO LAEMP, 2018 to 2021

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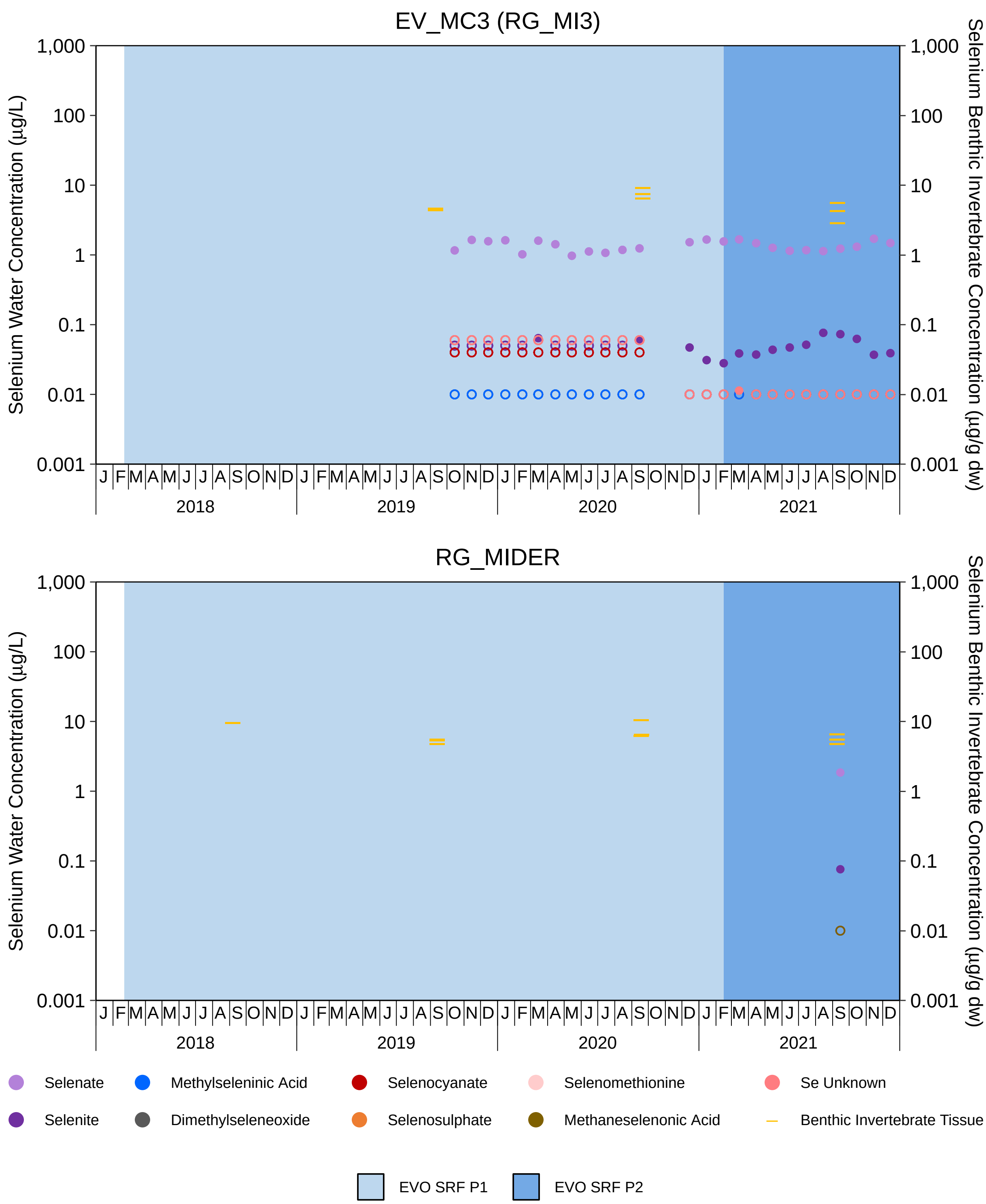

Figure 4.3: Monthly Mean Selenium Species and Benthic Invertebrate Tissue Selenium at Mine−Exposed and Reference Stations, EVO LAEMP, 2018 to 2021

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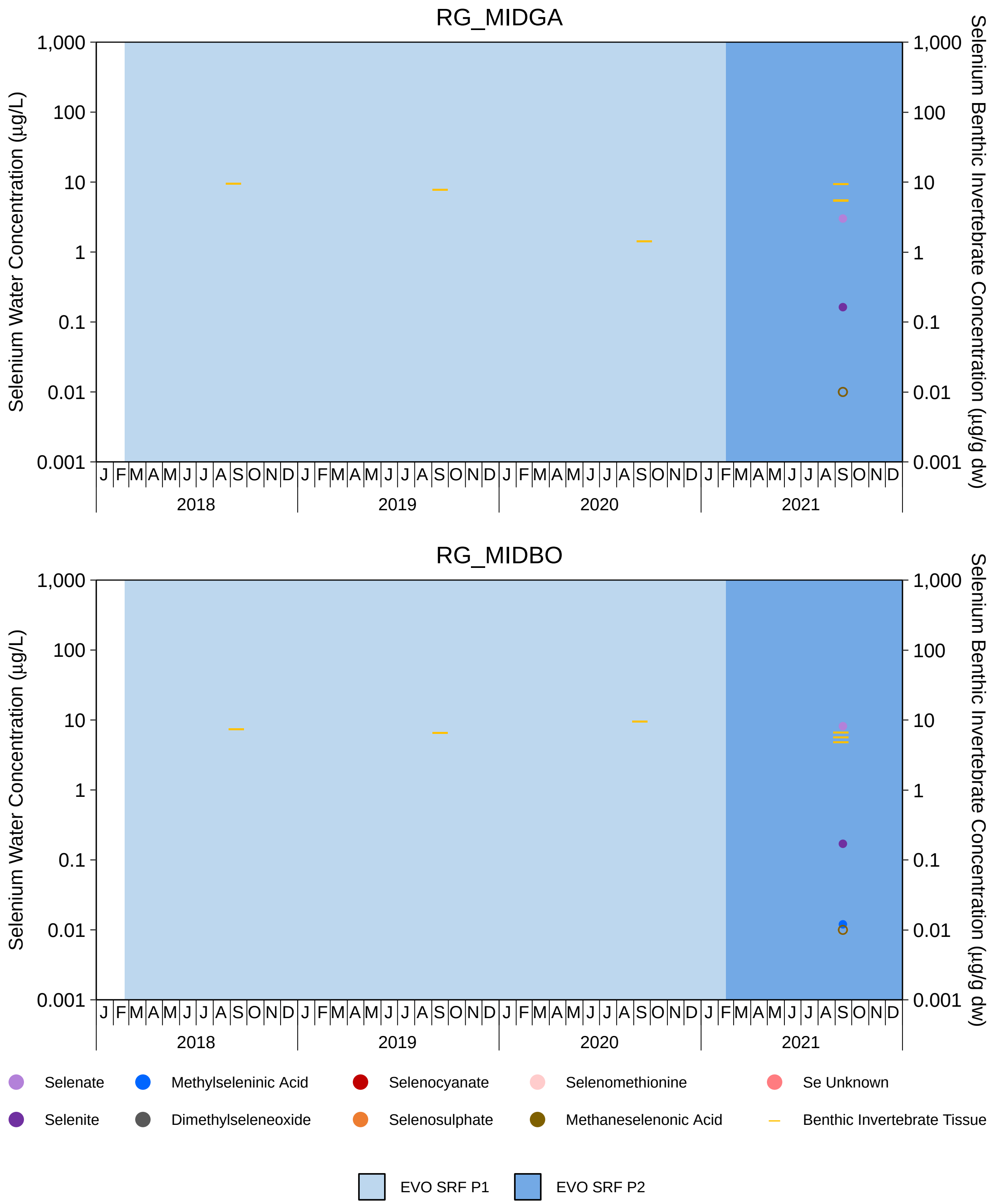

Figure 4.3: Monthly Mean Selenium Species and Benthic Invertebrate Tissue Selenium at Mine−Exposed and Reference Stations, EVO LAEMP, 2018 to 2021

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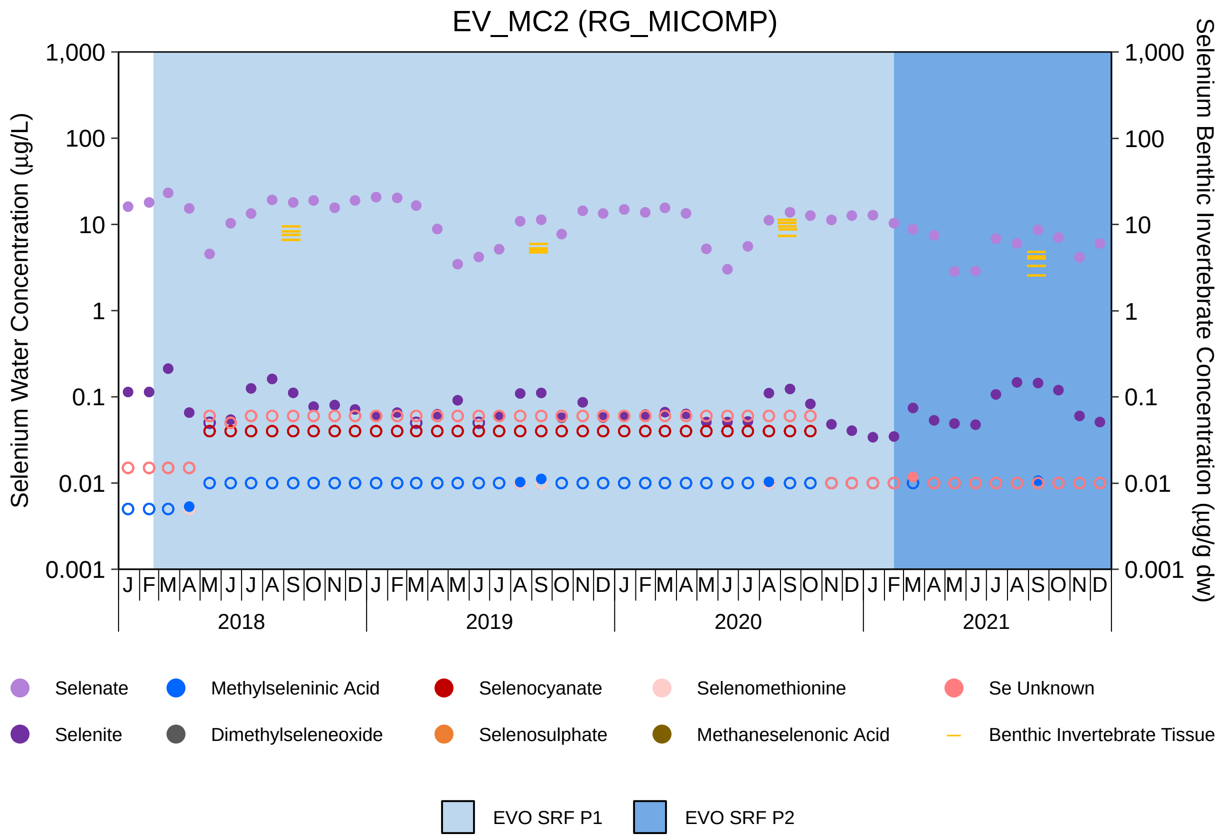

Figure 4.3: Monthly Mean Selenium Species and Benthic Invertebrate Tissue Selenium at Mine−Exposed and Reference Stations, EVO LAEMP, 2018 to 2021

Note: Samples at the laboratory reporting limit (LRL) are plotted with open symbols.

4.3 Nickel and Other Water Quality Constituents

SRF operational activities that maximize removal of nitrate and selenium also have the greatest potential to increase nickel concentrations in Erickson Creek (Teck 2022a). Concentrations of a number of mine-related constituents with EWTs increased directly downstream of the SRF outfall (EV_EC1 [RG_ERCKDT]) in 2021 when compared to aqueous concentrations prior to the commissioning of EVO SRF P2, albeit most were still below available water quality criteria, such as BCWQGs (Table 4.1; Appendix Table D.1 and D.2; Appendix Figure D.1, D.18 to D.29). These included: total antimony, total boron, dissolved cadmium, dissolved cobalt, total iron[33], total lithium, total manganese, total molybdenum, total nickel, sulphate, total dissolved solids, total uranium, and total zinc (Table 4.1). Although many of these constituents also increased upstream of the SRF outfall (F2_ECIN [RG_ERCKUT]; Table 4.1) in 2021 compared to previous years, the increase was more pronounced immediately downstream of the SRF outfall except for sulphate and total dissolved solids which showed similar increases between the areas (Appendix Figure D.20 and D.24, respectively). Some increases, such as total molybdenum, (Appendix Figure D.27) can be attributed to antiscalant addition to the SRF effluent (19,993 L of antiscalant was used for EVO operations in 2021; Teck 2022a). Although increased concentrations in 2021 were noted for a number of constituents downstream of the SRF outfall, a majority of these constituents had concentrations below available water quality criteria (BCWQGs, EVWQP benchmarks, etc.; Table 4.1, Appendix Table D.1 and D.2), with the exception of total nickel and total uranium (Figures 4.4 and 4.5). Concentrations of total nickel downstream of the SRF outfall at EV_ECOUT (RG_ERCKDT) and EV_EC1 (RG_ERCK) were above the Level 3 interim screening value in 67% and 75% of samples, respectively, while total uranium was above the BCWQG in 90% and 88% of samples, respectively (Appendix Table D.2). Dissolved cobalt and total lithium also increased downstream of the outfall in comparison to concentrations upstream of the SRF outfall or pre-EVO SRF P2, but guidelines for these constituents are currently not available (Appendix Figure D.19 and D.25, respectively). Total barium concentrations decreased at RG_ERCKDT in 2021 when compared to concentrations pre- EVO SRF P2 (Table 4.1; Appendix Figure D.22). Similar temporal trends noted for EV_ECOUT (RG_ERCKDT) were also noted at EV_EC1 (RG_ERCK; Table 4.1).

The majority of mine-related constituent concentrations were either similar or lower than concentrations pre-EVO SRF P2 in Gate Creek and Bodie Creek in 2021 (Table 4.1). Specifically, aqueous concentrations of total antimony, dissolved cobalt, total molybdenum, total nickel, and total uranium were lower in 2021 in Gate and Bodie relative to pre-SRF P2 (Table 4.1).

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[33] Although total iron is not a constituent with an EWT, it is included in the analysis for WQ as is it has been identified as a by-product of the SRF and was elevated in sediment downstream of the SRF outfall compared to upstream.

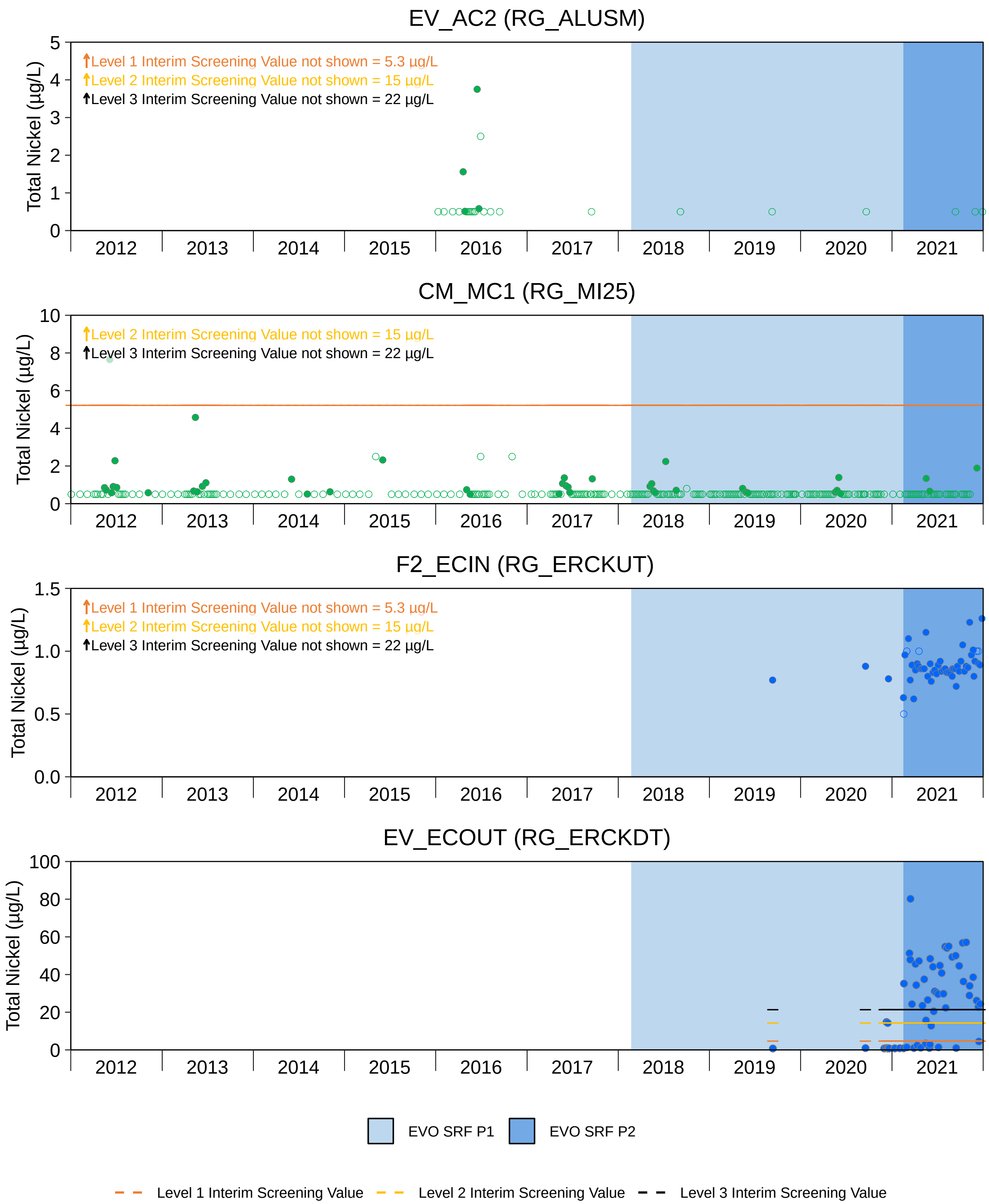

Figure 4.4: Time Series Plots for Total Nickel from EVO LAEMP Areas, 2012 to 2021

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).

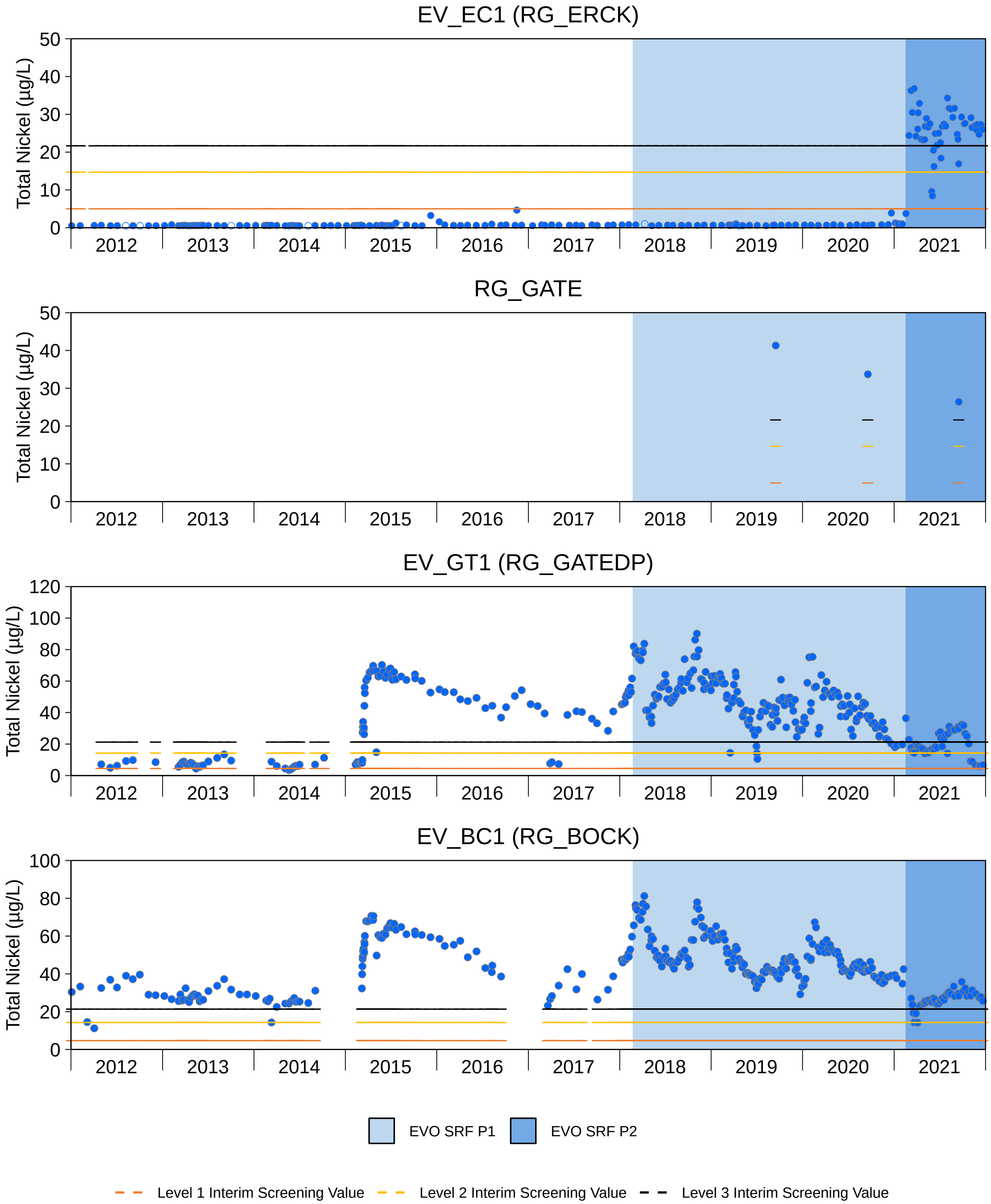

Figure 4.4: Time Series Plots for Total Nickel from EVO LAEMP Areas, 2012 to 2021

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).

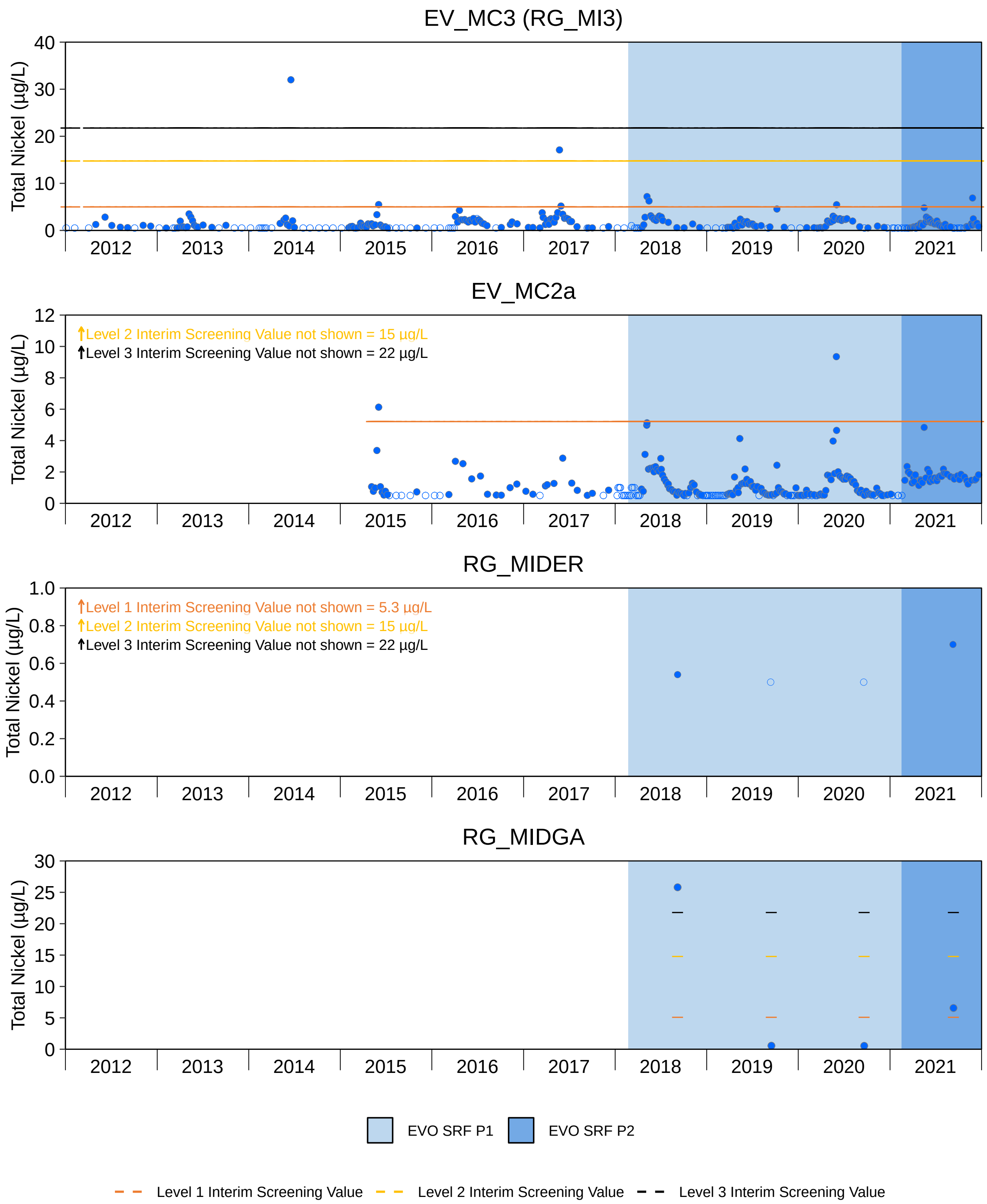

Figure 4.4: Time Series Plots for Total Nickel from EVO LAEMP Areas, 2012 to 2021

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).

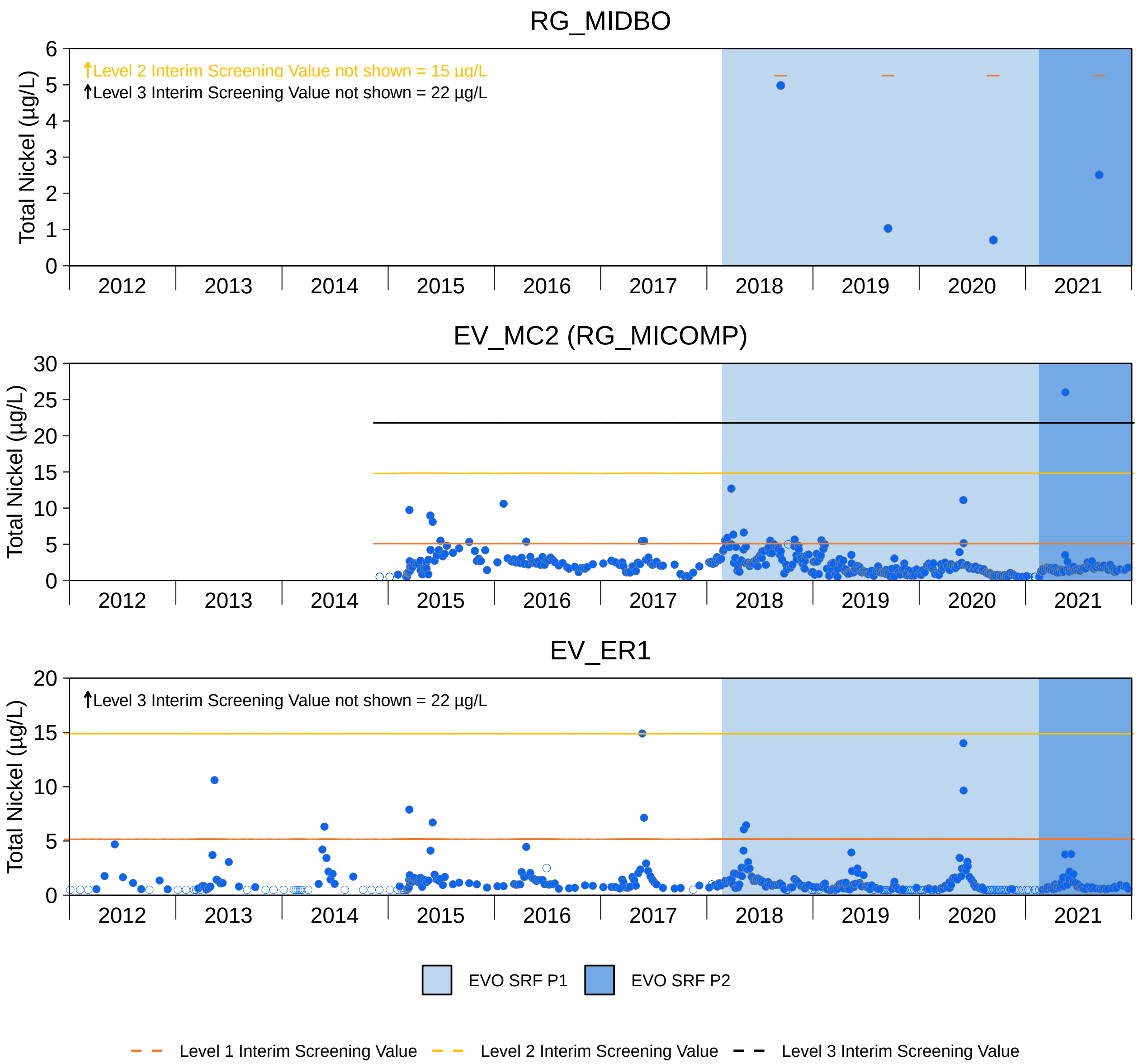

Figure 4.4: Time Series Plots for Total Nickel from EVO LAEMP Areas, 2012 to 2021

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).

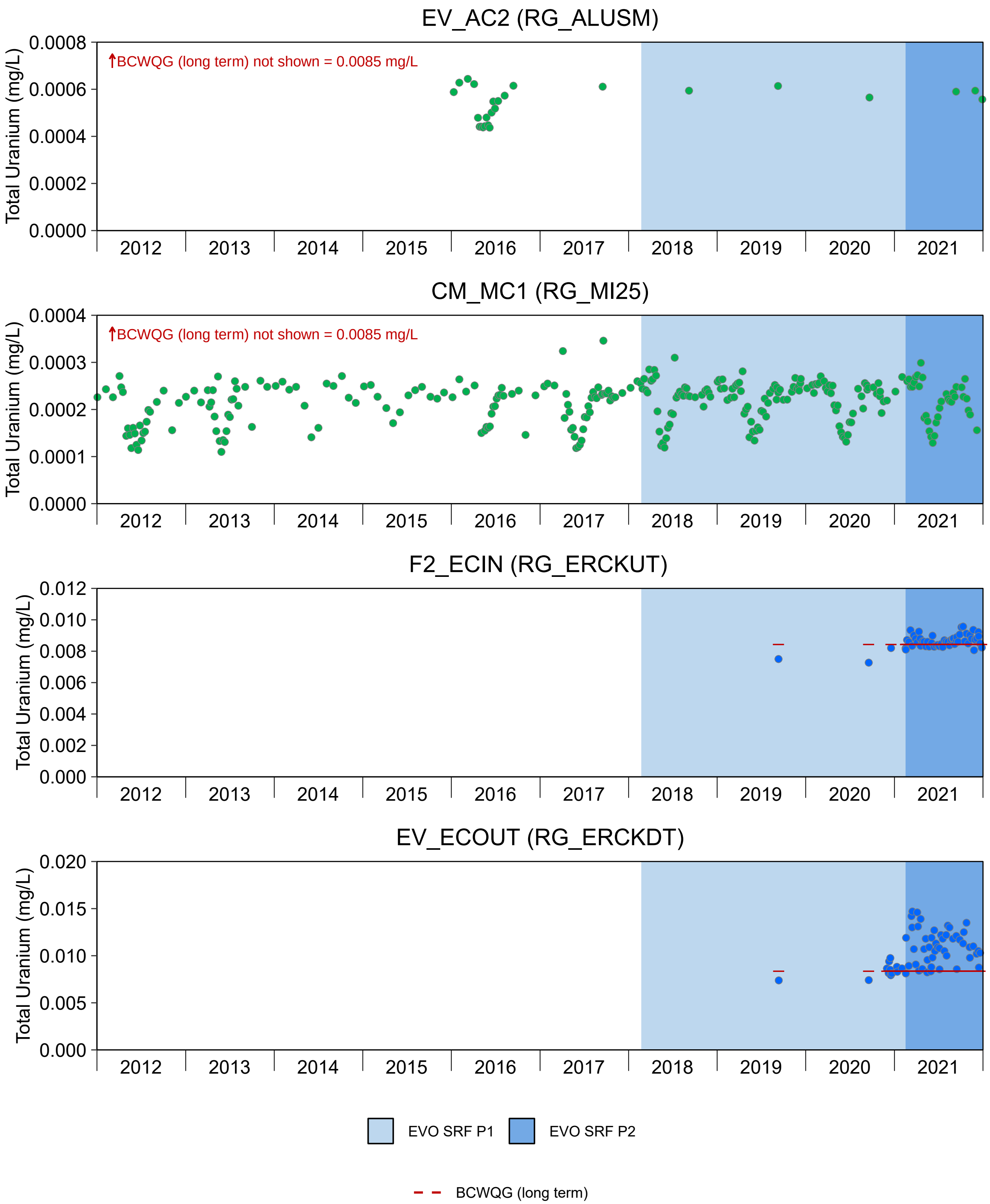

Figure 4.5: Time Series Plots for Total Uranium from EVO LAEMP Areas, 2012 to 2021

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).

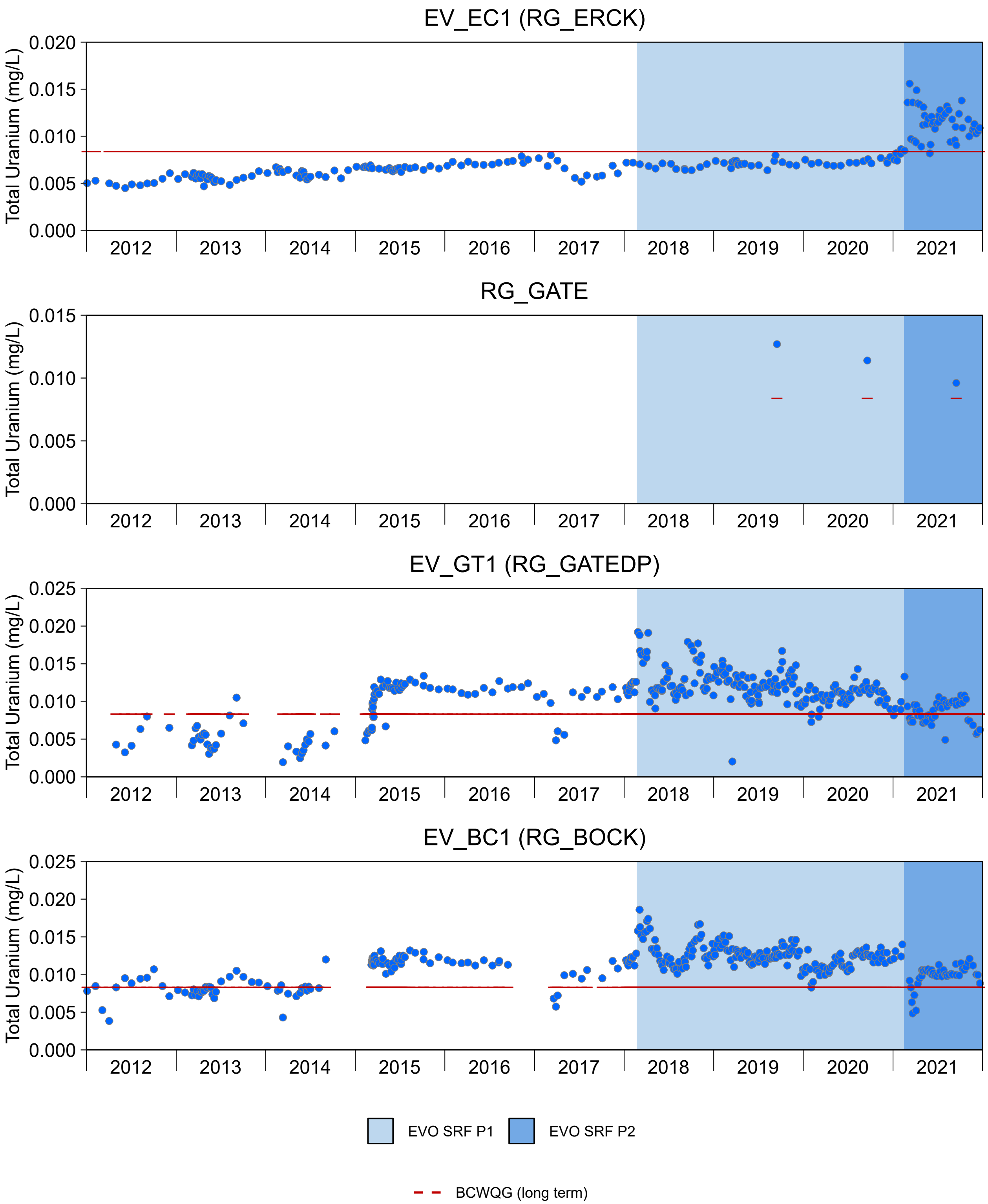

Figure 4.5: Time Series Plots for Total Uranium from EVO LAEMP Areas, 2012 to 2021

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).

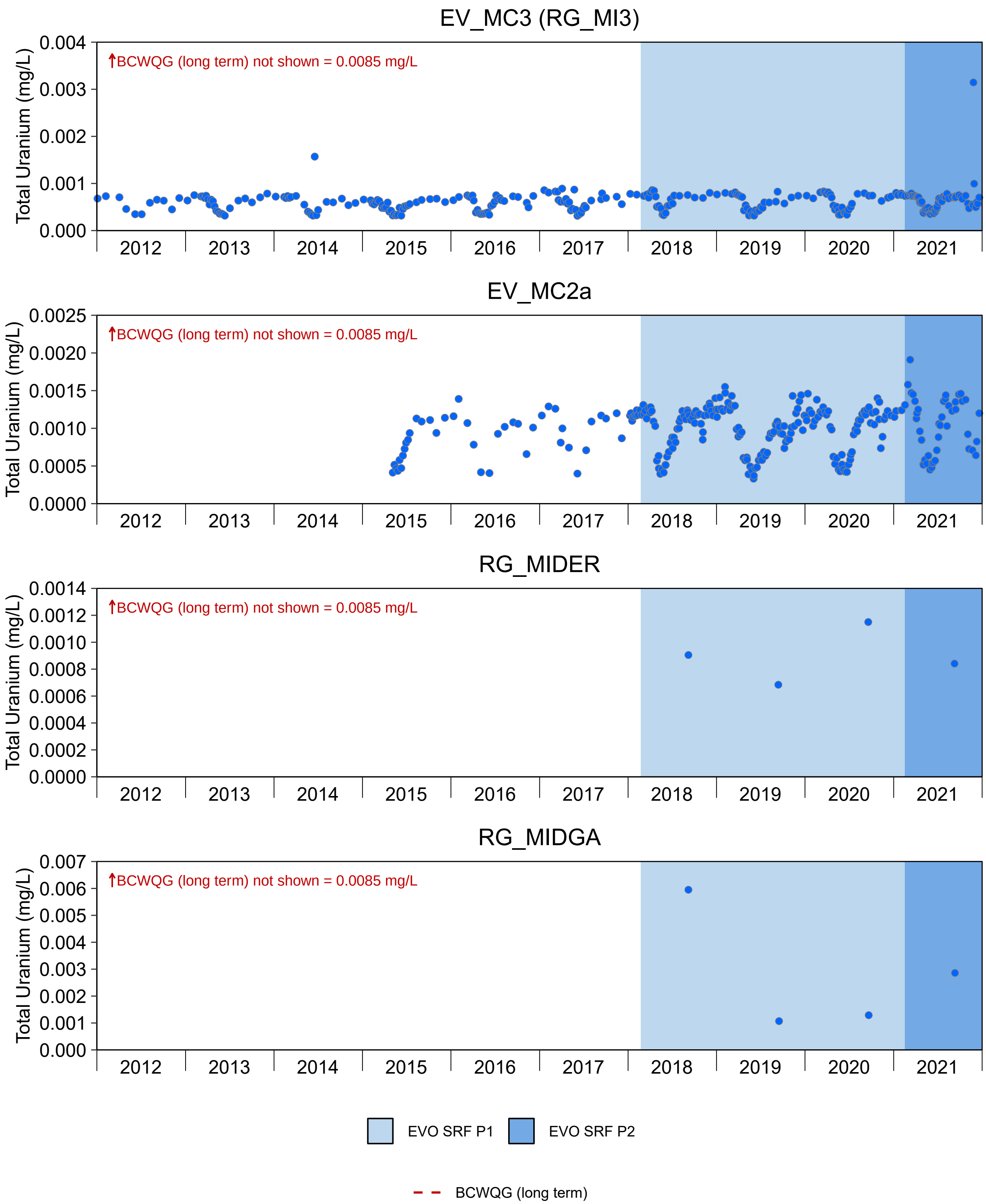

Figure 4.5: Time Series Plots for Total Uranium from EVO LAEMP Areas, 2012 to 2021

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).

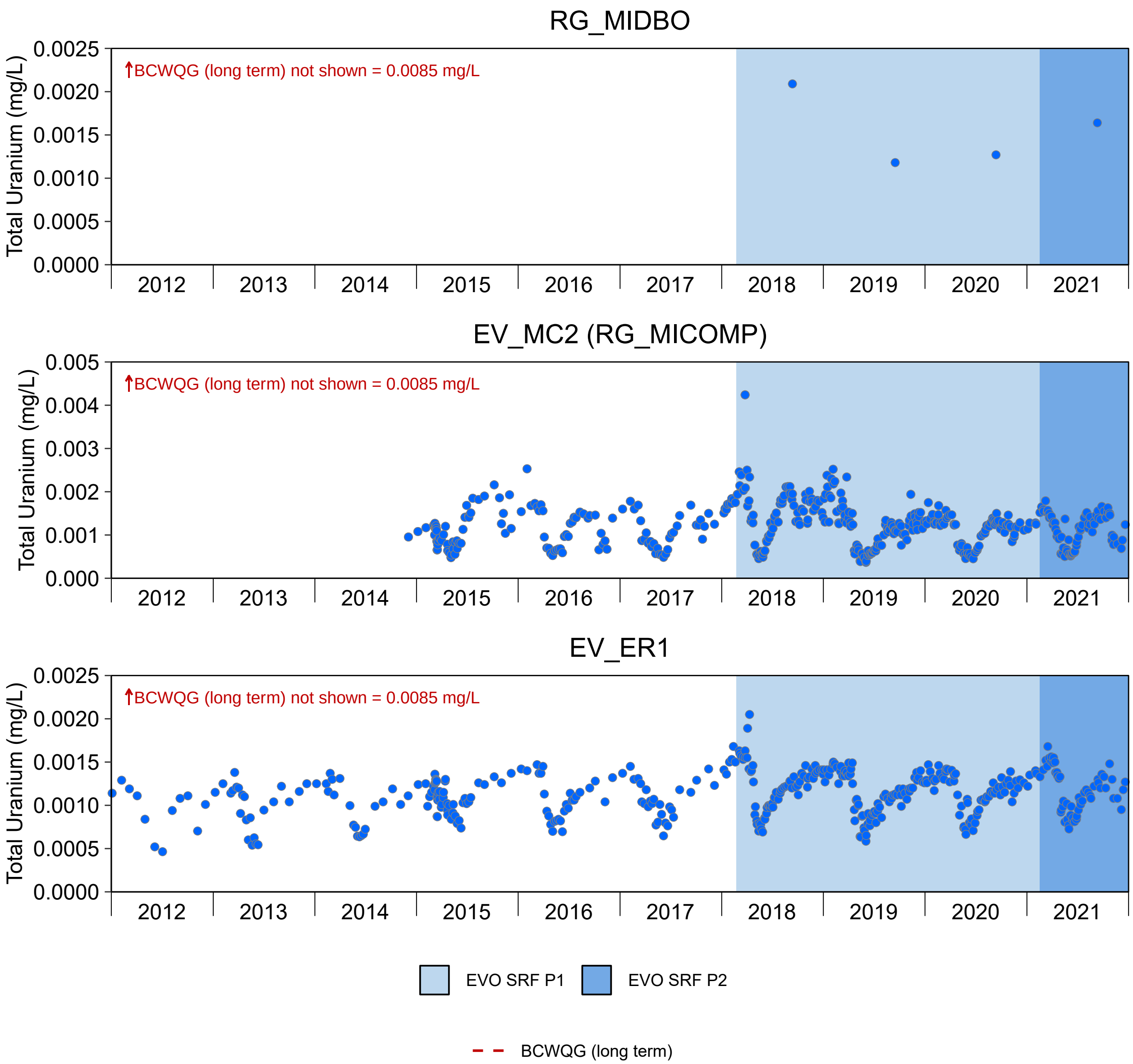

Figure 4.5: Time Series Plots for Total Uranium from EVO LAEMP Areas, 2012 to 2021

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).

Total manganese and total zinc increased in 2021 in Gate and Bodie creeks (in comparison to previous years), but concentrations in in both areas remained below the BCWQGs. In both routine water quality stations evaluated in Michel Creek downstream of the Erickson Creek confluence (EV_MC2a and EV_MC2 [RG_MICOMP]), most of the mine-related constituent concentrations were similar in 2021 to previous years (pre-EVO SRF P2), with increases observed in only a few constituents, namely total manganese, total molybdenum, and total nickel, while total uranium only increased at EV_MC2a. Regardless, concentrations typically remained below available water quality criteria (<1% of samples exceeded the respective criteria; Table 4.1, Appendix Table D.2). Other constituents were all below available BCWQG guidelines (where available) and/or similar to reference areas in Erickson, Gate, Bodie, and Michel creeks.

4.4 Toxicity Results

4.4.1 Acute Toxicity Results

Acute toxicity testing (using the water flea [*D. magna*] and rainbow trout) was conducted with water collected from four EVO LAEMP mine-exposed areas in 2021, EV_ECOUT (RG_ERCKDT; n=29), EV_EC1 (RG_ERCK; n=29), EV_GT1 (RG_GATEDP; n=31), and EV_BC1 (RG_BOCK; n=26; Table 4.2, Appendix Table D.4). Toxicity testing occurred at least monthly at each area, with a maximum of five events in a given month (e.g. EV_ECOUT in June). Additionally, testing was conducted with effluent from the SRF retention pond (F2_BPO; n=3). No water samples collected from these areas in 2021 failed the test criteria for acute toxicity (i.e., did not cause > 50% mortality with either organism; Table 4.2). A few individual water samples did show acute toxicity to rainbow trout (EV_ECOUT and EV_GT1 [n=1]; EV_EC1 [n=3]) or the water flea (EV_EC1 [n=2]) but in all cases toxicity was less than 10% (Appendix Table D.4). Effluent collected at F2_BPO and water collected from EV_BC1 did not cause mortality to either test species in toxicity tests throughout 2021. Further information regarding acute toxicity test can be found in the Annual Water Quality Monitoring Program (Teck 2022b).

4.4.2 Chronic Toxicity Results

Chronic toxicity testing at the Compliance Point, EV_MC2 (RG_MICOMP), started in 2015 and has been performed quarterly with the water flea (*C. dubia*) and algae, while semi-annual tests have been conducted with fathead minnow and rainbow trout (Table 4.3). In 2018, chronic toxicity testing with the amphipod, *H. azteca*, was initiated and has occurred one to three times per year thereafter. Chronic toxicity results with water collected for EV_MC2 (RG_MICOMP) is discussed on a species-specific basis below (Golder 2022).

Table 4.2: Summary of Acute Toxicity Test Results for EVO LAEMP Monitoring Stations, 2021 (Teck 2022b)

Water Station			Water Flea *(Daphnia magna)*		Rainbow Trout *(Oncorhynchus mykiss)*	
Teck Code	**Description**	**Year**	**# Tests > 50% mortality**	**Total # Tests**	**# Tests > 50% mortality**	**Total # Tests**
F2_BPO	Effluent Retention Pond Outlet	2021	0	3	0	3
EV_ECOUT	Erickson Creek d/s of SRF Outfall (RG_ERCKDT)	2021	0	29	0	29
EV_EC1	Erickson Creek at Mouth (discharge to Michel Creek; RG_ERCK)	2021	0	29	0	29
EV_GT1	Gate Creek Sedimentation Pond Decant (RG_GATEDP)	2021	0	31	0	31
EV_BC1	Bodie Creek Sedimentation Pond Decant (RG_BOCK)	2021	0	27	0	27

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

Notes: d/s = downstream, SRF = saturated rock fill.

Table 4.3: Results of Quarterly and Semi-Annual Chronic Toxicity Testing at EV_MC2, 2015 to2021[a] (Golder 2016, 2017a, 2018, 2019, 2020a, 2021, 2022)

Area	Quarter[b]		Water Flea (*Ceriodaphnia dubia*)[b]			Amphipod (*Hyalella azteca*)[c]		Green Alga (*Pseudokirchneriella subcapitata*)	Rainbow Trout (*Oncorhynchus mykiss*)				Fathead Minnow (*Pimephales promelas*)				
			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)
EV_MC2	2016	Q1	100	109±14	-	-	-	130.3± 12.4	-	-	-	-	-	-	-	-	-
		Q2	100	**77±17**	-	-	-	111.5± 8.1	68±5	66±4	105±3	113±13	-	-	-	-	-
		Q3	100	96±9	-	-	-	120.0± 5.7	-	-	-	-	-	-	-	-	-
		Q4	100	**66±24**		-	-	166.3± 2.2	87±9	88±7	102±1	110±4	-	-	-	-	-
	2017	Q1	100	**94±20**	-	-	-	216.3±13.3	-	-	-	-	-	-	-	-	-
		Q2	90±32	**80±20**	-	-	-	139.5±9.3	102±22	108±22	110±5	119±10	-	-	-	-	-
		Q3	100	***96±11***	-	-	-	157±12.1	-	-	-	-	-	-	-	-	-
		Q4	100	126±14	-	-	-	107.8±7	**24±46[M]**	**23±46[M]**	91±7	102±6	-	-	-	-	-
	2018	Q1	100	**56±22**	62±22	-	-	167.3±3.3	-	-	-	-	-	-	-	-	-
		Q2	90±32	94±17	87±17	-	-	155.5±5.3	106±2	109±5	105±3	111±22	-	-	-	-	-
		Q3	100	89±26	97±15	-	-	106.5±4.2	-	-	-	-	-	-	-	-	-
		Q4	111	92±31	100±11	98±14	51±6	***90.5±5.3***	91.5±15	96±16	105±1	106±3	-	-	-	-	-
	2019	Q1	100	96±16	96±16	-	-	81.5± 2.9					100	98	88±8	***88±3***	96±7
		Q2	100	83±7	83±7	-	-	*105.2± 9.7*	92±17	94±20	105±1	108±10	-	-	-	-	-
		Q3	100	96±16	81±14	104	143±11	**39.2± 5.4**	-	-	-	-	98± 3	78±24	86±13	103±8	100
		Q4	80±42	102±9	99±8	98±9	**84±40**	**106.8± 3.5**	**80±11**	**75±8**	100±2	101±6	-	-	-	-	-
	2020	Q1	111	100±27	100±27	-	-	***73.0± 5.0***	-	-	-	-	95±6[M]	84±25[M]	84±10[M]	97±5[M]	95±6[M]
		Q2	100	109±10	109±10	100±9	**92±12**	124.5± 5.4	97±27[M]	99±30[M]	98±8[M]	108±18[M]	-	-	-	-	-
		Q3	100	*100±9*	100±9	-	-	*82.0±7.2*	-	-	-	-	98.3±3.3	94±11	88±12	95±6	100±0
		Q4	100	98±9	98±9	86±23	55±27	130±2.4	97±5	97±5	105±2	109±4	-	-	-	-	-
	2021	Q1	100	107±8	-	-	-	*82.5±6.8*	-	-	-	-	98±10	97±9	84±8	96±5	98±5
		Q2	100	86±32	-	102±6	-[d]	70.0±6.1	100±9[M]	98±14[M]	104±2[M]	122±16[M]	-	-	-	-	-
		Q3	100	113±25	-	98±9	71±11	94.8±8.1	-	-	-	-	102±4	112±12	99±8	83±8	98±7
		Q4	100	110±8	-	104±6	98±14	*65.3±8.5*	94±13	91±12	99±3	101±11	-	-	-	-	-

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).
[box] result significantly lower than South Line Creek reference (LC_SLC).

[white] test categorized as no adverse response.
[yellow] test categorized as possible adverse response.
[orange] test categorized as likely adverse response.
M test had evidence of microbes in one or more replicates.

Notes: Q_x = Calendar year quarters; "-" = no data available. Possible and likely symbols are annotated with constituent identified as potentially contributing to observed response: H_RV = high inter-replicate variability; NO3 = nitrate; Ni = Nickel UN =unknown, no water quality constituent identified.

[a] Results presented as percent survival or mean ± standard deviation.

[b] Toxicity work in 2015 was not normalized to % control and thus is not shown

[c] *H. azteca* testing began in Q4 2018.

[d] H. azteca testing was conducted in Q2 and Q4, per Permit 107517. Tests in Q2 were successfully conducted and survival was measured; however, test organisms were disposed prior to measuring dry weight due to a lab technician error.

Water flea survival and reproduction when exposed to water from EV_MC2 showed “no adverse response” in 2021. Toxicity testing with amphipods (*H. azteca*) showed similar results as “no adverse response” was noted in each of the three sampling events in 2021. Similar results were also encountered for both fish species as fathead minnows (Q1 and Q3; via evaluation of hatch, survival, biomass, length, and normal development) and rainbow trout (Q2 and Q4; survival, viability, length, and wet weight) were either not significantly different from reference or were categorized as “no adverse response” (Golder 2022).

Algae chronic toxicity testing in Q1 and Q4 of 2021 with water collected from EV_MC2 showed “possible adverse effects” to cell yield (as cell yield was significantly less at this area when compared to each of the four reference locations in both quarters; Table 4.3). However, water quality screening did not reveal any constituent as a potential cause of response (all constituent concentrations in these toxicity tests were below BCWQG or EVWQP benchmarks; Appendix Table A.1). However, it should be noted that mean cell yields in both Q1 and Q4 were systematically depressed across all treatments (i.e. all test areas for that quarter) despite variability in water chemistry, which adds a level of uncertainty associated with toxicity testing observed effects EV_MC2 (RG_MICOMP) surface waters in both quarters (Golder 2022).

Temporal comparisons of chronic toxicity results for EV_MC2 indicated that observed organism responses (or lack thereof) for chronic toxicity testing in 2021 were similar to or lower than previous years. In addition, few adverse responses have been observed since initiation of testing in 2015, there is no apparent consistent pattern of responses, and there is no clear evidence of casual factors (Golder 2022), suggesting a lack of influence of the SRF (in either EVO SRF P1 or P2).

4.5 Summary

Water quality and toxicity results were used to address Study Questions #3 (SRF influence on water quality) and indirectly used in addressing changes in Study Questions #4 (SRF influence on selenium BIT concentrations), #5 (SRF influence on benthic community structure), and #6 (SRF influence on productivity). Further information regarding the indirect influence of changes to water quality (as influenced by the operation of the SRF) on selenium BIT concentrations, benthic community structure, and productivity is discussed in greater detail in Section 6 (Benthic Invertebrates).

Overall, water quality results suggest a number of constituents have decreased in the receiving environment of Erickson Creek with the commissioning of the EVO SRF P2, including nitrate, phosphorus, orthophosphate, and barium. Although total selenium concentration (as well as selenate and dissolved selenium) in the receiving environment of Erickson and upper portions of Michel Creek have decreased, selenite and some organoselenium species concentrations increased in Erickson Creek with the commissioning of the EVO SRF P2. 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; Golder 2021c), leading to increases in tissue selenium concentrations in benthic invertebrates, fish and/or other aquatic and aquatic dependent biota via dietary exposure. While the concentrations of a number of constituents decreased in Erickson Creek, several constituent concentrations increased (including total antimony, total boron, dissolved cadmium, dissolved cobalt, total iron, total manganese, total molybdenum, total nickel, total uranium, and total zinc). All of these constituents, with the exception of nickel and uranium, were below available water quality criteria. Increases in nickel (as well as cobalt and possibly other constituents) in 2021 were largely limited to Erickson Creek and likely related to *in situ* water entrained in the SRF[34], however as modelled in the application for EVO SRF P2, nickel (and cobalt) concentrations (at EV_EC1) are expected to decrease in roughly one year of treatment at designed throughput as entrained water is displaced by Erickson Creek water (Teck 2022b). Not only are concentrations of nickel expected to decrease in the next year, a review of expected nickel concentrations in this area completed in January 2022 (to support the EVO SRF nickel trigger response plan) suggested that elevated concentrations of nickel will not cause additional impacts to the current benthic community (Teck 2022a). Teck continues to work with EMC on nickel management, including the derivation of a nickel benchmark for the Elk Valley.

Concentrations of nutrients (namely nitrate, phosphorus, and orthophosphate) and total selenium in Gate and Bodie (which received limited discharge from the SRF in 2021) as well as Michel Creek were either similar or lower in 2021 than pre-EVO SRF P2 concentrations. While an increase in the concentrations of aqueous selenite and organoselenium species was observed downstream of the SRF outfall in Erickson Creek, similar trends were not observed in Gate, Bodie, and Michel Creek.

Areas evaluated in Erickson, Gate, Bodie, and Michel creeks showed no acute toxicity testing failures during 2021 to either the water flea or rainbow trout. With the exception of algae chronic toxicity results (which have an associated degree of uncertainty due to suppressed cell yield throughout the study), chronic toxicity results with water flea, amphipods, fathead minnows, and rainbow trout showed no adverse effects when exposed to water from the compliance point at Michel Creek (EV_MC2 [RG_MICOMP]).

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[34] By December 2021, the EVO SRF P2 effluent was estimated to be approximately 92% treated Erickson Creek water and more representative of EVO SRF P2 effluent, while earlier conditions more representing *in situ* water (i.e. water that was present in the SRF at the time the new influent source [Erickson Creek] was introduced; Teck 2022a).

5 PERIPHYTON

5.1 Visual Periphyton Coverage

In September 2021, mean periphyton coverage was moderate at the reference study areas (RG_ALUSM and RG_MI25) and at nine of eleven mine-exposed study areas evaluated (Table 5.1; Appendix Figure E.1). Mean visual periphyton coverage scores ranged between 2.0 and 3.2 of a possible range from one (rocks not slippery and no obvious colour) to five (rocks mostly obscured by algae mats; Environment Canada 2012a). Moderate coverage in Gate, Bodie, Erickson (upstream of the SRF), and Michel creeks were similar to previous years (Minnow 2020a, 2021a). Periphyton scores at RG_ERCKDT, located directly downstream of the SRF outfall, were lower than other areas (mean visual score of 1.6) and compared to previous years (periphyton scores in 2019 and 2020 were 4 and 5, respectively). Erickson Creek near the confluence with Michel Creek which was slightly higher than the score of three in 2019 (Minnow 2020a, 2021a).

Visual periphyton coverage was sampled as an indicator of primary productivity. However, the method of scoring periphyton coverage (Environment Canada 2012a) does not fully consider the presence of other primary producers, such as bryophytes. Although RG_ERCKDT had the lowest visual coverage score for periphyton, bryophytes were abundant (Appendix Figure E.1), representing 76 to 100% coverage on substrates (Appendix Table C.5). Similarly, bryophyte coverage was also observed at other areas in Erickson Creek including RG_ERCKUT and RG_ERCK (Appendix Table C.5; Appendix Figure E.1) despite high variability among the areas for visual periphyton coverage. Bryophyte coverage in Erickson Creek will be evaluated as part of the EVO LAEMP study design moving forward to be understand the influence of the SRF on primary productivity. Regardless, no consistent changes associated with SRF discharge were apparent in 2021.

Table 5.1: Visual Periphyton Coverage Scores, EVO LAEMP, September 2021

Area Type	Biological Area Code	Station					Mean	Standard Deviation
		1	2	3	4	5		
Reference	RG_ALUSM	4	4	2	2	3	3.0	1.00
	RG_MI25	2	2	2	2	3	2.2	0.447
Mine-Exposed	RG_ERCKUT	4	3	3	4	2	3.2	0.837
	RG_ERCKDT	1	1	1	1	4	1.6	1.34
	RG_ERCK	5	5	4	5	4	4.6	0.548
	RG_GATE	2	2	3	2	1	2.0	0.707
	RG_GATEDP	3	-	-	-	-	3.0	-
	RG_BOCK	2	-	-	-	-	2.0	-
	RG_MI3	3	2	3	2	2	2.4	0.548
	RG_MIDER	3	2	3	1	2	2.2	0.837
	RG_MIDGA	2	2	2	2	2	2.0	0
	RG_MIDBO	3	2	2	2	2	2.2	0.447
	RG_MICOMP	2	4	3	3	4	3.2	0.837

Notes: "-" = not sampled. 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)

6 BENTHIC INVERTEBRATES

6.1 Tissue Selenium Concentrations

6.1.1 Spatial and Temporal Trends

Mean composite-taxa benthic invertebrate tissue (BIT) selenium concentrations at four mine-exposed areas in September 2021, RG_ERCKDT (directly below the SRF outfall in Erickson Creek), RG_BOCK (directly below the settling pond in Bodie Creek), RG_GATE (above the settling pond in Gate Creek), and RG_GATEDP (directly below the settling pond in Gate Creek), exceeded the Level 1 benchmark for effects to benthic invertebrates (as well as the Level 2 and Level 3 benchmark for RG_GATE and RG_BOCK, respectively), were above the regional reference normal range, and were significantly higher than the reference areas (RG_ALUSM and RG_MI25; Figure 6.1; Appendix Table F.1). Mean BIT selenium concentrations in the other areas evaluated as part of the EVO LAEMP, including the area above the SRF outfall (RG_ERCKUT), the area at the confluence of Erickson and Michel Creek (RG_ERCK), as well as the entire study area of Michel Creek (which is the receiving water body for Erickson Creek, Gate Creek, and Bodie Creek), which included five study areas: (RG_MI3 [which is above the Erickson and Michel Creek confluence], RG_MIDER, RG_MIDGA, RG_MIDBO, and RG_MICOMP, which were all below the Level 1 benchmark. These areas had BIT selenium concentrations that were also within the regional reference normal range and not significantly different from reference, suggesting that elevated BIT selenium concentrations were localized to a small area with the EVO LAEMP study area. Confirmation sampling in December 2021 confirmed the localized nature of elevated tissue selenium concentrations in Erickson Creek as mean tissue selenium concentrations (18.2 mg/kg dw) at RG_ERCKDT were similar to observed concentrations in September (16.2 mg/kg; Figure 6.1, Appendix Table F.1), while further downstream at RG_ERCKMD (added to evaluate spatial extent of the elevated BIT selenium concentrations in December) and RG_ERCK, mean BIT selenium concentrations were below the Level 1 benchmark (Figure 6.1, Appendix Table F.1).

Of the four areas where mean BIT selenium concentrations exceeded the Level 1 benchmark, RG_ERCKDT and RG_GATE, also had BIT selenium concentrations that significantly increased in 2021 when compared to pre-EVO SRF P2 (when compared to changes at both reference areas over the same time frame; Figure 6.2; Appendix Figure F.1, Appendix Table F.2). In contrast, selenium concentrations in BIT was similar in 2021 compared to recent years at both RG_BOCK and RG_GATEDP (Appendix Figure F.1; Appendix Tables F.1 and F.2). Selenium concentrations in BIT in Michel Creek in 2021, both upstream (RG_MI3) and downstream of the confluence with Erickson Creek (RG_MIDER), Gate Creek (RG_MIDGA), and Bodie Creek (RG_MIDBO), as well

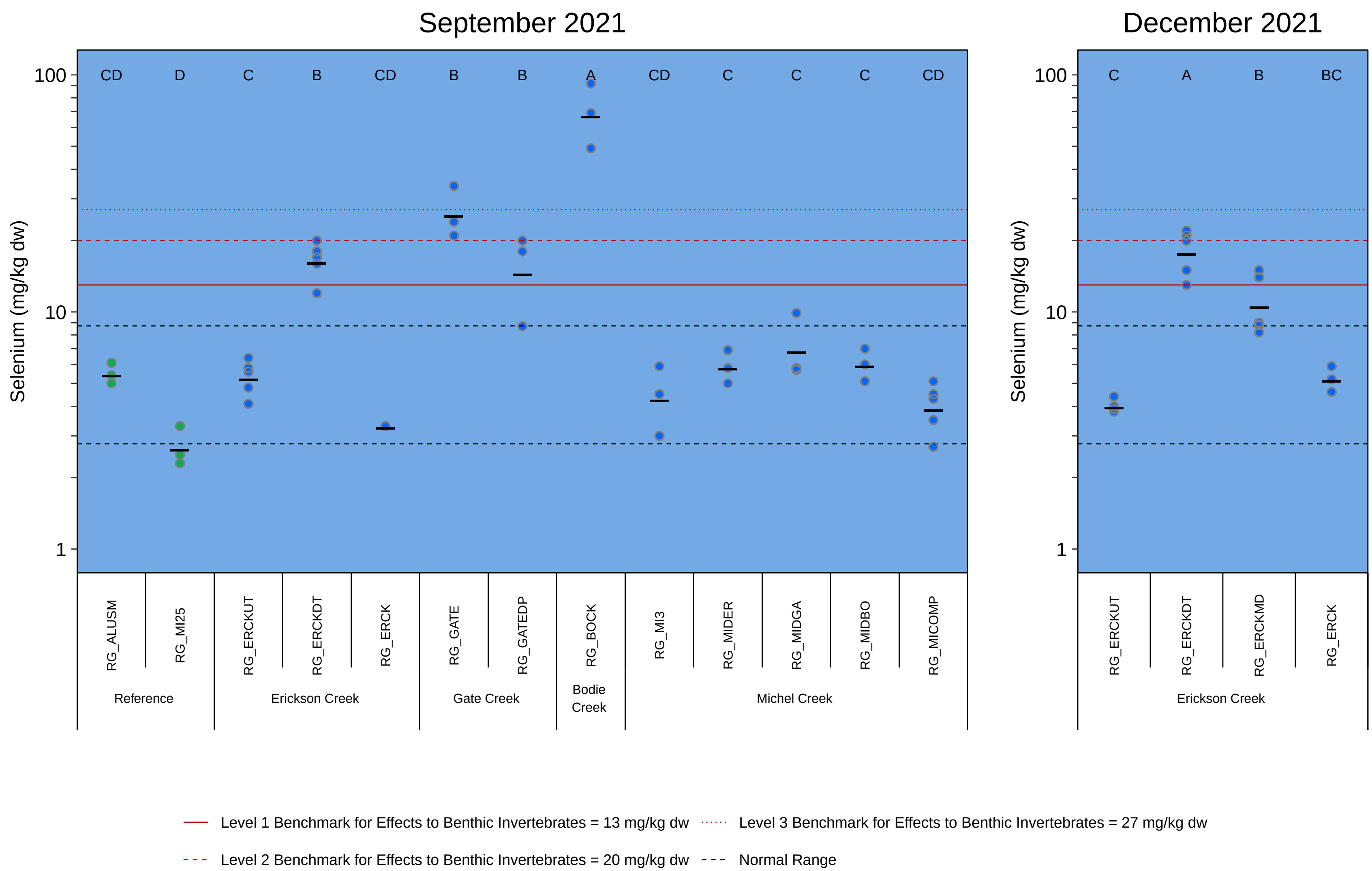

Figure 6.1: Selenium Concentrations in Composite−Taxa Benthic Invertebrate Samples Collected at Reference (Green) and Mine−Exposed (Blue) Areas of Bodie, Erickson, Gate, and Michel Creeks, EVO LAEMP, 2021

Notes: SRF Operational (blue shading) only applies to mine−exposed areas. 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). Black horizonal lines represent geometric means. 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 one−way ANOVA by area with selenium $\log_{10}$-transformed. Selenium concentrations in composite-taxa benthic invertebrates collected from EV_GT1 (near RG_GATEDP) and EV_BC1 (near RG_BOCK) in August are not shown in the above plots (as sampling was conducted as part of the Selenium Speciation program), but are shown in the temporal plots (Figure 6.2).

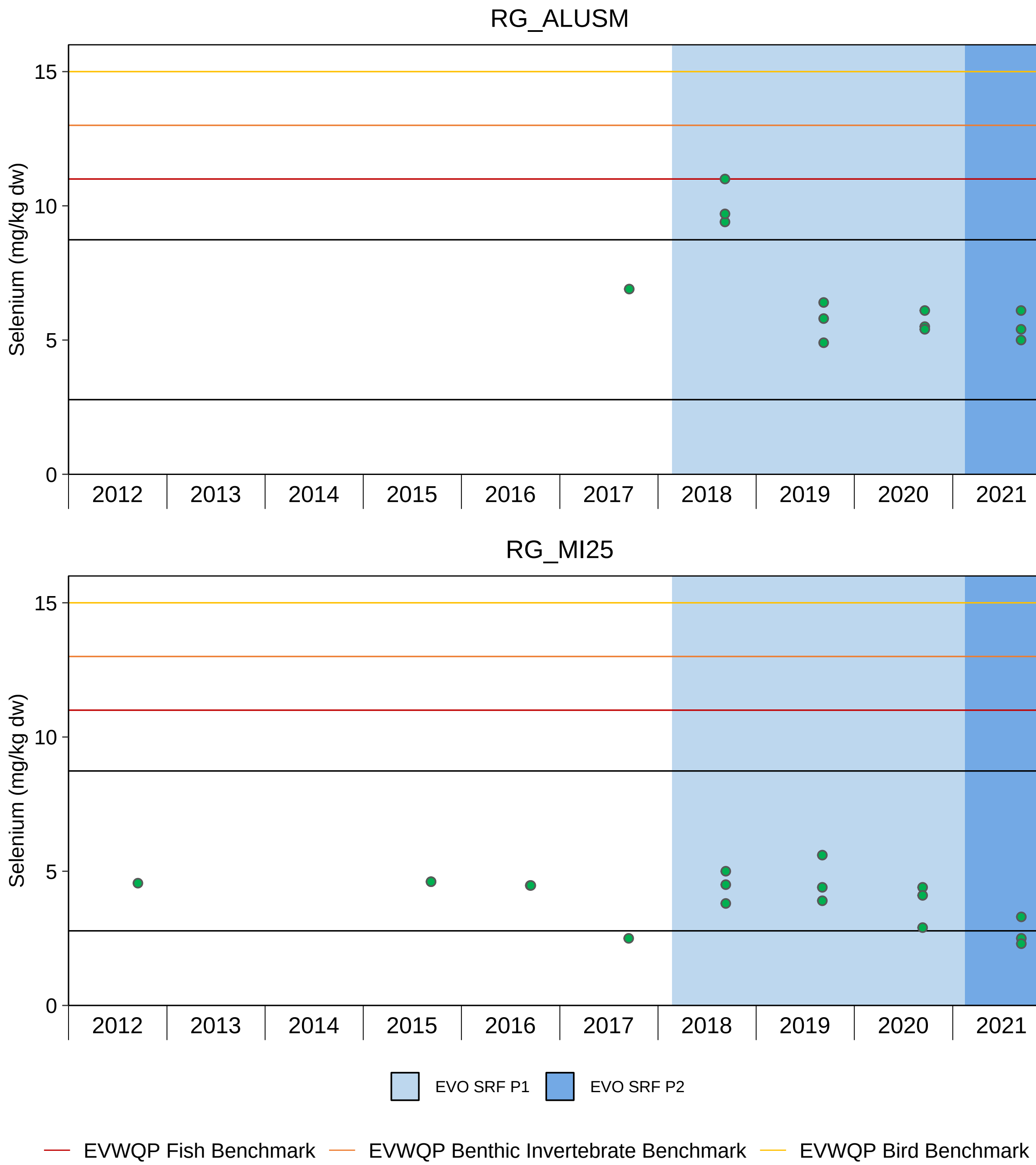

Figure 6.2: Benthic Invertebrate Tissue Selenium Concentrations in Bodie, Erickson, Gate, and Michel Creeks, 2012 to 2022

Notes: Reference areas are shown in green and mine−exposed areas are shown in blue. Area between the black lines represents the reference area normal range defined as the 2.5th and 97.5th percentiles of the distribution of reference area data (pooled 1996 to 2019 data) reported in the Regional Aquatic Effects Monitoring Program (RAEMP). For the remaining lines: Solid line = Level 1 Benchmark, long hashed line = Level 2 benchmark, short hashed line = Level 3 benchmark. EVWQP = Elk Valley Water Quality Plan..

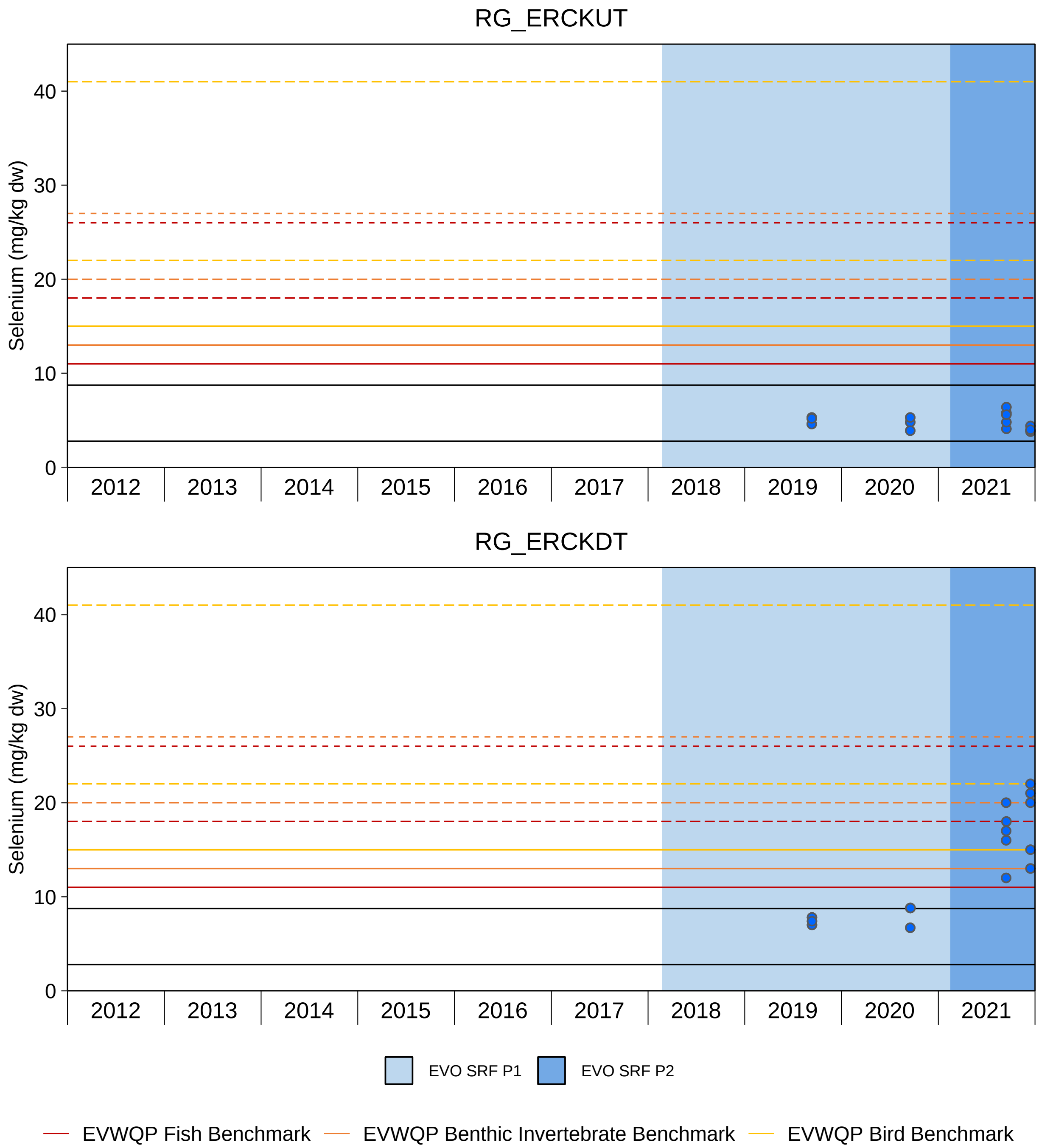

Figure 6.2: Benthic Invertebrate Tissue Selenium Concentrations, Bodie, Erickson, Gate, and Michel Creeks, 2012 to 2022

Notes: Reference areas are shown in green and mine−exposed areas are shown in blue. Area between the black lines represents the reference area normal range defined as the 2.5th and 97.5th percentiles of the distribution of reference area data (pooled 1996 to 2019 data) reported in the Regional Aquatic Effects Monitoring Program (RAEMP). For the remaining lines: Solid line = Level 1 Benchmark, long hashed line = Level 2 benchmark, short hashed line = Level 3 benchmark. EVWQP = Elk Valley Water Quality Plan..

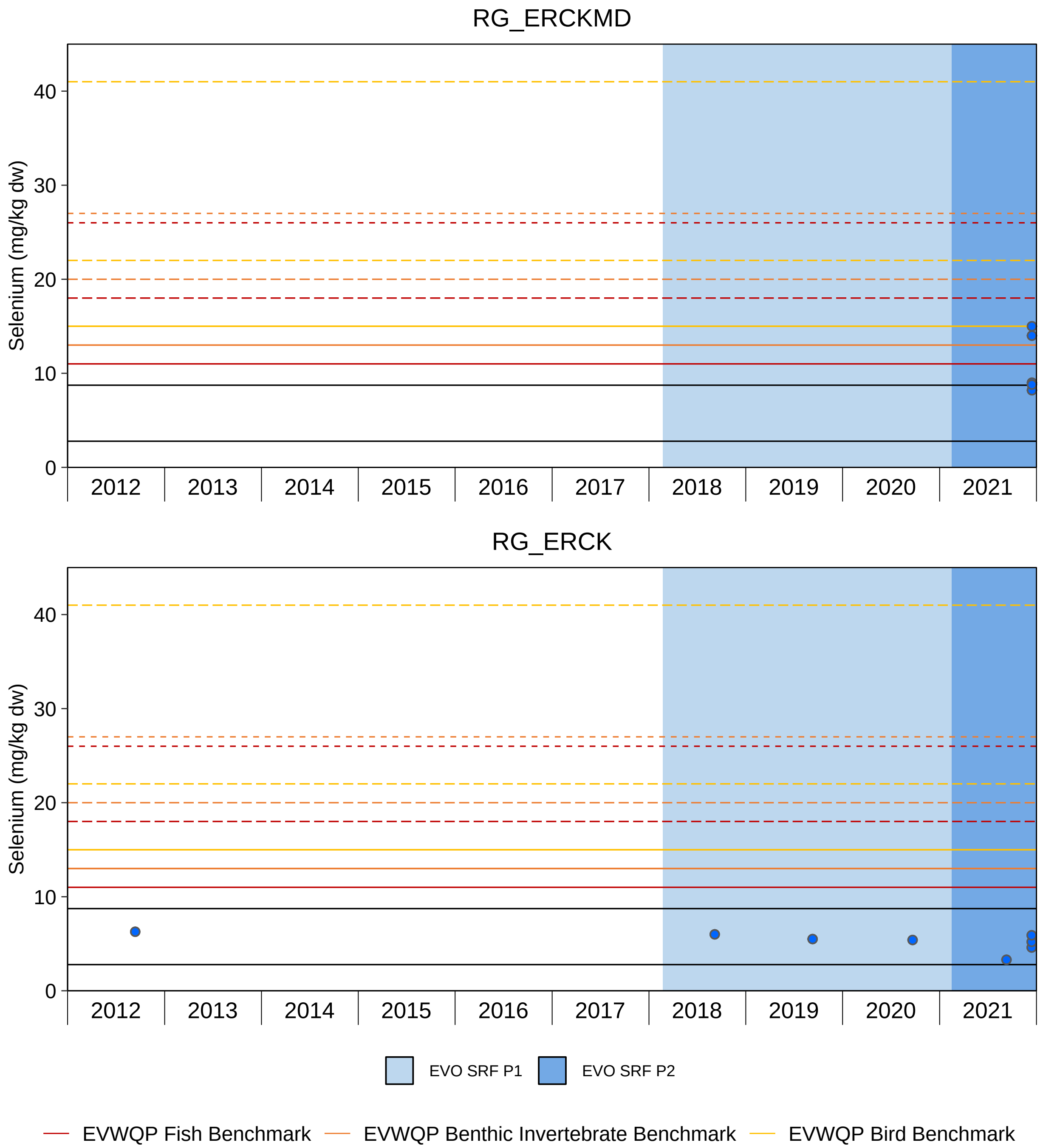

Figure 6.2: Benthic Invertebrate Tissue Selenium Concentrations, Bodie, Erickson, Gate, and Michel Creeks, 2012 to 2022

Notes: Reference areas are shown in green and mine−exposed areas are shown in blue. Area between the black lines represents the reference area normal range defined as the 2.5th and 97.5th percentiles of the distribution of reference area data (pooled 1996 to 2019 data) reported in the Regional Aquatic Effects Monitoring Program (RAEMP). For the remaining lines: Solid line = Level 1 Benchmark, long hashed line = Level 2 benchmark, short hashed line = Level 3 benchmark. EVWQP = Elk Valley Water Quality Plan..

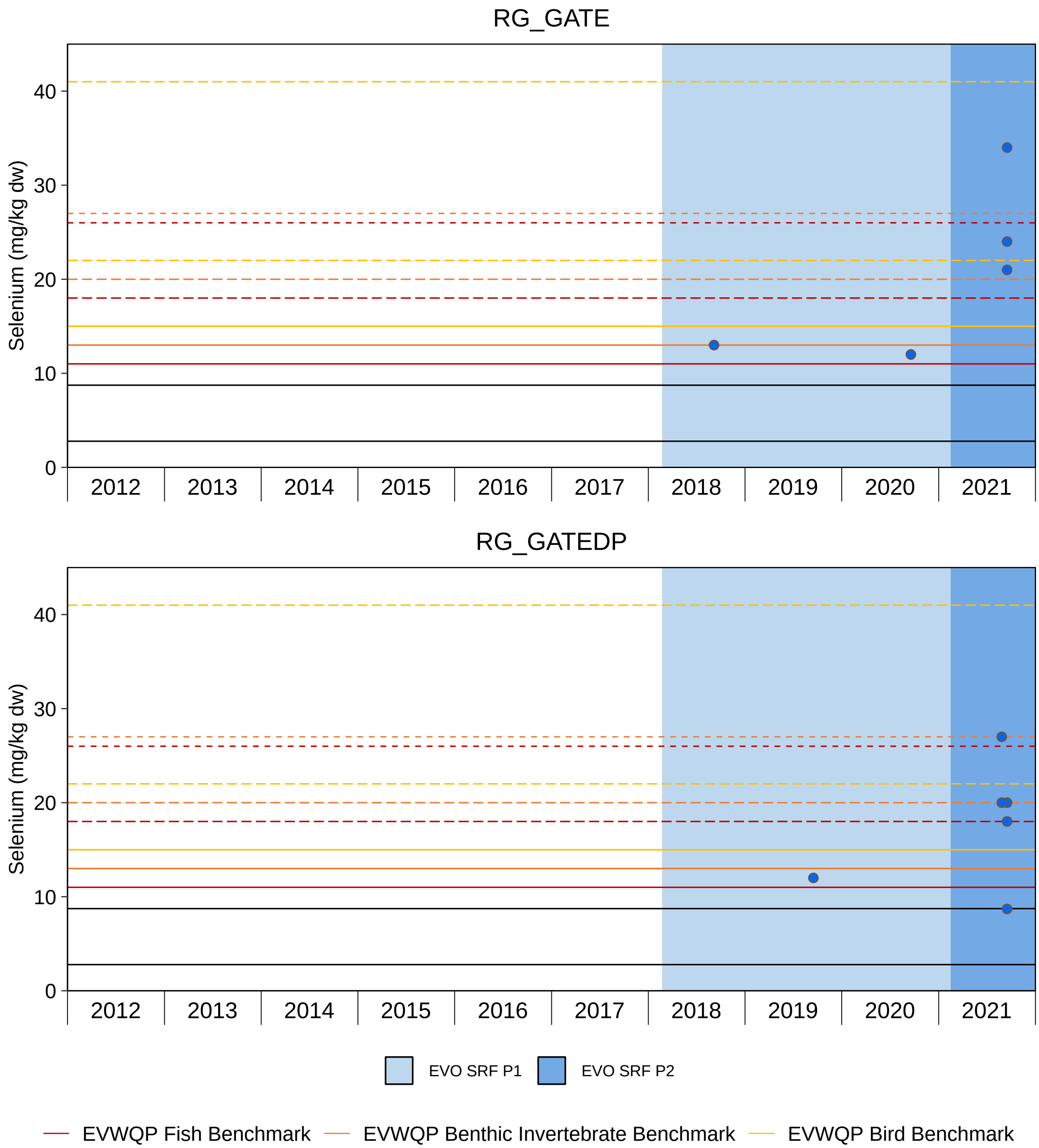

Figure 6.2: Benthic Invertebrate Tissue Selenium Concentrations, Bodie, Erickson, Gate, and Michel Creeks, 2012 to 2022

Notes: Reference areas are shown in green and mine−exposed areas are shown in blue. Area between the black lines represents the reference area normal range defined as the 2.5th and 97.5th percentiles of the distribution of reference area data (pooled 1996 to 2019 data) reported in the Regional Aquatic Effects Monitoring Program (RAEMP). For the remaining lines: Solid line = Level 1 Benchmark, long hashed line = Level 2 benchmark, short hashed line = Level 3 benchmark. EVWQP = Elk Valley Water Quality Plan..

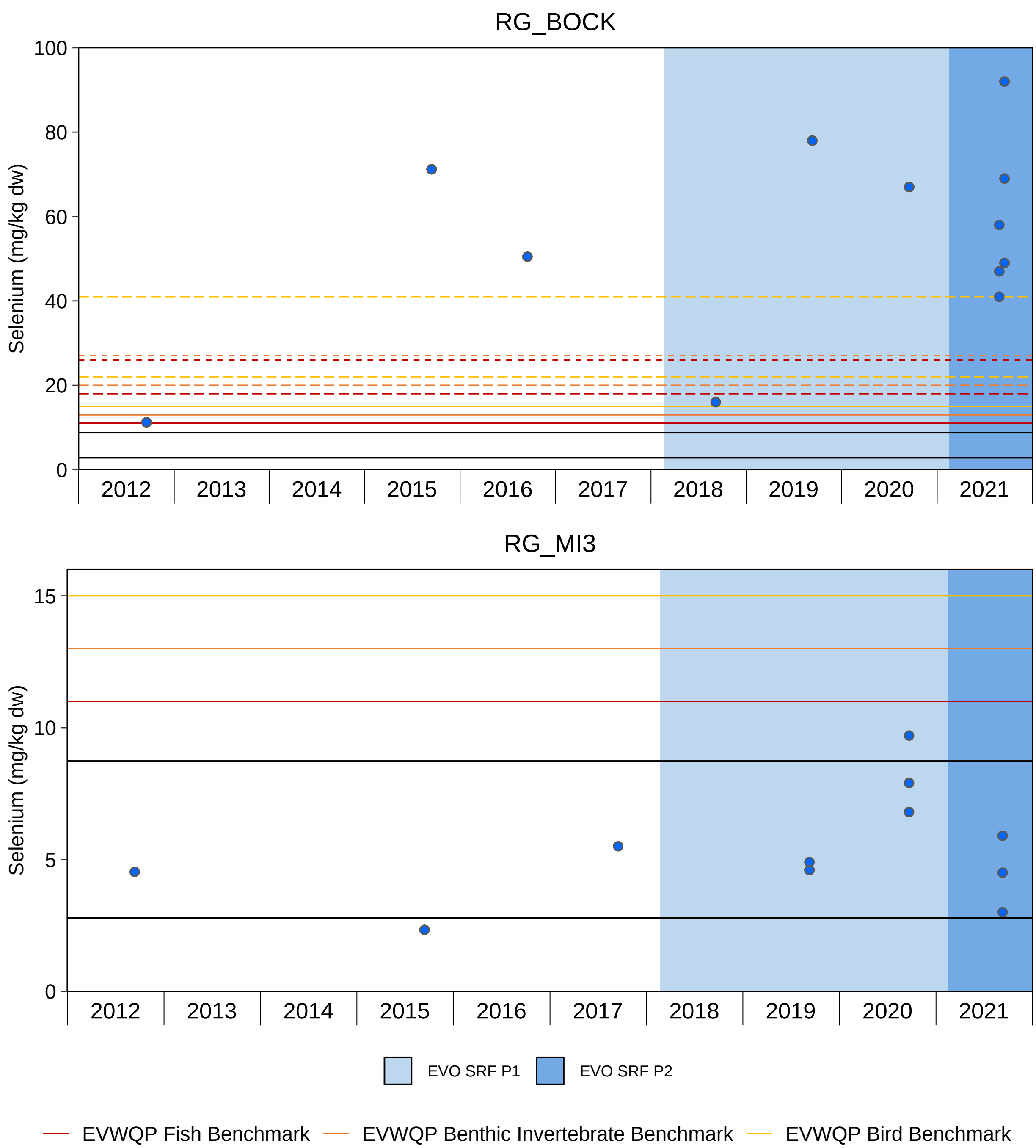

Figure 6.2: Benthic Invertebrate Tissue Selenium Concentrations, Bodie, Erickson, Gate, and Michel Creeks, 2012 to 2022

Notes: Reference areas are shown in green and mine−exposed areas are shown in blue. Area between the black lines represents the reference area normal range defined as the 2.5th and 97.5th percentiles of the distribution of reference area data (pooled 1996 to 2019 data) reported in the Regional Aquatic Effects Monitoring Program (RAEMP). For the remaining lines: Solid line = Level 1 Benchmark, long hashed line = Level 2 benchmark, short hashed line = Level 3 benchmark. EVWQP = Elk Valley Water Quality Plan..

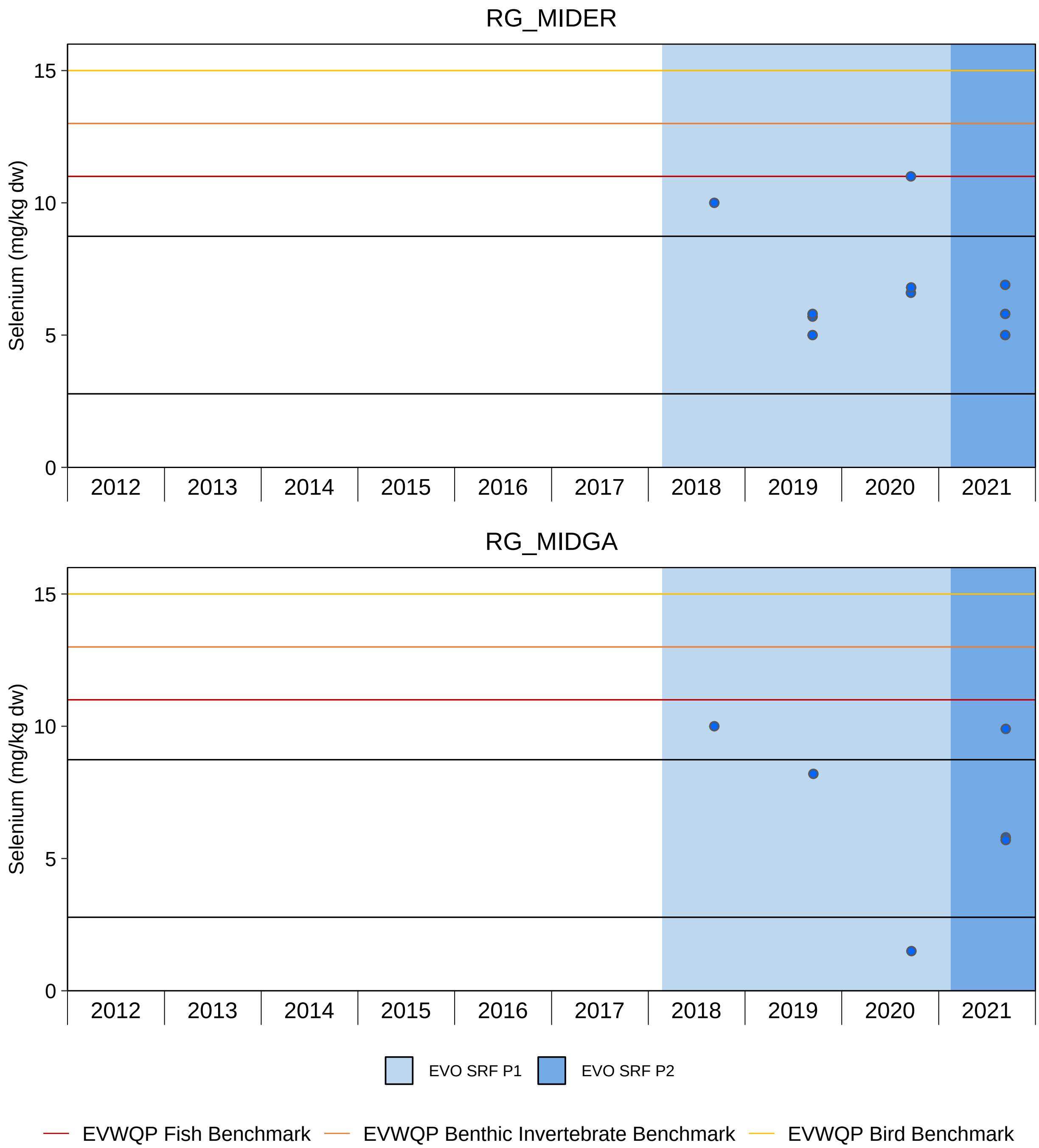

Figure 6.2: Benthic Invertebrate Tissue Selenium Concentrations, Bodie, Erickson, Gate, and Michel Creeks, 2012 to 2022

Notes: Reference areas are shown in green and mine−exposed areas are shown in blue. Area between the black lines represents the reference area normal range defined as the 2.5th and 97.5th percentiles of the distribution of reference area data (pooled 1996 to 2019 data) reported in the Regional Aquatic Effects Monitoring Program (RAEMP). For the remaining lines: Solid line = Level 1 Benchmark, long hashed line = Level 2 benchmark, short hashed line = Level 3 benchmark. EVWQP = Elk Valley Water Quality Plan..

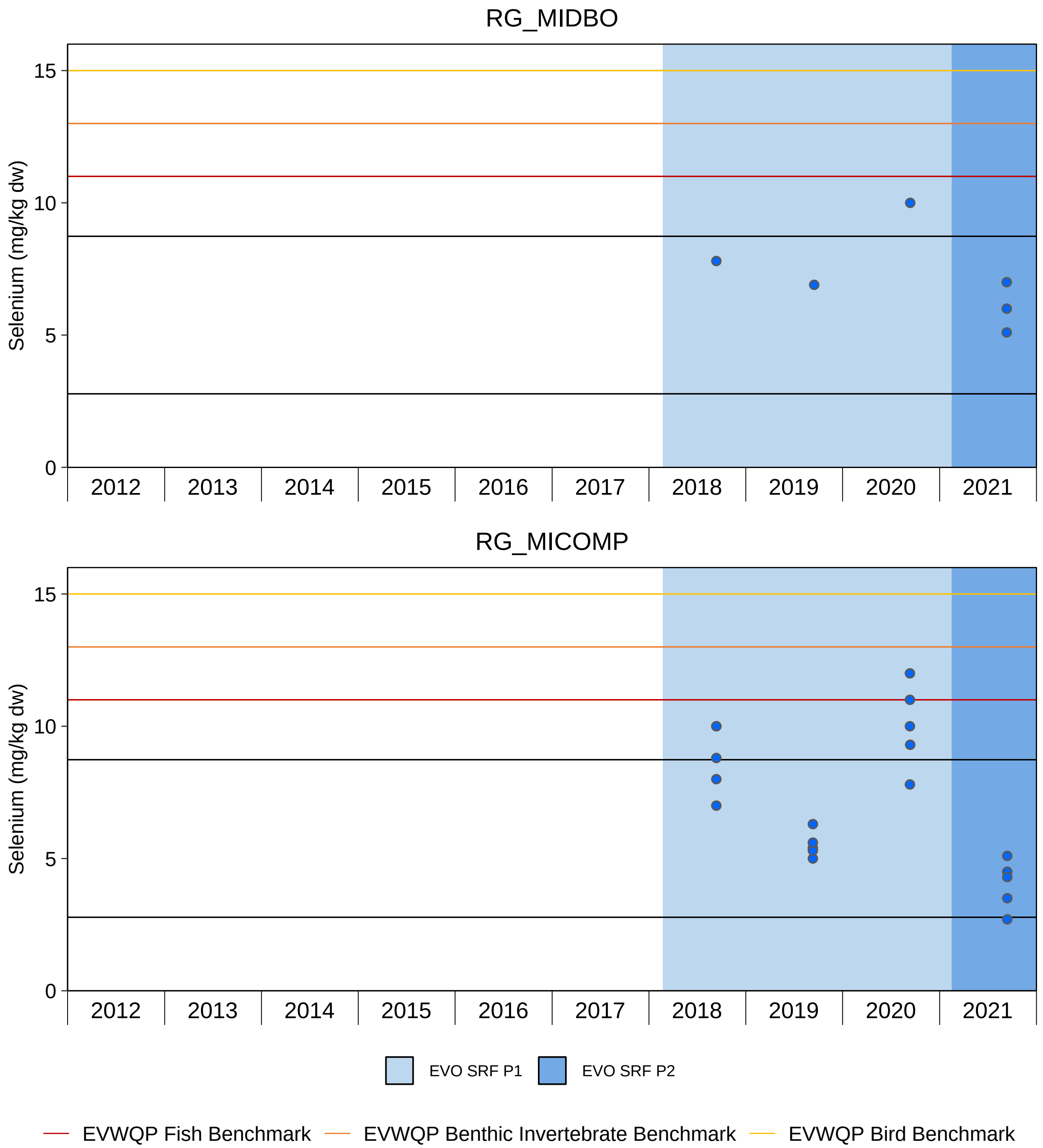

Figure 6.2: Benthic Invertebrate Tissue Selenium Concentrations, Bodie, Erickson, Gate, and Michel Creeks, 2012 to 2022

Notes: Reference areas are shown in green and mine−exposed areas are shown in blue. Area between the black lines represents the reference area normal range defined as the 2.5th and 97.5th percentiles of the distribution of reference area data (pooled 1996 to 2019 data) reported in the Regional Aquatic Effects Monitoring Program (RAEMP). For the remaining lines: Solid line = Level 1 Benchmark, long hashed line = Level 2 benchmark, short hashed line = Level 3 benchmark. EVWQP = Elk Valley Water Quality Plan..

as the compliance point (RG_MICOMP) were either similar or lower than previous years except for one sample at RG_MIDGA in 2020 and one sample at RG_MI3 in 2015 that were lower.

Two areas sampled in September 2021, RG_BOCK (n=1) and RG_GATEDP (n=1), had a proportion of annelids that met the criteria to evaluate annelids separately[35]. The 'annelid only' tissue replicates for both areas were substantially higher than the composite sample (RG_BOCK: annelid only sample: 240 mg/kg dw; composite sample: 92 mg/kg dw; RG_GATEDP: annelid only sample: 138 mg/kg dw; composite sample: 18 mg/kg dw; Appendix Table F.1). Overall, the presence of annelids in these two samples (of the 53 samples taken throughout the EVO LAEMP in September) are not expected to greatly affect the results of the study and the analysis will focus on composite-taxa benthic invertebrate results.

Selenium concentrations in BIT was also assessed against the biological trigger (see Appendix G for details). This was completed for each replicate from EVO LAEMP monitoring areas where water quality projections are available for each sampling event (i.e., (evaluated in August [RG_BOCK], September [RG_ERCK, RG_GATE, RG_BOCK, RG_MI3, RG_MICOMP]), and December [RG_ERCK]). The biological trigger for BIT selenium concentrations was exceeded in all replicates from both RG_BOCK and RG_GATE (during the August and September sampling events). The BIT selenium concentration at RG_ERCK in Erickson Creek and the two areas evaluated in Michel Creek, were below the biological trigger threshold.

6.1.2 Bioaccumulation

Observed selenium results in BIT from 2012 to 2021 were plotted relative to the regional one-step water-to-invertebrate lotic selenium accumulation model (Golder 2020b) and the selenium speciation bioaccumulation tool (B-tool; de Bruyn and Luoma 2021) to better understand the relationships between aqueous selenium (with the models using total selenium and selenium speciation, respectively) and BIT selenium concentrations. These models provide insight into selenium bioaccumulation mechanisms in relation to samples collected previously in the Elk River watershed (Golder 2020b). A majority of values directly downstream of the SRF outfall (RG_ERCKDT, one replicate at RG_ERCKMD, and most BIT values from Bodie and Gate Creek (RG_BOCK, RG_GATE, and RG_GATEDP) were above the 95% prediction limits of the regional one-step water-to-invertebrate lotic selenium accumulation model in 2021 (Figure 6.3). Benthic invertebrates tissue samples at Bodie Creek (RG_BOCK), however, were higher than

[35] As noted in the methods, annelids were only included in the composite-taxa tissue sample if the proportion of annelids was >5% of the total biomass sample, and if so, an additional 'annelids only' sample was also evaluated. This process started in September 2021 as previous assessments have suggested that the presence of annelids in composite-taxa BIT samples may bias the results high (Golder 2021b). Annelids were not found at a high enough proportion in December sampling for any area to be evaluated separately.

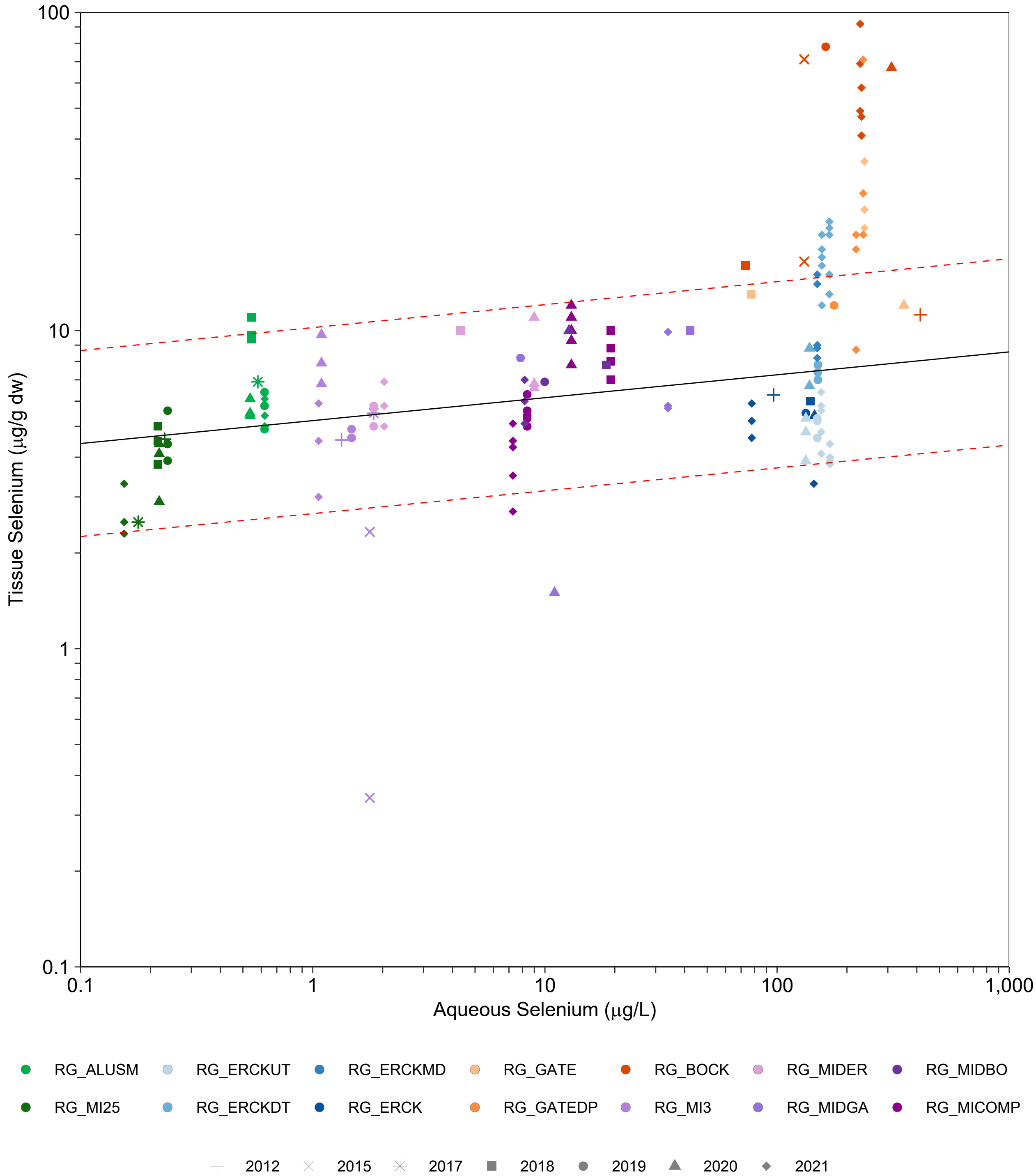

Figure 6.3: Observed and Modelled Selenium Concentrations in Benthic Invertebrate Composite Samples Relative to Aqueous Selenium Concentrations, 2012 to 2021

Notes: Mean benthic invertebrate selenium concentrations (solid black line) were estimated using a one-step water to benthic invertebrate selenium accumulation model: log10[Se]benthic invertebrate=0.717+0.0.072 x log10[Se]aq (Golder 2020). 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, Erickson Creek is shown in blue, Bodie and Gate Creeks are shown in orange and Michel Creek is shown in purple.

prediction limits in previous years as well (2015, 2018, 2019, and 2020). To better contextualize values that fell above the 95% prediction limits of the regional one-step water-to-invertebrate lotic selenium accumulation model at RG_ERCK, RG_BOCK, RG_GATE, and RG_GATEDP, the observed to predicted tissue selenium relationship of each EVO LAEMP area was compared to the 95% prediction interval based on the same relationship for all Elk Valley samples (Figure 6.4). Overall, the relationship between the predicted and observed tissue selenium concentrations for these three areas fell outside the 95% prediction interval of the Elk Valley. This suggests that these areas are not within the typical range for the observed-to-predicted relationship for tissue concentrations. Thus, the use of the regional one-step water-to-invertebrate lotic selenium accumulation model (and hence the use of aqueous total selenium to evaluate bioaccumulation) may not evaluate the potential factors contributing to the elevated selenium concentrations in these samples.

Similar findings were observed when evaluating these results using the selenium speciation B-tool (Figure 6.4; Appendix Table F.3), as sampling areas in Bodie (RG_BOCK), Gate (RG_GATE and RG_GATEDP), and upper portions of Erickson Creek below the SRF outfall (RG_ERCKDT and RG_ERCKMD) had observed selenium concentrations in benthic invertebrate selenium that were up to 3.5 fold-higher than the predicted selenium concentration (Appendix Table F.3). This model was also used to compare BIT selenium concentrations downstream of the outfall (RG_ERCKDT) with concurrent concentrations from the effluent retention pond of the SRF (F2_BPO) to better understand the influence of selenium and selenium speciation of the effluent on the receiving environment (i.e. most conservative scenario), in this scenario the model still under predicted selenium bioaccumulation (observed BIT Se: 16.6 to 18.2 µg/g dw; predicted BIT Se: 6.4 to 8.1 µg/g dw). Taking this one step further, B-tool BIT Se predictions from F2_BPO based on all available data from 2021 (n=157) were all below 9 mg/kg dw, with the exception of two sampling events in April which were 10.6 and 11.4 mg/kg dw. Similar to the regional one-step water-to-invertebrate lotic selenium accumulation model, the observed to predicted tissue selenium relationship of each of the EVO LAEMP areas was compared to other areas in the Elk Valley (via 95% prediction intervals; Figure 6.4). The results from this analysis (similar to those with the regional one-step water-to-invertebrate lotic selenium accumulation model) suggested that samples fall outside the typical range in the Elk Valley and the use of the B-tool may not evaluate the potential factors contributing to the elevated selenium concentrations in these samples. Interestingly, RG_ERCK, which is at the confluence of Michel Creek was generally over-predicted based on the total selenium and selenium species present in the water of that area. In contrast to Erickson, Gate, and Bodie Creek areas, both models (the one-step model and the B-tool model) were able to

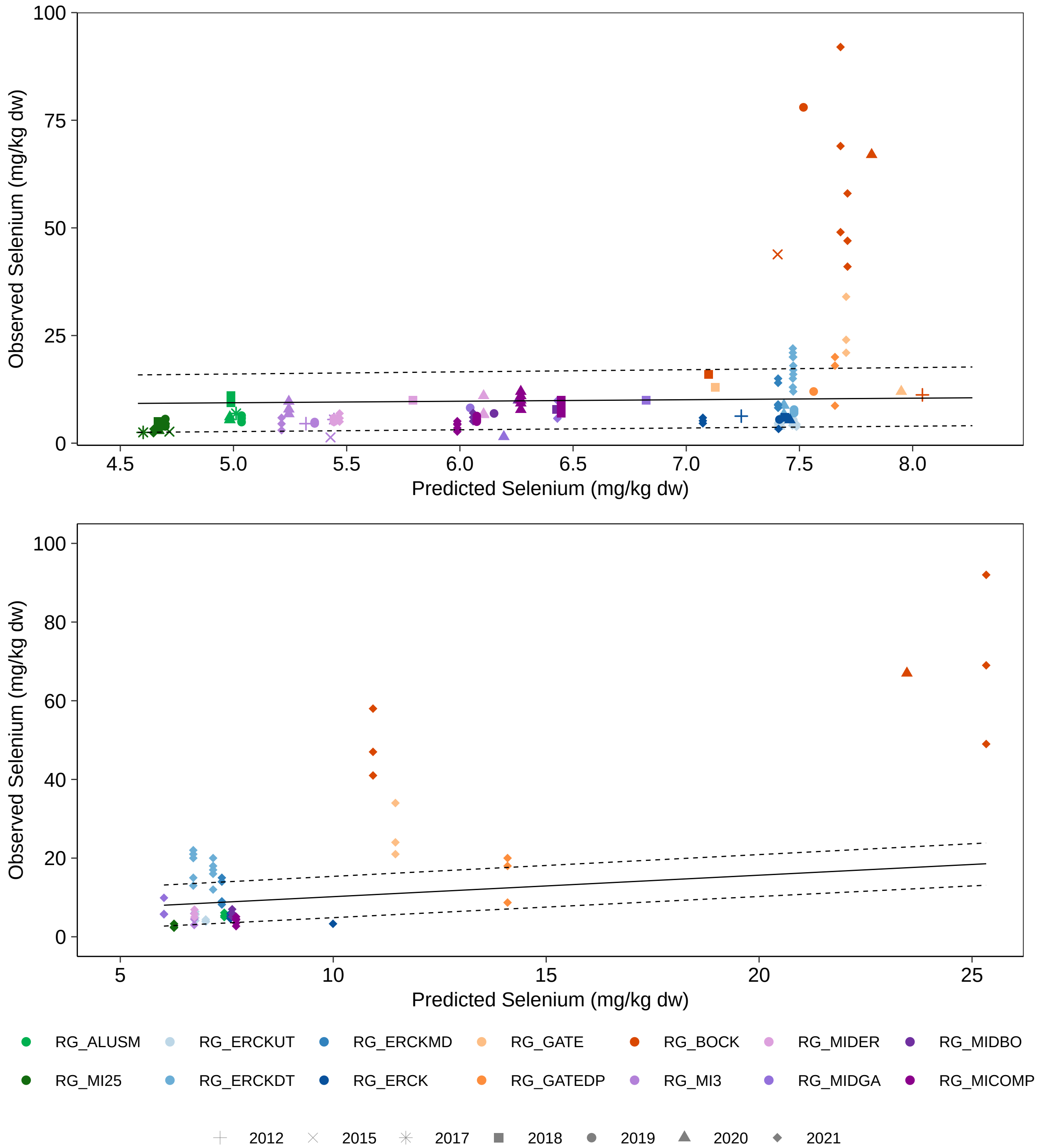

Figure 6.4: Observed and Predicted Selenium Concentrations in Benthic Invertebrate Composite Samples for the One-Step Bioaccumulation Model (Top) and B−tool Model (Bottom)

Notes: mg/kg dw = milligrams per kilogram dry weight. Predicted benthic invertebrate selenium concentrations were estimated using a one−step water to benthic invertebrate selenium accumulation model (Golder 2020b) in the top plot and using the speciation bioaccumulation tool (B-tool) to predict bioaccumulation in areas with detectable organoselenium species (deBruyn and Luoma 2021) in the bottom plot. Mean (solid line) and 95% prediction intervals (dashed lines) are shown for a linear mixed−model of observed to predicted concentrations for Elk Valley samples (2012 to 2021) for each respective relationship. Only water data collected with ± 5 days with tissue samples at each biological area were included in the plots and analysis. Selenium speciation was not evaluated any area (excluding RG_BOCK in 2020) in the 2019 or 2020 EVO Existing Conditions Study (Minnow 2020a, 2021a).

accurately predict BIT selenium concentrations for areas in Michel Creek (Figures 6.3 and 6.4; Appendix Table F.3).

6.2 Biomass, Density, and Community Structure

6.2.1 Biomass and Density

The total density of benthic invertebrates determined by Hess sampling in Erickson Creek in September 2021 was significantly higher at RG_ERCKDT, downstream of the SRF water treatment outfall, than at RG_ERCKUT, upstream of the SRF water treatment outfall (Figure 6.5; Appendix Tables F.4 and F.5). This difference was driven by significantly higher densities of most major taxa at RG_ERCKDT, including Ephemeroptera, Plecoptera, and Chironomidae, as well as combined EPT density (Figure 6.5; Appendix Tables F.4 and F.5). Trichoptera density was also higher at RG_ERCKDT than RG_ERCKUT and, although the difference was not statistically significant, the magnitude of difference between the areas was similar to the difference in areas for other taxa (Figure 6.5; Appendix Tables F.4 and F.5). Greater organism densities at RG_ERCKDT compared to RG_ERCKUT suggests higher benthic invertebrate productivity immediately downstream of the SRF outfall in Erickson Creek. Based on water quality results in 2021, there was no indication of an increase in nutrient concentrations resulting from the commissioning of EVO SRF P2 (Section 4.1) and variable results for periphyton coverage (Section 5.1), suggests that water quality and primary productivity are unlikely to be contributing factors. Water temperatures at RG_ERCKDT, downstream of the SRF outfall, were higher than at RG_ERCKUT and pre-EVO SRF P2 (Section 3.1), which may have contributed to higher benthic invertebrate productivity at RG_ERCKDT in 2021.

The total biomass of benthic invertebrates in Hess samples did not differ significantly between the two areas, although the mean biomass was slightly higher at RG_ERCKDT than RG_ERCKUT (57.5 and 37.9 g/m^2 ww, respectively; Figure 6.5; Appendix Table F.4). Similarity in total biomass despite relatively large differences in organism density between the two areas could be due to the relatively greater density contribution of smaller taxa (e.g., Chironomidae, Nadidae) at RG_ERCKDT than at RG_ERCKUT (Appendix H).

6.2.2 Community Structure

Temporal changes in endpoints related to benthic invertebrate community (BIC) structure as determined by kick and sweep (i.e., CABIN) sampling in Erickson and Michel creeks downstream of SRF discharge were evaluated relative to reference areas in Alexander and Michel creeks, other mine-exposed areas in Michel Creek, and regional and habitat-adjusted normal ranges defined in the RAEMP (Appendix Table F.6; Minnow 2020b). Richness (# of taxa at Lowest Practical Level [LPL]) was within or above the regional and habitat-adjusted normal ranges at

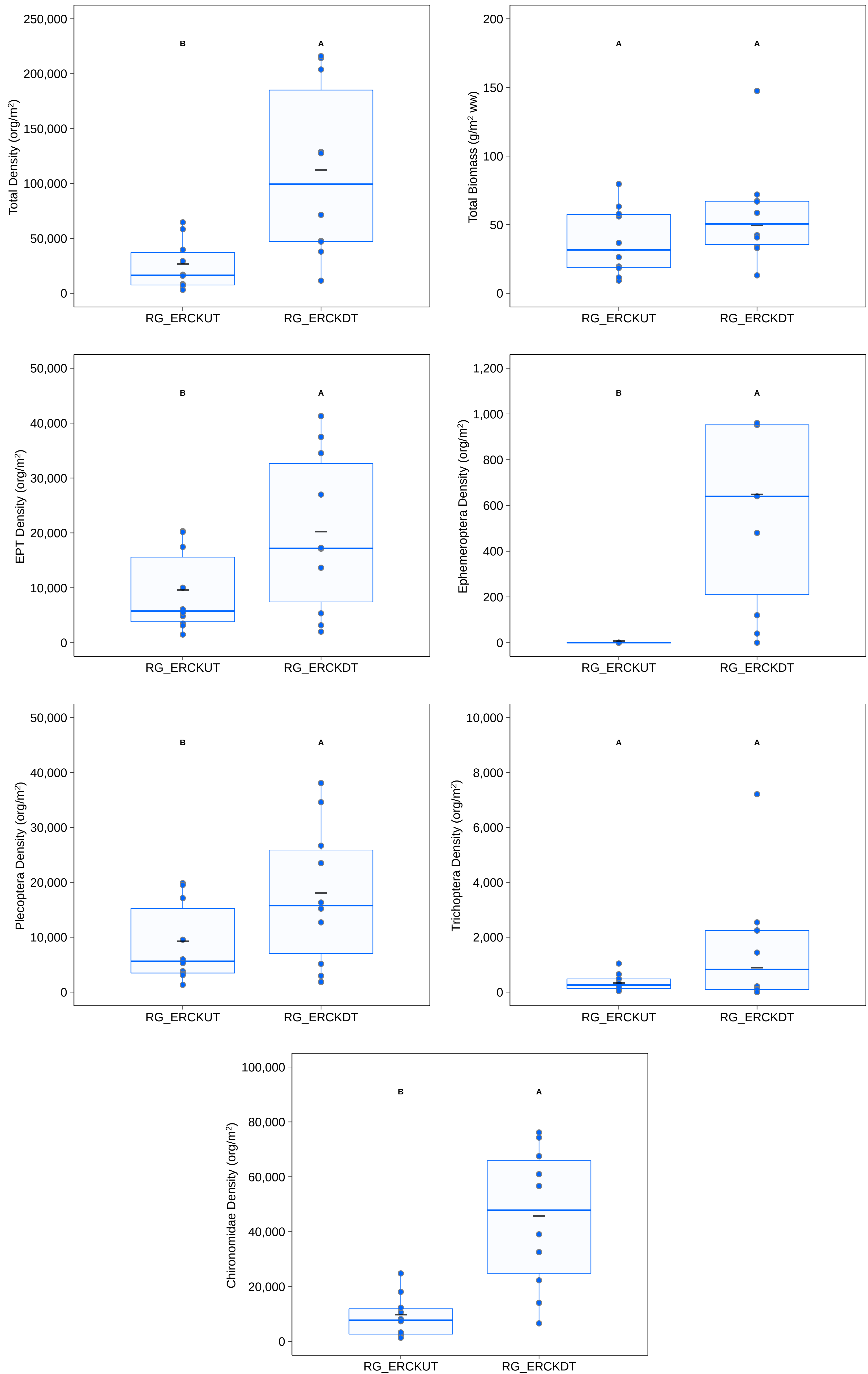

Figure 6.5: Benthic Invertebrate Density and Biomass Metrics from Hess Sampling for Upstream (RG_ERCKUT) and Downstream (RG_ERCKDT) Areas, EVO LAEMP, September 2021

Notes: org/m^2 = organisms per metre squared. g/m2 ww = grams per metre squared wet weight. EPT = Ephemeroptera, Plecoptera, Trichoptera. Areas that share a letter are not significantly different (p−value=0.1).

mine-exposed sites in Michel Creek and reference sites in Michel and Alexander creeks in sampled years between 2012 and 2021 (Figure 6.6; Appendix Figure F.2). Downstream of the SRF outfall at RG_ERCKDT, taxa richness was largely within the normal range and the habitat-adjusted range, and greater than upstream of the SRF outfall at RG_ERCKUT where richness was below the habitat-adjusted and normal range in both 2020 and 2021 (Appendix Figure F.2). Further downstream at RG_ERCK, taxa richness in 2021 was within the normal range and habitat-adjusted range and similar to all pre-EVO SRF P2 years except 2012 (Appendix Figure F.2). Data from Erickson Creek suggest that taxa richness at RG_ERCKUT and RG_ERCKDT may be at the lower limit of the regional reference normal range and, and although this may be related to mine influence in general, no effects associated with the SRF outfall is apparent.

Total organism abundance and EPT Abundance (i.e., # of organisms/ 3-min kick) were within regional reference normal ranges and within or above habitat-adjusted normal ranges in all sampled years at all areas (mine-exposed and reference; Figures 6.6 and 6.7; Appendix Figures F.3 and F.4), except the reference area RG_MI25 where interannual variability resulted in abundance and EPT abundance lower than the habitat-adjusted normal range in multiple years (i.e., 2012, 2019, and 2020; Appendix Figures F.3 and F.4). An increase in total organism abundance was observed at RG_ERCKDT (downstream of the SRF outfall) and to a lesser extent at RG_MIDBO (downstream of SRF inputs to Bodie, Gate, and Erickson Creek) in 2021 when compared to previous years, while a small decrease was noted at RG_MIDER when the same comparison was made (Appendix Figure F.3). In combination with higher organism density at RG_ERCKDT compared to RG_ERCKUT in Hess sampling in 2021 (Section 6.2.1), higher organism abundance at RG_ERCKDT may indicate greater benthic invertebrate productivity downstream of the SRF outfall in Erickson Creek, which as noted in Section 6.2.1 could be the result of increased temperature directly downstream of the SRF outfall. However, given only a single year of monitoring during EVO SRF P2, and that increases in organism abundance are similar in magnitude to variability observed at reference areas over time, it is unclear if changes are associated with SRF discharge.

Despite EPT abundance within regional reference normal ranges, % EPT in 2021 fell below the regional and habitat-adjusted normal ranges at areas downstream of the SRF outfall in Erickson Creek (RG_ERCKDT and RG_ERCK). Additionally, % EPT at RG_ERCKDT in 2021 was lower than in either 2019 or 2020. A similar pattern was also noted, to a lesser degree, upstream of the SRF outfall at RG_ERCKUT where % EPT was lower in 2021 compared to 2020 and 2019, and one replicate fell below the regional and habitat-adjusted normal ranges (Figure 6.7; Appendix Figure F.5). Further downstream at RG_ERCK, % EPT was similar or increased in 2021 when compared to recent years (2019 and 2020) but was lower than in 2012 or 2018 (Appendix Figure F.5). At other mine-exposed areas in Michel Creek and reference areas

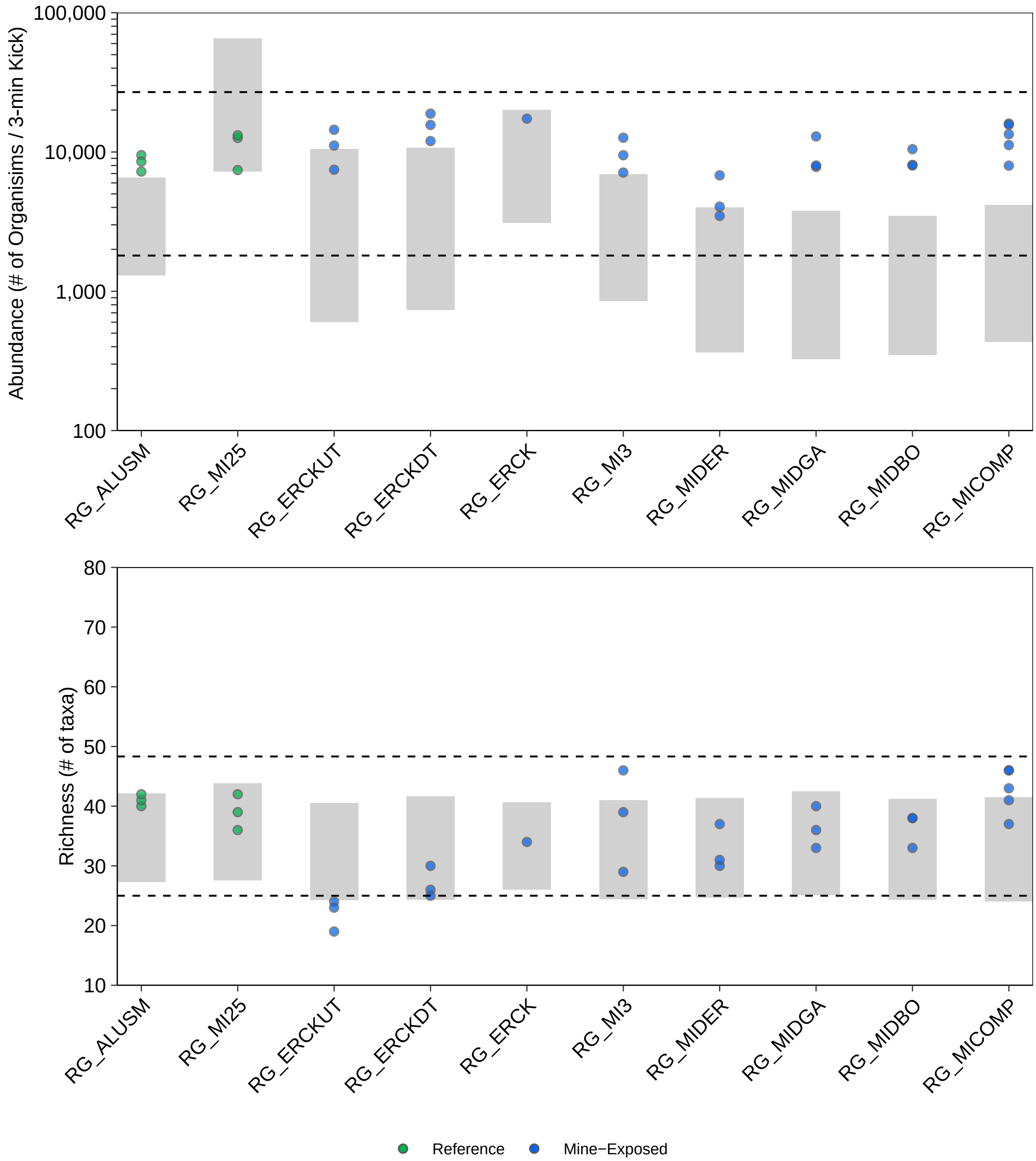

Figure 6.6: Benthic Invertebrate Abundance and Richness, EVO LAEMP, September 2021

Notes: Site specific normal ranges developed using regression models for the Regional Aquatic Environmental Monitoring Program (RAEMP; Minnow 2020b) are shown, when applicable, with grey shading. Dashed horizontal lines represent the normal range defined as the 2.5th and 97.5 percentiles of the 2012 to 2019 reference area data from the RAEMP.

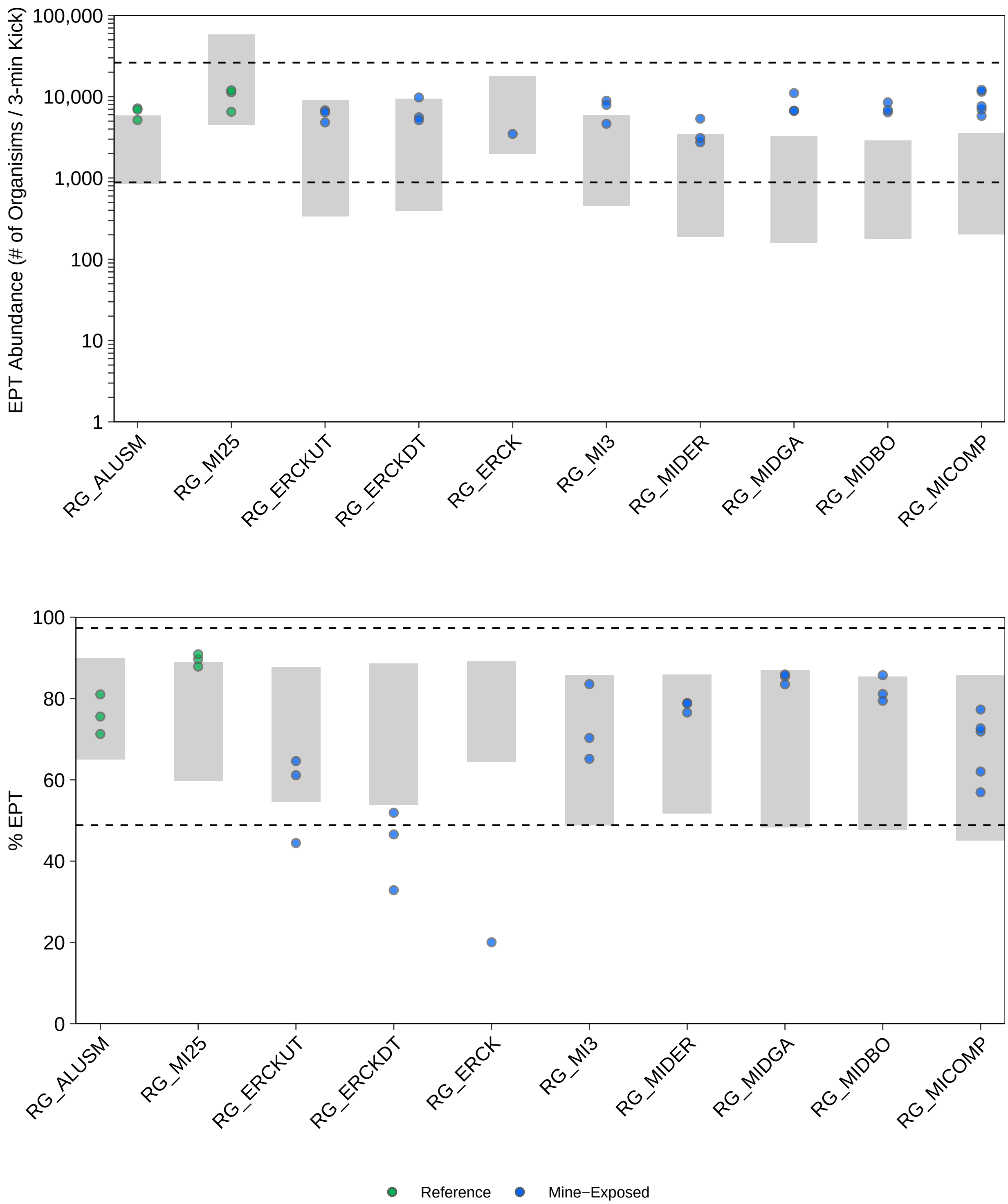

Figure 6.7: Percent Ephemeroptera, Plectoptera, Trichoptera (%EPT) and Abundance, EVO LAEMP, September 2021

Notes: Site specific normal ranges developed using regression models for the Regional Aquatic Environmental Monitoring Program (RAEMP; Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Dashed horizontal lines represent the normal range defined as the 2.5th and 97.5 percentiles of the 2012 to 2019 reference area data from the RAEMP.

in Michel and Alexander creeks, % EPT was within or above the regional and habitat-adjusted normal ranges in all sampled years, except at RG_MICOMP in 2019 where some replicates were below one or both ranges (Appendix Figure F.5).

Lower % EPT at RG_ERCKDT in 2021 and RG_ERCK from 2018 to 2021 appears to be driven by low total and relative abundance of Ephemeroptera and high total and relative abundance of Chironomidae at all sampling areas in Erickson Creek, including those upstream of the SRF outfall (RG_ERCKUT). Total Ephemeroptera and % Ephemeroptera were below the regional and habitat-adjusted normal ranges at all three areas in Erickson Creek (RG_ERCKUT, RG_ERCKDT, and RG_ERCK) in all samples collected since 2018, with Ephemeroptera abundance <100 individuals for each replicate at RG_ERCKUT in 2021 (Figure 6.8; Appendix Figures F.6 and F.7; Appendix Table F.6). Conversely, the total and relative abundance of Plecoptera was within or above the regional normal range at all sampled areas and was highest at RG_ERCKUT and RG_ERCKDT when compared to the other study areas, though relative abundance at these two areas declined in 2021 compared to 2019 and 2020 (Figure 6.9; Appendix Figures F.8 and F.9). Trichoptera total and relative abundance, although generally lower at areas in Erickson Creek than at reference areas and areas in Michel Creek, were also within the regional normal range between 2018 and 2021 (Figure 6.10; Appendix Figures F.10 and F.11).

The total abundance of Chironomidae has been high at RG_ERCK since 2018, sometimes exceeding the regional normal range, and increased at RG_ERCKUT and RG_ERCKDT in 2021 relative to earlier sampled years (Figure 6.11; Appendix Figure F.12). These observed high abundances of Chironomidae translated to higher % Chironomidae, which were above the regional normal range at RG_ERCK from 2018 to 2021 and at RG_ERCKUT and RG_ERCKDT in 2021 (Figure 6.11; Appendix Figure F.13). The shift in community composition at RG_ERCKDT (increase in % Chironomidae and decrease in % Plecoptera), although coinciding with commissioning of EVO SRF P2 in early 2021, occurred at areas both upstream and downstream of the SRF outfall and therefore does not appear to be directly related to SRF discharge.

Relative abundance of EPT was also assessed against the biological trigger established for this endpoint (see Appendix G for details). This was completed for each replicate from EVO LAEMP monitoring areas where water quality projections were available for each sampling event in 2021 (i.e., September sampling at RG_ERCK, RG_MI3, RG_MICOMP; see Appendix G for details). Biological trigger results indicated that of the three mine-exposed areas evaluated only RG_ERCK had % EPT that reached the biological trigger criteria (i.e., % EPT was below the biological trigger).

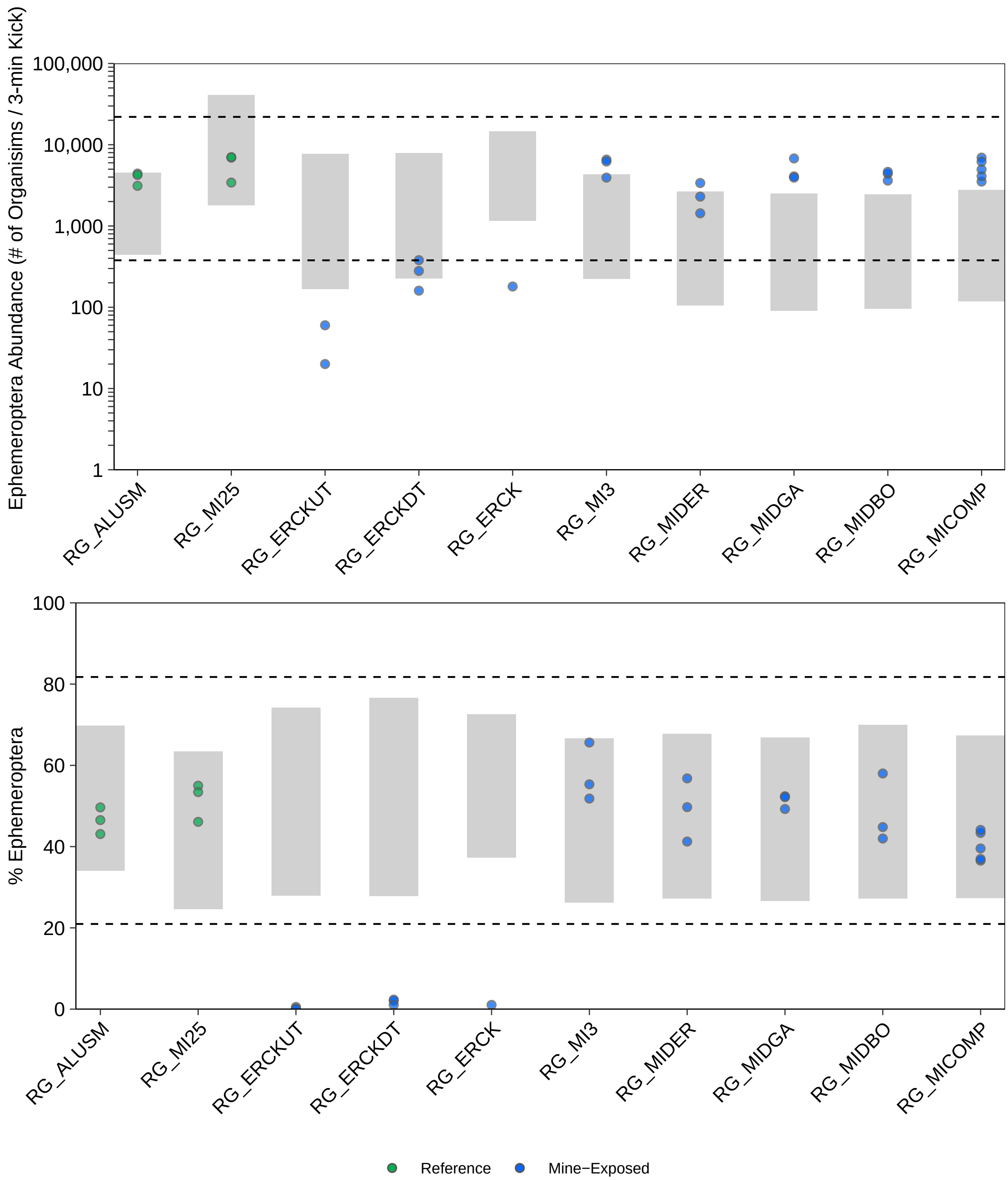

Figure 6.8: Percent (%) Ephemeroptera and Abundance, EVO LAEMP, September 2021

Notes: Site specific normal ranges developed using regression models for the Regional Aquatic Environmental Monitoring Program (RAEMP; Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Dashed horizontal lines represent the normal range defined as the 2.5th and 97.5 percentiles of the 2012 to 2019 reference area data from the RAEMP.

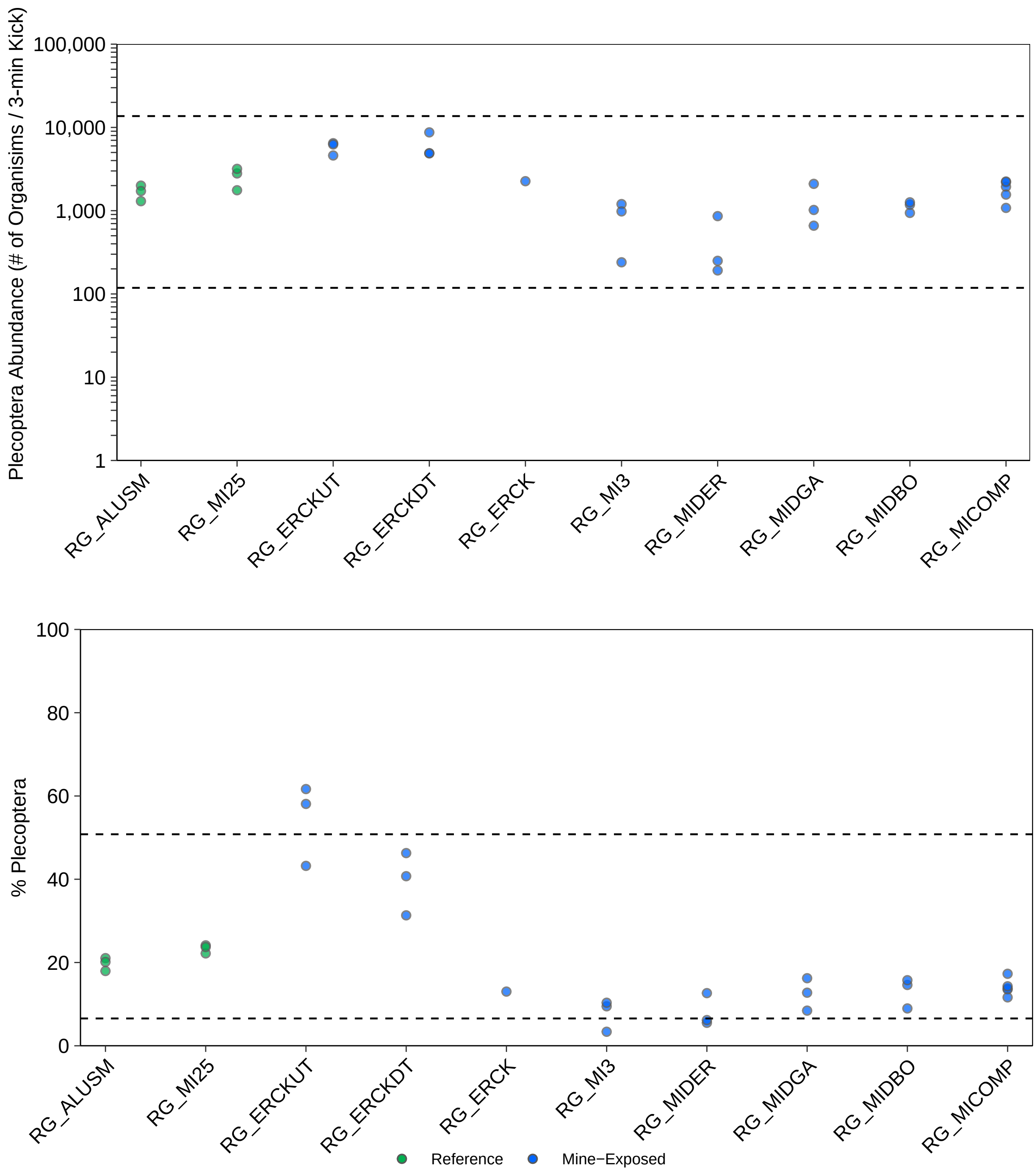

Figure 6.9: Percent (%) Plecoptera and Abundance, EVO LAEMP, September 2021

Notes: Site specific normal ranges developed using regression models for the Regional Aquatic Environmental Monitoring Program (RAEMP; Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Dashed horizontal lines represent the normal range defined as the 2.5th and 97.5 percentiles of the 2012 to 2019 reference area data from the RAEMP.

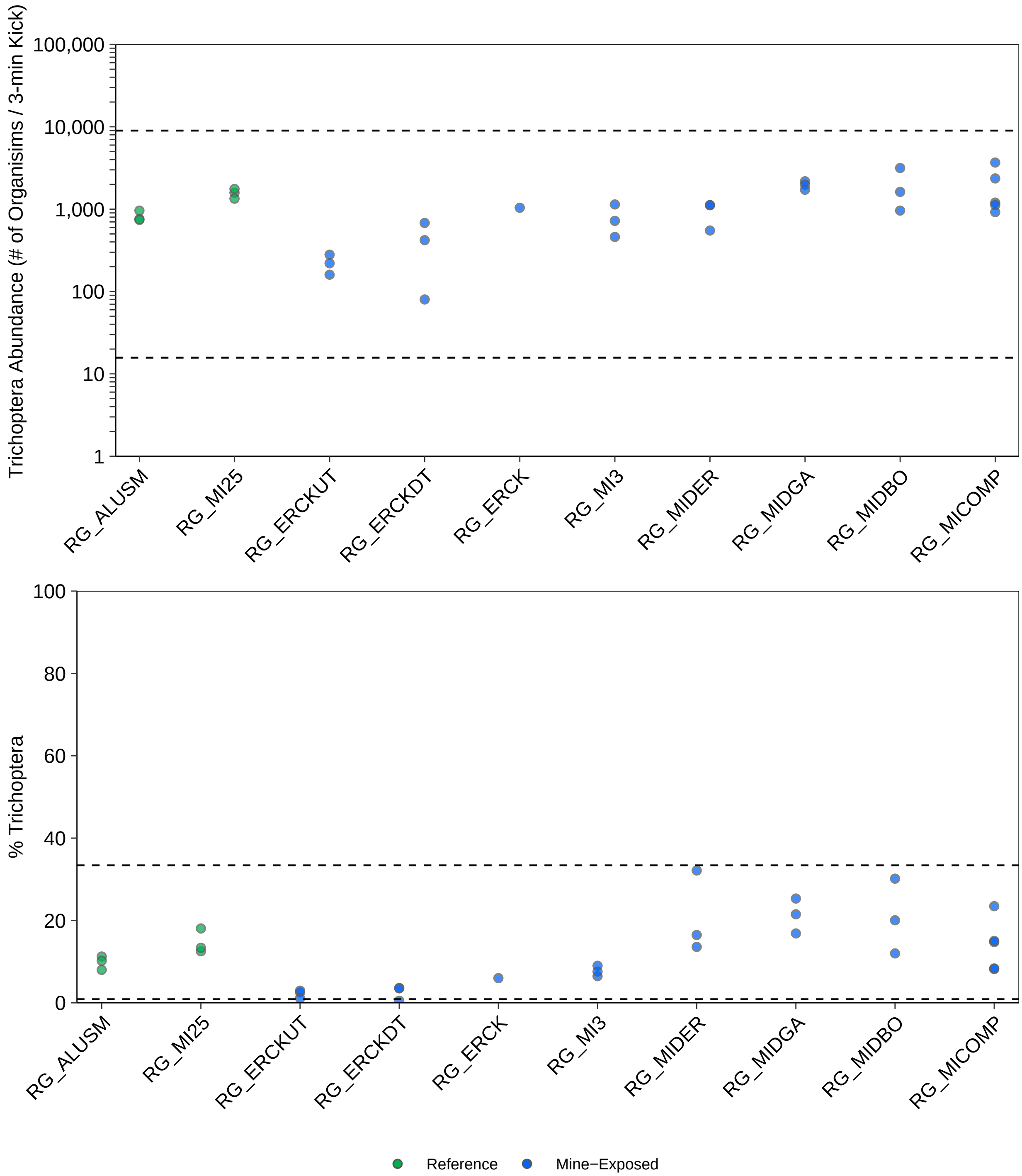

Figure 6.10: Percent (%) Trichoptera and Abundance, EVO LAEMP, September 2021

Notes: Site specific normal ranges developed using regression models for the Regional Aquatic Environmental Monitoring Program (RAEMP; Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Dashed horizontal lines represent the normal range defined as the 2.5th and 97.5 percentiles of the 2012 to 2019 reference area data from the RAEMP.

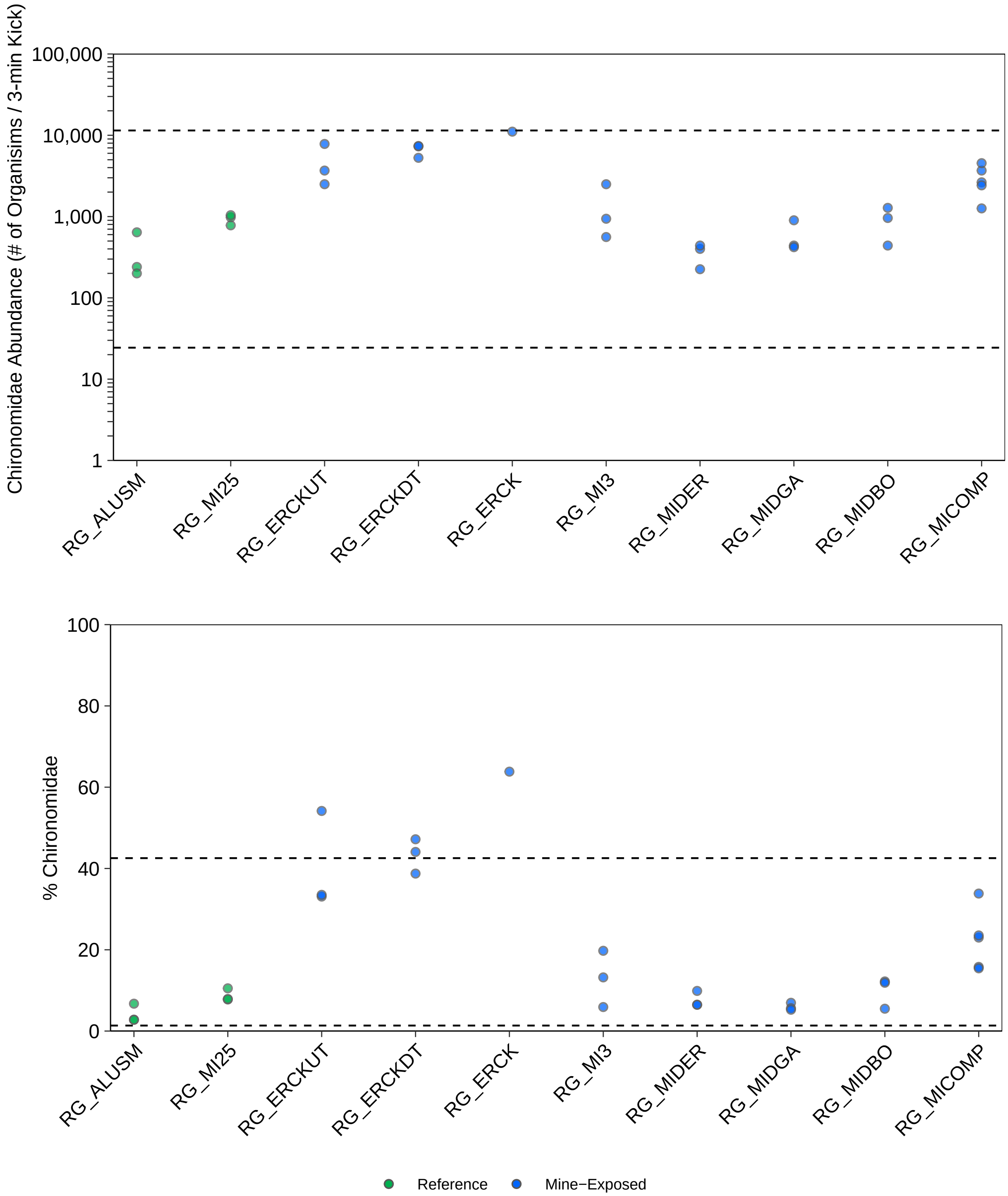

Figure 6.11: Percent (%) Chironomidae and Abundance, EVO LAEMP, September 2021

Notes: Site specific normal ranges developed using regression models for the Regional Aquatic Environmental Monitoring Program (RAEMP; Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Dashed horizontal lines represent the normal range defined as the 2.5th and 97.5 percentiles of the 2012 to 2019 reference area data from the RAEMP.

Correspondence analysis was conducted on September LPL benthic invertebrate abundance data for all study years (2012 to 2021), with CA axis 1 (CA1) and CA axis 2 (CA2) accounting for 33.0% and 14.5% of the variability in the community, respectively (Figure 6.12). Sampling areas were separated in ordination space into three groups: Erickson Creek areas, mine-exposed Michel Creek areas, and reference areas, with Erickson Creek areas being the most divergent group (Figure 6.12). Erickson Creek areas were primarily separated from Michel Creek areas along CA1, but separated from reference areas along both CA1 and CA2.

The taxa driving separation among the groups of areas included: Peltoperlidae and Zapada (Plecoptera) which were associated with Erickson Creek areas, Megarcys (Plecoptera) which was associated with reference and Erickson Creek areas, Taeniopterygidae (Plecoptera) and Rhyacophila taxa (Trichoptera) which were associated with reference areas, and Polypedilum (Chironomidae), Nais (Nadidae), and Torrenticola (Arachnidae) which were associated with mine-exposed Michel Creek areas (Figure 6.12). There were also multiple Ephemeroptera taxa (e.g., Heptageniidae, Baetis, Ephemerellidae, Ephemerella, and Rhithrogena) and some Trichoptera taxa (e.g., Hydropsychidae, Glossosomatidae and Brahycentrus) with low to moderate positive scores on CA1 and CA2, suggesting a general association of these species with both the mine-exposed areas in Michel Creek and reference areas (Figure 6.12). Chironomidae taxa including Eukiefferiella and Tventenia had positive scores on CA2, and therefore were mainly associated with Erickson Creek and mine-exposed Michel Creek areas (Figure 6.12). Overall, the CA analysis indicates that the benthic invertebrate communities in mine-exposed Erickson and Michel creeks differ from each other and from reference areas, and that Erickson Creek areas are characterized by higher abundances of certain Plecoptera and Chironomidae taxa and lower overall abundances of most Ephemeroptera and Trichoptera taxa. Correspondence analysis also indicated that the difference in Erickson Creek BIC composition compared to other sampled areas has been consistent over the time and not a result of SRF discharge (Figure 6.12).

Detailed examination of CA results for Erickson Creek identified a BIC shift at Erickson Creek areas in 2021, relative to earlier sampling years. Erickson Creek areas generally had higher scores on CA1 (i.e., less negative) in 2021, potentially suggesting lower abundance of Plecoptera taxa with negative scores on CA1 (Peltoperlidae, *Zapada columbiana*, and Megarcys) and greater abundance of Chironomidae taxa that scored higher on CA1 (Figure 6.12). This shift is observed at all three Erickson Creek areas (RG_ERCKUT, RG_ERCKDT, and RG_ERCK), and suggests that observed differences in 2021 are unrelated to SRF discharge.

Canonical Correspondence Analysis (CCA) were used to explain variation in BIC using habitat, calcite and water chemistry variables. Canonical correspondence analysis was conducted on

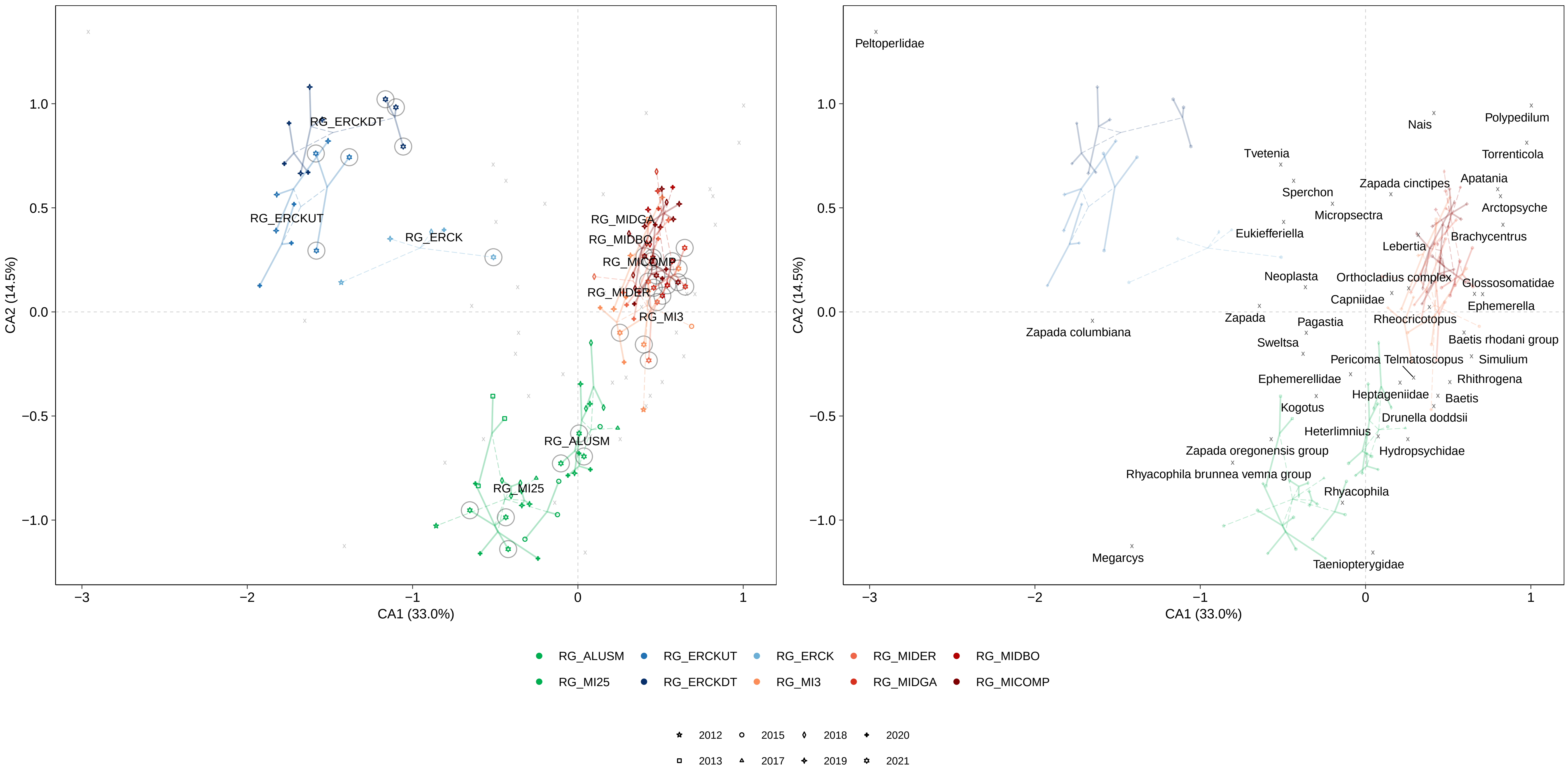

Figure 6.12: Correspondence Analysis of Benthic Invertebrate Communities in September, EVO LAEMP, 2012 to 2021

Notes: Green symbols represent reference stations and other colours represents mine−exposed stations. Lowest Practical Level taxon abundances were $\ln_{(x+1)}$-transformed prior to analysis. Taxa that made up less than 1% of total abundance (on the $\ln_{(x+1)}$ scale) and occurred in fewer than 10% of samples were excluded from analysis. Samples from 2021 are circled in grey.

September LPL benthic invertebrate abundance data for all study years for which environmental variable data were available (i.e., 2018 to 2021; Figures 6.13 and 6.14). This subset of the temporal dataset is considered appropriate for the CCA analysis as CA analysis on this subset resulted in equivalent results to CA analysis on the full dataset (i.e., 2012 to 2021; Figure 6.12 and Appendix Figure F.14). The separation among Erickson Creek, mine-exposed Michel Creek, and reference areas observed in the CA was maintained when the dataset was constrained by both stressors (water chemistry and calcite) and habitat variables and the taxa responsible for area separation were also consistent with the CA analysis results (Figures 6.13 and 6.14).

When the BIC data were constrained by water chemistry and calcite variables, the first and second CCA axes (CCA1 and CCA2) explained 38.7% and 14.7% of variability, respectively (Figure 6.13). The first axis strongly separated Erickson Creek from both mine-exposed Michel Creek areas and reference areas, with Erickson Creek separating in the negative direction and associating with most mine-related water quality constituents (except total barium and total molybdenum) and calcite. The second axis separated the mine-exposed areas (both Erickson Creek and Michel Creek) from the reference areas in the positive direction and was driven by higher concentrations of all water quality constituents and calcite variables (Figure 6.13). Results suggest that mine-related effects on BIC follow a stressor gradient, with the most impacts on BIC associated with elevated mine-influenced water quality in Erickson Creek, followed by Michel Creek where BIC structure is more similar to reference areas.

When BIC data were constrained by habitat, the first and second CCA axes (CCA1 and CCA2) explained 36.4% and 11.9% of variability, respectively (Figure 6.14). The first axis separated Erickson Creek from mine-exposed areas in Michel Creek and the reference areas in the negative primarily by station gradient and high watershed slope. In the positive direction on CCA1, mine-exposed Michel Creek areas were associated with larger watershed area, larger bankfull width, and larger substrate size. The second axis separated the mine-exposed areas from the reference areas, similar to the CA and the CCA constrained by water quality and stressors. The reference areas were generally defined by their small watershed area and low watershed slope (Figure 6.14). While strong associations with mine-related stressors were apparent, habitat features are likely also contributing significantly to variations in BIC among areas.

6.3 Summary

Results pertaining to the evaluation of benthic invertebrates are directly used to address Study Questions #4 (SRF influence on selenium BIT concentrations), #5 (SRF influence on benthic community structure), and #6 (SRF influence on productivity). A summary of the direct

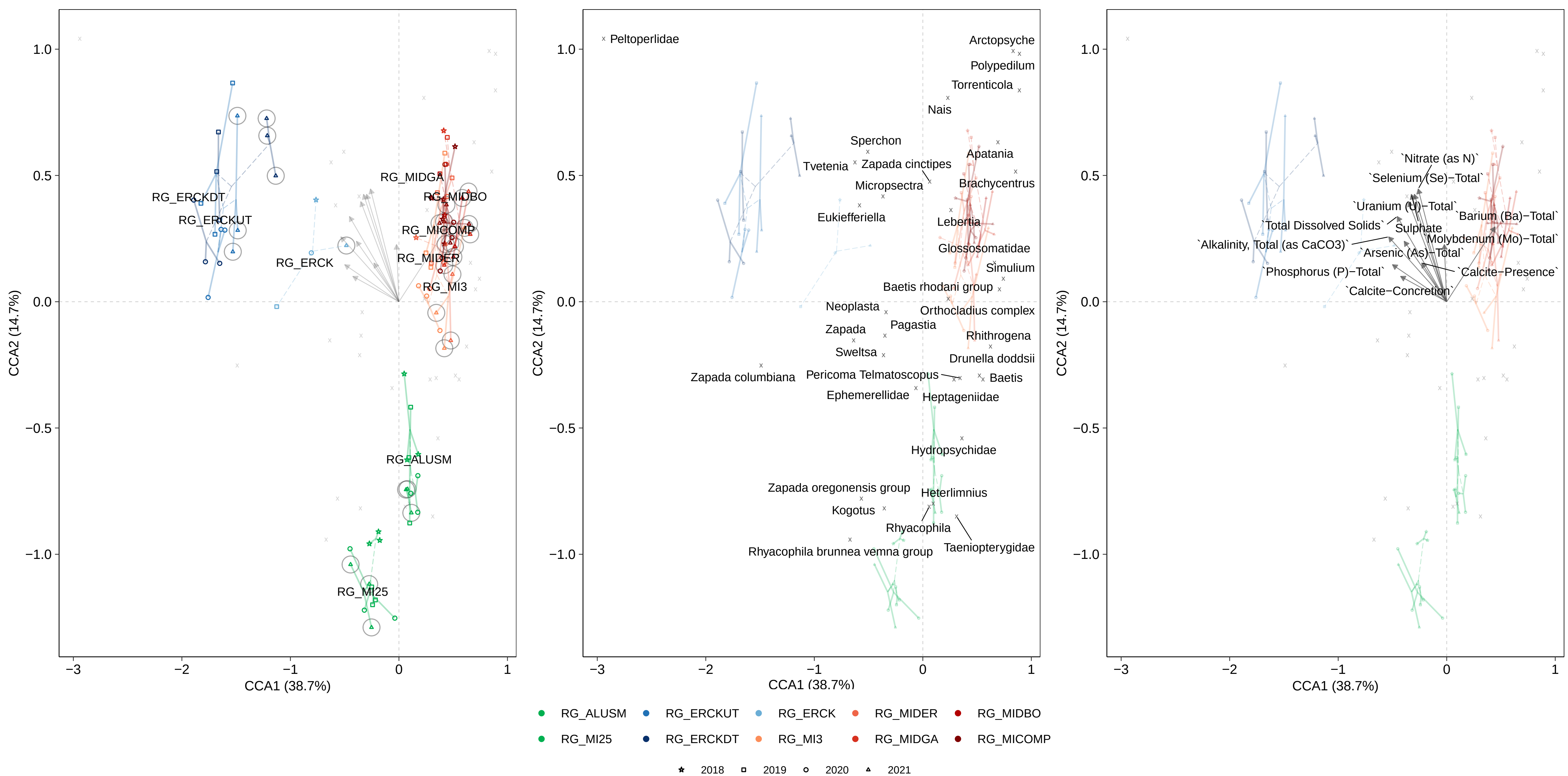

Figure 6.13: Canonical Correspondence Analysis of Benthic Invertebrate Communities in September Constrained by Water Chemistry and Calcite Variables, EVO LAEMP, 2018 to 2021

Notes: Green symbols represent reference stations and other colours represents mine−exposed stations. Lowest Practical Level taxon abundances were $\ln_{(x+1)}$-transformed prior to analysis. Taxa that made up less than 1% of total abundance (on the $\ln_{(x+1)}$ scale) and occurred in fewer than 10% of samples were excluded from analysis. Samples from 2021 are circled in grey.

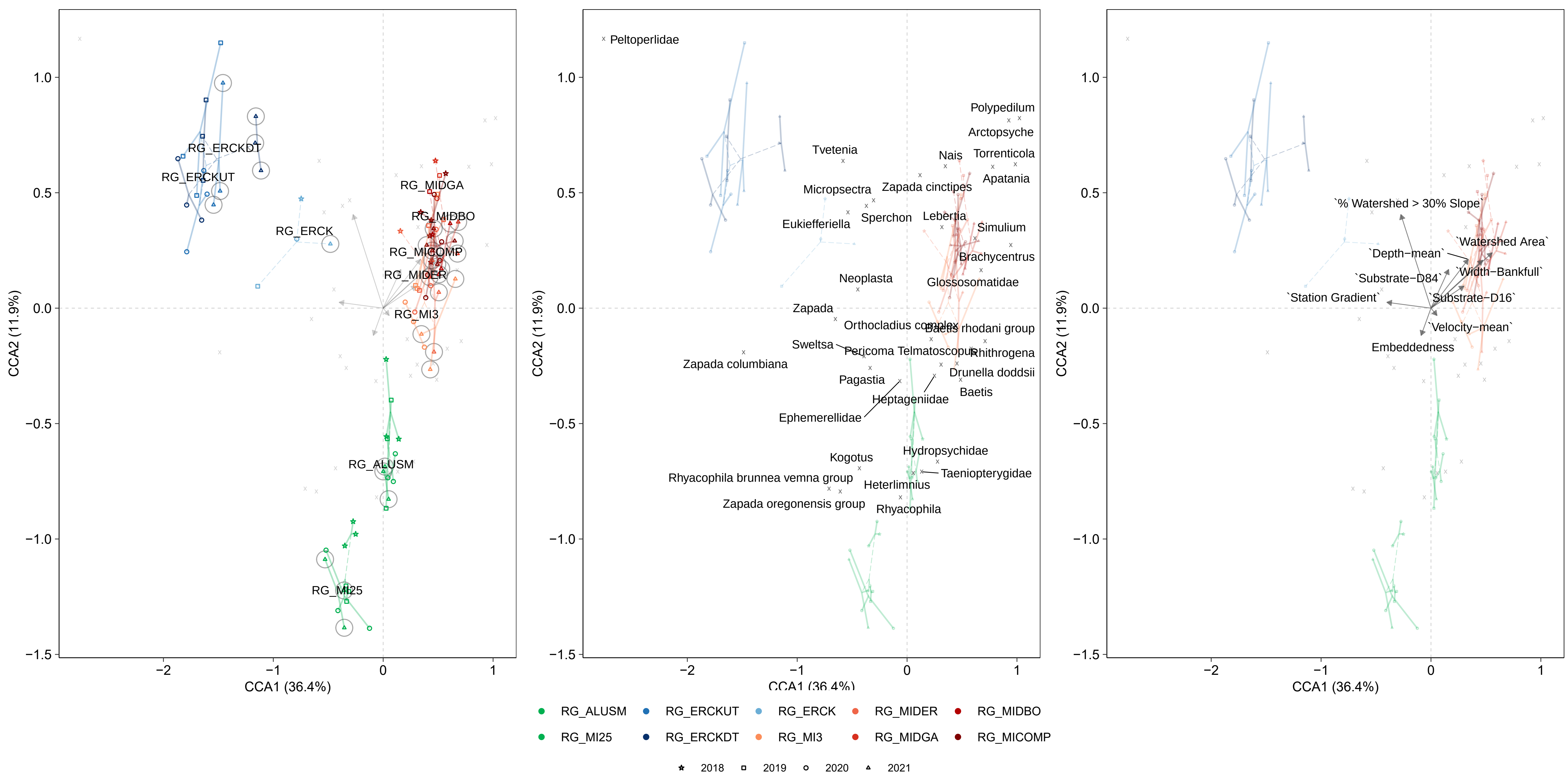

Figure 6.14: Canonical Correspondence Analysis of Benthic Invertebrate Communities in September Constrained by Habitat Variables, EVO LAEMP, 2018 to 2021

Notes: Green symbols represent reference stations and other colours represents mine−exposed stations. Lowest Practical Level taxon abundances were $\ln_{(x+1)}$-transformed prior to analysis. Taxa that made up less than 1% of total abundance (on the $\ln_{(x+1)}$ scale) and occurred in fewer than 10% of samples were excluded from analysis. Samples from 2021 are circled in grey.

influence of the SRF on selenium BIT concentrations, benthic community structure, and productivity are detailed below.

Mean BIT selenium concentrations in areas of upper portions of Erickson (below the SRF outfall), Gate, and Bodie Creek exceeded the Level 1 benchmark for effects to benthic invertebrates, were above the regional reference normal range, and were significantly higher than the reference areas evaluated in the EVO LAEMP. As noted previously, elevated BIT selenium concentrations in Bodie and Gate creeks were not likely related to the SRF as limited discharge occurred in these areas in 2021. This is supported by elevated BIT selenium concentrations pre-EVO SRF P2, suggesting that the elevated concentrations in 2021 at these areas are not related to pre-EVO SRF P2 commissioning. Mean BIT selenium concentrations in the other areas evaluated as part of the EVO LAEMP, including the area above the SRF outfall in Erickson Creek, lower portions of Erickson Creek, and all areas in Michel Creek were below the Level 1 benchmark for benthic invertebrates, within the normal range, and not significantly different from reference areas, suggesting that elevated BIT selenium concentrations were localized to downstream of EVO SRF P2 discharges. Both bioaccumulation models (the regional one-step water-to-invertebrate lotic selenium accumulation model and the B-tool) were unable to accurately predict BIT selenium concentrations for those areas where elevated tissue concentrations were noted suggesting that aqueous total selenium and selenium speciation is not the sole cause of the elevated concentrations in these areas. Additional investigations to better understand the cause of the elevated selenium concentrations in BIT are currently underway as part of an AMP response framework.

In 2021, the total density, but not the total biomass, of benthic invertebrates was greater in the area directly downstream of the SRF outfall in Erickson Creek when compared to the area above the SRF outfall. The density of individual taxa was also higher downstream, in particular Chironomidae, Plecoptera, and Ephemeroptera, and total abundance measured by kick and sweep sampling was higher in 2021 at RG_ERCKDT compared to 2019 and 2021. Taken together, benthic invertebrate productivity appears to be elevated downstream of the SRF outfall in 2021 (i.e., following the initiation of EVO SRF P2). An observed increase in water temperature at RG_ERCKDT compared to pre-EVO SRF P2 was identified as a potential factor for the increased productivity.

Effects on BIC endpoints (i.e., values lower than regional reference normal ranges or lower than other areas evaluated under the EVO LAEMP) were generally limited to areas in Erickson Creek. A few individual BIC replicates had % EPT values in 2021 which were lower than regional and/or habitat-adjusted normal ranges at areas both upstream (RG_ERCKUT) and downstream (RG_ERCKDT and RG_ERCK) of the SRF outfall in Erickson Creek. Ephemeroptera abundance and relative abundance have been consistently low both upstream (RG_ERCKUT) and downstream of the SRF (RG_ERCKDT and RG_ERCK) in all years evaluated pre-EVO SRF P2. Increases in total and relative abundance of Chironomidae and decreases in relative abundance of Plecoptera in 2021 at both RG_ERCKUT and RG_ERCKDT suggest that a shift in BIC structure may be occurring, but as it has occurred both upstream and downstream of the SRF outfall, it is likely unrelated to treatment.

Multivariate ordinations of BIC composition identified unique BIC among Erickson Creek areas, mine-exposed Michel Creek areas, and reference areas. When BIC data were constrained by mine-related stressors (water quality and calcite) and habitat, the separations were maintained. When constrained by water quality and calcite, areas were separated based on a stressor gradient, with Erickson Creek being associated with the highest concentrations of mine-related water quality constituents and calcite along CCA1, but all mine-exposed areas separating from the reference areas based on water quality along CCA2. When BIC data were constrained by habitat, Erickson Creek separated out based on watershed slope and station gradient, while the mine-exposed areas separated from other areas primarily based on larger watershed area and bankfull width. As both constrained ordinations delineated the same three groupings of monitoring areas, it is likely that both mine-related stressors and habitat variables are important contributors to variations in BIC structure among areas, which is consistent with findings in other areas of the Elk River watershed (Minnow 2020b).

7 SUMMARY

Potential effects to the aquatic environment related to the commissioning of the EVO SRF P2 in Erickson and Michel creeks (Gate and Bodie creeks received limited discharge from the SRF in 2021) were evaluated by addressing six study questions, a summary of the results for each study question are discussed below (as well as in Table 7.1).

7.1 Study Question #1

The first study question in the EVO LAEMP Study Design is “Has temperature changed in the receiving environment of Erickson Creek as the result of SRF water treatment?” Water temperature downstream of the SRF outfall in Erickson Creek increased in 2021 compared to temperatures upstream of the outfall (i.e., consistently ~5°C) and also compared to temperatures downstream of the outfall prior to operation of the EVO SRF P2. These increases were expected as the treatment process involves water retention and ponding (i.e. use of buffer pond) to manage effluent quality, increasing the likelihood of temperature increases during periods of seasonally elevated ambient air temperature (i.e., summer). The increase in water temperature downstream of the outfall (RG_ERCKDT, which is non-fish bearing) compared to pre-SRF conditions and upstream temperatures was related to higher effluent temperatures. The potential influence of increased temperatures from the SRF on fish in lower Erickson Creek, specifically at the confluence of Erickson Creek with Michel Creek is expected to be minimal as water temperatures at this area met the SPO that came into effect August 13, 2021, and were also largely within or below guidelines for critical life stages of WCT and bull trout. Temperatures in Michel Creek were also within or below guidelines for critical life stages of these fish. Overall, the influence of the SRF on water temperature is localized and is expected to have minimal impact on the fish-bearing portions of the receiving environment.

7.2 Study Question #2

The second study question of the EVO LAEMP Study Design is “Has calcite in the receiving environment (Erickson, Bodie, Gate, and Michel creeks) been influenced by SRF water treatment and/or calcite prevention (e.g. antiscalant) efforts?” In 2021, calcite in the receiving environment (Gate, Bodie, Erickson and Michel creeks) was largely similar to or lower than previous years (pre-EVO SRF P2) based on observations from the present study as well as the annual Regional Calcite Monitoring Program. Although calcite presence and concretion scores were high in Gate, Bodie, and Erickson Creek, calcite was low (CI <0.3) or not present in areas of Michel Creek. Based on monitoring results collected under the EVO LAEMP and under the Regional Calcite Monitoring Program, the SRF did not appear to influence calcite in the receiving environment of Gate, Bodie, Erickson or Michel creeks in 2021.

Table 7.1: Summary of Findings, Responses, and Adjustments Related to the EVO LAEMP, 2021

Key Question(s)	Data Evaluation Process	Outcome(s)	Responses & Adjustments in 2021	EMC Engagement
Study Question #1: Has temperature changed in the receiving environment of Erickson Creek as the result of SRF water treatment?	Comparison of temperature to pre-EVO SRF P2 results, guidelines, and/or literature (such as the optimal temperature for different WCT life stages).	Water temperatures increased below the EVO SRF outfall at RG_ERCKDT when compared to upstream temperatures at RG_ERCKUT, due to the heavy influence of groundwater in upstream areas of Erickson Creek (upstream temperatures are consistently 5°C). Regardless, maximum daily water temperatures at the confluence of Erickson Creek and Michel Creek, RG_ERCK, was largely within limits for WCT rearing and survival in 2021. Maximum daily temperature at RG_ERCK, with the exception of some results in September, met the SPO (which was initiated on August 13, 2021) .	Ongoing monitoring of temperature at RG_ERCK in 2022 will provide information regarding whether mitigation efforts during parts of the year are required.	EMC and other external stakeholders notified via email of localized elevated benthic invertebrate tissue selenium concentrations on March 25, 2022. Additional benthic invertebrate tissue sampling results from April provided to EMC on May 12, 2022. Preliminary 2021 data sent to EMC on May 13, 2022. Presentation with preliminary 2021 EVO LAEMP data discussed with EMC on May 17, 2022. Written input from ENV and KNC was May 31st and June 17th, respectively. 2021 EVO LAEMP report delivered to EMC by June 30, 2022. Updates to 2021-2023 EVO LAEMP study design by July 1st, 2022.
Study Question #2: Has calcite in the receiving environment (Erickson, Bodie, Gate, and Michel creeks) been influenced by SRF water treatment and/or calcite prevention (e.g. antiscalant) efforts?	Comparison of calcite index to regional normal range and future SPO, visual evaluation of temporal and spatial trends relative to reference and conditions pre-EVO SRF P2. Summarized in relationship to ongoing calcite work under the annual Regional Calcite Monitoring Program.	Calcite in Gate, Bodie, Erickson and Michel Creeks in 2021 were largely similar to or lower than pre-EVO SRF P2 based on observations from the present study and/or the annual Regional Calcite Monitoring Program. Although calcite presence and concretion scores were high in Gate, Bodie, and Erickson Creek (as based on the annual Regional Calcite Monitoring Program), calcite was low or not present in Michel Creek.	Further work with the annual calcite monitoring team to be understand differences in calcite scores for Erickson Creek in 2021 will take place in 2022.	
Study Question #3: Has SRF water treatment and/or calcite prevention (e.g. antiscalant) (a) decreased aqueous concentrations of selenium and nitrate and/or (b) changed other mine-related constituents in effluent and receiving environments (Erickson, Bodie, Gate, and Michel creeks)?	Comparison of water quality data to reference areas, regional and site-specific normal ranges, comparison to BCWQGs and EVWQP benchmarks (and interim screening values for total nickel). Statistical analysis of temporal trends over time and among years. Quarterly acute toxicity test at EV_ECOUT (RG_ERCKDT), EV_EC1 (RG_ERCK), EV_GT1 (RG_GATE), and EV_BC1 (RG_BOCK). Evaluation of chronic toxicity test results from EV_MC2 (RG_MICOMP) in comparison to pooled regional references and pre-EVO SRF P2 results.	Statistical analyses were completed for Order Constituents, constituents with early warning triggers under the AMP, and constituents with benchmarks and/or available guidelines (listed in Section 2.3.1). Aqueous concentrations of nutrients, (such as nitrate, phosphorus, and orthophosphate) and total selenium showed decreases below the SRF outfall (as well as other areas evaluated). Increases in selenite and organoselenium species, however, were observed below the SRF outfall as well, although these trends were largely localized to Erickson Creek. Concentrations of other mine-related constituents, namely nickel and uranium, also increased and above available water quality guidelines in Erickson Creek, but did not show the same trend in Gate, Bodie, or Michel Creeks. Areas evaluated in Erickson, Gate, Bodie, and Michel creeks showed no acute toxicity testing failures during 2021, and with the exception of a few algae chronic toxicity results (which have an associated degree of uncertainty due to suppressed cell yield throughout the study), chronic toxicity results suggested no adverse effects to test species at Michel Creek (RG_MICOMP).	Further investigation to understand the influence of the SRF (and water quality) and elevated benthic invertebrate tissue selenium concentrations through the AMP process (triggered by Sept 2021 results) and consideration of additional mitigation options is ongoing.	
Study Question #4: Have benthic invertebrate tissue selenium concentrations changed as a result of the SRF in Erickson, Bodie, Gate, and Michel creeks?	Comparison of benthic invertebrate tissue selenium concentrations to regional normal range and EVWQP benchmarks, statistical evaluation of temporal and spatial trends relative to reference.	Mean benthic invertebrate tissue selenium concentrations in Gate, Bodie, and upper portions of Erickson Creek (all of which are non-fish bearing) were above the Level 1 benchmark for effects to benthic invertebrates in 2021. These elevated concentrations represent increases in comparison pre-EVO SRF P2 for Gate and upper portions of Erickson Creek, but are similar to pre-EVO SRF P2 concentrations in Bodie Creek. Selenium concentrations in benthic invertebrates in each of these areas was not well predicted using the one-step model or the selenium speciation bioaccumulation tool suggesting that total selenium and/or selenium speciation is not the sole cause of elevated benthic invertebrate tissue selenium concentrations . Mean benthic invertebrate tissue selenium concentrations in Michel Creek were below benchmark, within the normal range, and similar to reference areas suggesting that effects are largely localized.	Further investigation to understand the influence of the SRF and elevated benthic invertebrate tissue selenium concentrations through the AMP process (triggered by Sept 2021 results) and consideration of additional mitigation options is ongoing.	
Study Question #5: Are there changes in the benthic invertebrate community in Erickson, Bodie, Gate, and Michel creeks associated with SRF treatment (including calcite prevention)?	Comparison of benthic invertebrate community endpoints to regional and site-specific normal ranges, visual evaluation of spatial and temporal trends relative to reference, and multivariate analyses. Comparison of biomass and density (as well as taxa-specific evaluation of these parameters) upstream and downstream of the SRF outfall in Erickson Creek (RG_ERCKUT and RG_ERCKDT) via Hess sampling.	BIC endpoints including taxa richness and % EPT were lower than reference and below regional and/or site-specific normal ranges at sites in Erickson Creek in 2021. Investigation of spatial and temporal trends indicated that these differences were either observed both up- and downstream of the SRF outfall and/or were observed prior to commissioning for EVO SRF P2. Multivariate analyses of BIC composition indicated that Erickson and mine-exposed Michel creek benthic invertebrate taxa occurrences were positively correlated with indicators of mine-related effects but relative BIC composition at all sites was consistent over the 2018 to 2021 sampling period as well as up- and downstream of SRF outfall locations. Overall, analyses suggest that observed changes in BIC in 2021 are unrelated to commissioning of the SRF. Increases in density (overall and taxa-specific) and to a lesser degree biomass were observed downstream of the SRF outfall in Erickson Creek when compared to above the SRF outfall. These increases are believed to be due to temperature increases below the outfall as nutrient concentrations have decreased with the commissioning of the SRF.	No response or adjustment required. Additional monitoring in 2022 will provide additional information in understanding the results observed in 2021.	
Study Question #6: Is SRF water treatment affecting indicators of productivity (e.g. phosphorus) in the receiving environment?	Collective evaluation of indicators that have the potential to affect productivity such as temperature (Study Question #1) and water quality (specifically nitrate, phosphorus, and orthophosphate; Study Question #2) were investigated and evaluated in relation to primary productivity (periphyton visual scores), and biomass and density of benthic invertebrates (via Hess sampling which is also part of Study Question #5).	Visual periphyton coverage as an indicator of changes in primary productivity did not show any trends associated with the SRF in 2021. Increases in benthic invertebrate productivity as evident in increases in density (overall and taxa-specific) and to a lesser degree biomass were observed downstream of the SRF outfall in Erickson Creek. These increases are unlikely due to increased nutrients in the receiving environment as decreased concentrations of nitrate, phosphorus, and orthophosphate were noted below the outfall of the SRF in Erickson Creek (as well as other evaluated study areas). Increases in temperature in comparison to pre-EVO SRF P2 were observed and are believed to be the cause of the elevated benthic invertebrate productivity in the area.	No response or adjustment required. Additional monitoring in 2022 will provide additional information in understanding the results observed in 2021.	

7.3 Study Question #3

The third study question of the EVO LAEMP Study Design is "Has SRF water treatment and/or calcite prevention (e.g. antiscalant) (a) decreased aqueous concentrations of selenium and nitrate and/or (b) changed other mine-related constituents in effluent and the receiving environment (Erickson, Bodie, Gate, and Michel creeks)?" The commissioning of the EVO SRF P2 has decreased concentrations of nitrate and selenium in the receiving environment of Erickson and Michel Creek as expected, and decreases in other constituents (phosphorus, orthophosphate, and barium) were also observed in Erickson Creek. Although decreases in concentrations of nitrate and selenium were also noted in Gate and Bodie creeks in 2021 when compared to previous years, this is more likely related to water management and not SRF operation (as limited discharge occurred in these areas in 2021). Although total selenium concentrations decreased in Erickson following the commissioning of the EVO SRF P2, both selenite and organoselenium species concentrations increased. A number of other mine-related constituents increased in the receiving environment downstream of the SRF outfall following commissioning of the EVO SRF P2, including total antimony, total boron, dissolved cadmium, dissolved cobalt, total iron, total manganese, total molybdenum, total nickel, total uranium, and total zinc. All of these constituents, with the exception of nickel and uranium in Erickson Creek, were below available water quality criteria in Erickson Creek. Increases in some of these constituents (such as total nickel) is likely due to higher concentrations present in *the in situ* water entrained in the SRF, which is expected to decrease over time. Additionally, acute toxicity (in areas of Erickson, Gate, Bodie, and Michel) and chronic toxicity testing (at the compliance point in Michel Creek) showed no adverse responses to either invertebrate and fish species after exposure to site water.

7.4 Study Question #4

The fourth study question of the EVO LAEMP Study Design is "Have benthic invertebrate tissue selenium concentrations changed as a result of the SRF in Erickson, Bodie, Gate, and Michel creeks?" Mean benthic invertebrate tissue (BIT) selenium concentrations in Gate, Bodie, and upper portions of Erickson Creek (below the SRF outfall) were above the Level 1 benchmark for effects to benthic invertebrates in 2021 and increased in comparison to pre-EVO SRF P2 for areas directly downstream of the outfall in Erickson Creek (as well as upstream of the settling pond in Gate Creek). In contrast, mean BIT selenium concentrations at the confluence of Erickson Creek and Michel Creek (RG_ERCK) and the study areas in Michel Creek were all below EVWQP benchmarks, within the normal range, and similar to reference areas. As discharge from the SRF was limited in Gate and Bodie Creek in 2021, the influence of the SRF on elevated BIT selenium concentrations is isolated to a small area directly below the SRF outfall in Erickson Creek.

Selenium concentrations in benthic invertebrates in these areas were not well predicted using the regional one-step water-to-invertebrate lotic selenium accumulation model or the selenium speciation bioaccumulation tool suggesting that aqueous total selenium and/or selenium speciation cannot fully explain the elevated BIT selenium concentrations in these areas. Additional investigations to better understand the cause of the elevated selenium concentrations in BIT are currently underway as part of an AMP response framework.

7.5 Study Question #5

The fifth study question of the EVO LAEMP Study Design is "Are there changes in the benthic invertebrate community in Erickson, Bodie, Gate, and Michel creeks associated with SRF treatment (including calcite prevention)?" BIC endpoints including taxa richness and % EPT were lower than reference and below regional and/or habitat-adjusted normal ranges at areas in Erickson Creek in 2021. Investigation of spatial and temporal trends indicated that these differences were either observed both up- and downstream of the SRF outfall (e.g., lower taxa richness and % EPT at both RG_ERCKUT and RG_ERCKDT) and/or were observed prior to commissioning for EVO SRF P2 (e.g., lower taxa richness at RG_ERCKUT; lower % EPT at RG_ERCK). Multivariate ordinations of BIC structure indicated that Erickson and mine-exposed Michel creek benthic invertebrate taxa occurrences were associated with higher concentrations of mine-related water quality constituents and calcite, but relative BIC composition at all areas was consistent over the 2018 to 2021 sampling period as well as up- and downstream of SRF outfall locations. Overall, while BIC effects were apparent in Erickson Creek, they were present prior to SRF commissioning and have not changed substantially over time, indicating minimal effects of the SRF.

7.6 Study Question #6

The last study question of the EVO LAEMP Study Design is "Is SRF water treatment affecting indicators of productivity (e.g. phosphorus) in the receiving environment?" Visual periphyton coverage as an indicator of changes in primary productivity did not show any patterns that could be attributed to the SRF in 2021. Higher benthic organism density (overall and taxa-specific) downstream of the SRF outfall compared to upstream in Erickson Creek suggested an increase in benthic invertebrate productivity associated with SRF operation but were not due to increased nutrients in the receiving environment as decreased concentrations of nitrate, phosphorus, and orthophosphate were noted below the outfall of the SRF in Erickson Creek (as well as other evaluated study areas). Increases in temperature in comparison to pre-EVO SRF P2 were observed and are believed to be the cause of the elevated benthic invertebrate productivity in the area.

7.7 AMP and Biological Triggers

The results from the EVO LAEMP provide information that supports Teck's Adaptive Management Plan (AMP; Teck 2021a) and Table 7.1 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 of the three mine-exposed areas evaluated (RG_ERCK, RG_MI3, and RG_MICOMP), only RG_ERCK had % EPT which corresponded to a biological trigger (i.e., % EPT was below the biological trigger; Table 7.2). However, low % EPT (i.e., below regional and habitat-adjusted normal ranges) has been observed at RG_ERCK since 2018 suggesting the trigger result is unrelated to EVO SRF P2. The cause of % EPT lower than the biological trigger has been assessed as part of Study Question #5 in the current report, and this area will continue to be assessed for biological triggers as part of the EVO LAEMP as well as the RAEMP. Other efforts are also currently underway, namely BIC predictive modeling, to resolve uncertainty around effects of mine-related stressors on benthic invertebrate community endpoints. Replicate BIT selenium samples from mine-exposed areas in Michel Creek had selenium concentrations that did not exceed the biological trigger, and results were consistent with observations in the EVO LAEMP report where mean concentrations were below benchmarks and within the normal range). Investigations under the AMP are currently underway to investigate the elevated BIT concentrations in Gate and Bodie Creek, as well as in Erickson Creek downstream of the SRF outfall. Further information regarding percent EPT and BIT selenium concentration biological triggers as it pertains to the EVO LAEMP can be found in Appendix G. Given that current biological triggers were sufficient to identify monitoring areas where biological responses are occurring, no additional triggers are recommended at this time. Additional work conducted in 2022, to better understand biological responses to SRF effluent, will be included in the AMP annual report (2023) and the 2023 annual EVO LAEMP report as well through ongoing external engagements.

Table 7.2: Summary of Biological Trigger Analysis for Percent EPT and Selenium Benthic Invertebrate Tissue, EVO LAEMP, 2021

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]
Erickson Creek	RG_ERCK	Reference	1	100	4	0
Gate Creek	RG_GATE	Mine-exposed	-	-	3	100
Bodie Creek	RG_BOCK		-	-	6	100
Michel Creek	RG_MI3		3	0	3	0
	RG_MICOMP		5	0	5	0

Notes: % EPT = percent 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 September sampling event.

[b] Biological Trigger analysis for Selenium BIT was for the August (RG_BOCK), September (RG_ERCK, RG_BOCK, RG_MI3, RG_MICOMP), and December sampling events (RG_ERCK).

[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 Appendix G for further 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 Appendix G for further details.

8 UPDATES TO 2021 TO 2023 EVO LAEMP STUDY DESIGN

Section 8.3.5 of Permit 107517 outlines the LAEMP requirements for any changes to the approved 2021 to 2023 study design as follows:

> The permittee must notify the director at 15 days prior to implementing any proposed changes to the approved LAEMP. Any changes to the approved study design must be reported in the annual LAEMP report.

Several adjustments to the approved EVO LAEMP 2021 to 2023 study design are proposed below based on learnings from the 2021 LAEMP monitoring and reporting cycle, input from the EMC, and monitoring needs associated with the EVO SRF P2:

1. **Adjustment: Relocation of EV_ECOUT Station.** Field observations indicated incomplete mixing of EVO SRF P2 effluent and non-treated Erickson Creek water at the current EV_ECOUT location (which is 10 meters below the EVO SRF outfall). Additional investigations using nitrate as a surrogate was conducted during high flow conditions to measure mixing conditions of water being discharged from the SRF outfall and overflow Erickson Creek water bypassing treatment. This investigation confirmed field observations as nitrate was substantially lower on the right side of the downstream bank (i.e. which is on the same side as the SRF outfall and thus receives a higher proportion of flow from the SRF) than the left side of the downstream bank. Investigations were also conducted further downstream to determine the closest area downstream of the outfall which had more homogenous water conditions throughout the transect. These investigations suggested that conditions approximately 60 meters downstream of the outfall provide a more representative water sample for the area which is imperative for accurately addressing exposure to potential effect to biota. Per discussion with the EMC, a technical memo regarding these findings as well as additional supporting information is provided as part of the EVO LAEMP report (see Appendix I).

2. **Adjustment: Discontinue BIC Sampling in Gate and Bodie Creek.** As per the 2021-2023 EVO LAEMP study design (and agreed upon with the EMC; Minnow 2021b), benthic invertebrate community and calcite index (which is conducted as part of CABIN protocols) were not evaluated in 2021 at RG_GATEDP, as this area lacked riffle habitat. During September sampling, similar conditions were noted at RG_BOCK and RG_GATE. As noted in the CABIN protocol (Environment Canada 2012a):

> *"The habitat type where invertebrate samples are collected in CABIN is the erosional zone (riffle, straight run, or rapid). A reach that does not have a well-established riffle or straight run should not be used for CABIN sampling."*

The purposes of the benthic invertebrate community sampling for the EVO LAEMP is to (1) understand the influence of the SRF on these communities, and (2) understand how these communities relate to other areas in the Elk Valley (either reference areas or other mine-exposed areas). Overall, the evaluation of benthic invertebrate communities in these areas to answer these questions is confounded for a number of reasons: (1) discharge in these areas did not occur in 2021 in comparison to the past (change in habitat and flow); (2) systems are anthropogenic in nature and lack riffle-run-pool characteristics (more comparable to drainage ditches or constructed discharge channels than creeks); and (3) a limited area for effective sampling with replication. While selenium concentrations in benthic invertebrate tissue will continue to be monitored at RG_GATE, RG_BOCK, and RG_GATEDP, we propose that benthic invertebrate community is not evaluated at these areas moving forward. Photos of these areas in 2021 can be found in Appendix Figure E.1.

3. **Adjustment: Pairing of Water Quality Stations: F2_ECIN and RG_ERCKUT.** On December 7th, 2022, Teck Coal Limited (Teck) submitted a request to ENV to revise the approval for the study design on the basis that the routine water quality station F2_ECIN (water collected from the Erickson Creek intake) is representative of RG_ERCKUT water quality. Following a review of advice from the Environmental Monitoring Committee (EMC), the Ktunaxa Nation Council (KNC), and Teck's responses to the EMC, the revised Study Design approval was issued by ENV on March 4th, 2022, but required, as one of its conditions, a statistical comparison of water quality between RG_ERCKUT and F2_ECIN to determine if F2_ECIN is a suitable surrogate for monthly water quality monitoring at RG_ERCKUT (BCMOECC 2022). Overall, results of the statistical analysis comparing water quality at RG_ERCKUT and F2_ECIN revealed very few significant differences in water quality constituents between these areas using two different data analysis approaches. For constituents that differed, where concentration at F2_ECIN was higher, this could provide a conservative representation of conditions at RG_ERCKUT. Where the concentration was lower at F2_ECIN, the difference in nearly all cases was relatively small. Collectively, this suggests that the F2_ECIN routine water quality sampling location is reflective of water quality conditions at RG_ERCKUT and would act as a suitable surrogate for water quality sampling at RG_ERCKUT for the 2021 to 2023 EVO LAEMP. Per discussion with EMC a technical memo regarding these results is provided as part of the EVO LAEMP report (see Appendix J).

4. **Adjustment: Additional Erickson Creek Bryophyte Coverage Monitoring.** As noted in Section 5, the current EVO LAEMP study design evaluates changes in periphyton coverage as a means to understand changes in productivity to primary producers. While visual periphyton coverage maybe appropriate in Gate Creek, Bodie Creek, and Michel Creek, the high prevalence of bryophytes in Erickson Creek (and the corresponding low presence of periphyton in these areas) suggests that additional investigations of bryophyte coverage in subsequent sampling events is warranted to better understand the influence of the SRF on primary productivity. Bryophytes coverage has been evaluated in past monitoring programs in the Elk Valley and similar protocols will be utilized as part of the 2022 monitoring efforts (Minnow 2018c).

The above updates to the 2021-2023 EVO LAEMP study design reflect discussions between the study team and the EMC during the May 17th, 2022, EMC meeting and the subsequent advice table provided to the study team from the EMC.

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APPENDIX A
DATA ANALYSIS

A1 DATA ANALYSIS

A1.1 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. Data extracted from Teck's EQuIS database were screened for text values and converted to a common unit (all metal concentrations were converted to mg/L, except for total and dissolved cadmium, dissolved cobalt, total nickel, total selenium which were stored as µg/L).

Water quality data for select constituents reported was screened against BCWQG (BCMOECSS 2021a,b), interim screening values (Golder 2017), and EVWQP Water Quality Benchmarks (Teck 2014; Table A.1). These select constituents included Order constituents (i.e., nitrate, sulphate, total selenium, and dissolved cadmium), nutrients (i.e., nitrate, nitrite, ammonia, total phosphorus, and orthophosphate), and analytes with early warning triggers under the AMP ([i.e., total dissolved solids, sulphate, total concentrations of antimony, barium, boron, lithium, manganese, molybdenum, nickel, selenium, uranium, and zinc, and dissolved concentrations of cadmium and cobalt]). Constituent concentrations relative to BCWQG, EVWQP Water Quality Benchmarks (where applicable), or interim screening values (total nickel only) were plotted over time (when historical data was available) for each water quality station, or biological monitoring area if a water quality station was not available, to aid in visual assessment of the data.

Constituents that were expected to decrease (i.e., nitrate and selenium) or increase (i.e., nickel) with SRF treatment and those that showed increases/decreases based upon on the visual analysis noted above were further analyzed to determine if the trend was significant.

Specifically, a censored regression ANOVA was conducted to determine temporal changes in constituent concentrations between pre- (2021) and post- EVO SRF P2 commissioning for the years of 2012 to 2021. The censored regression ANOVA models assumed a log-normal distribution of the response variable and were fit using maximum likelihood estimation. The significance of each term in the model was assessed using likelihood-ratio tests to determine if there was a significant change in log-likelihood with the addition of each term in the model, utilizing an $\alpha = 0.05$ for all tests. Constituent results for each monitoring area were also plotted as monthly mean concentrations and compared visually to support the temporal evaluations of water quality.

Table A.1: British Columbia Water Quality Guidelines (BCWQG), Site-Specific Elk Valley Water Quality Plan (EVWQP) Benchmarks, and Interim Screening Values for Parameters Assessed in EVO LAEMP, 2021

Group	Subgroup	Variable	Units	British Columbia Water Quality Guidelines[a] Long-term Average	Short-term Maximum	Year	Status	Site-Specific Benchmark[b]
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 as N	mg/L	3	33	2009	Approved	Level 1 EVWQP benchmark= $10^{1.0003[\log(hardness)]-1.52}$ Maximum applicable hardness = 500 mg/L Level 2 EVWQP benchmark= $10^{1.0003[\log(hardness)]-1.38}$ Maximum applicable hardness = 500 mg/L
		Nitrite as 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 = 1,000
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	µg/L	4	110	2004	Approved	-
		Iron	mg/L	-	1	2008	Approved	-
		Lead[g]	mg/L	For hardness ≤ 8 mg/L, none proposed For hardness 8 to 360 mg/L, BCWQG = 0.001×{3.31+ exp[1.273 × ln(hardness) - 4.704]} No more than 20% of samples in a 30-d period should be >1.5X the guideline. Maximum applicable hardness = 360 mg/L	For hardness ≤ 8 mg/L, BCWQG ≤ 0.003 For hardness 8 to 360 mg/L, BCWQG = 0.001×{exp[1.273 × ln(hardness) - 1.460]} Maximum applicable hardness = 360 mg/L	1987	Approved	-
		Manganese[g]	mg/L	For hardness 37 to 450 mg/L, BCWQG ≤ 0.004 × hardness + 0.605 Maximum applicable hardness = 450 mg/L	For hardness 25 to 259 mg/L, BCWQG ≤ 0.01102 × hardness + 0.54 Maximum applicable hardness = 259 mg/L	2001	Approved	-
		Mercury[i]	mg/L	MeHg ≤ 0.5% of THg, BCWQG = 0.00002 Else, BCWQG = [0.0001/(MeHg/THg)] OR When MeHg = 0.5% of THg, BCWQG= 0.00002 When MeHg = 1.0% of THg, BCWQG = 0.00001 When MeHg = 8.0% of THg, BCWQG= 0.00000125	-	2001	Approved	-
		Molybdenum	mg/L	7.6	46	2021	Approved	-
		Nickel	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	-
	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 = $10^{0.83(\log(hardness))-2.53}$ 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	-

Notes: "-" = no data available. The EVWQP Level 1 Benchmark for Nitrate is consistent with the longer term BCWQG.

[a] British Columbia Working (BCMOECCS 2021a) or Accepted (BCMOECCS 2021b) Water Quality Guidelines for the Protection of Aquatic Life. For guidelines dependent on other analytes (e.g., hardness), guidelines were screened using concurrent values.

[b] When appropriate, site-specific Elk Valley Water Quality Plan Benchmarks (EVWQP; Teck 2014) or interim screening values were applied in addition to or instead of BC water quality guidelines. Interim screening values are displayed for nickel (Golder 2017b).

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

[d] Dependent on concurrent chloride, range of values reported (BCMOECCS 2021b).

[e] Dissolved oxygen guidelines represent a minimum value, and so exceedances were quantified below this guideline.

[f] Unrestricted change permitted within this pH range.

[g] For hardness-based guidelines, concurrent hardness values were used for calculating guidelines. If hardness values exceeding the maximum applicable hardness, then guidelines were determined using the maximum applicable hardness. If hardness values is lower than the minimum hardness, then guidelines were determined using the minimum hardness.

[h] Chromium(VI) is the dominant oxidation state in oxygenated environments, and so its guideline was applied.

[i] The most conservative guideline (0.00000125 mg/L) was applied.

The percentage of data below the laboratory reporting limit (LRL) in both the mine-exposed and reference areas determined the specific approach of the ANOVA model: (i) a relative change model was used when the percent LRL was less than 80% for both the exposed and reference area, or (ii) a temporal change model was used when the reference area % LRL was greater than 80%, but the mine-exposed was not. If both the exposed and reference area were above 80 % LRL no tests were conducted. Post-hoc comparisons for both approaches were corrected for the number of comparisons using Tukey's Honestly Significant Differences (HSD) method. January and February data were excluded from the analyses because there were no EVO SFR P2 data for these months.

The relative change model was used to quantify temporal changes at the mine-exposed area relative to concentrations at the reference area (CM_MC1 [RG_MI25]) and included terms for month (Month), before and after EVO SRF P2 (BA), exposed or reference areas (CI), year nested in BA (Year[BA]), and the interaction terms BA x CI, and Year(BA) x CI.

The analysis proceeded by first assessing the significance of the Year(BA) x CI interaction term. A significant interaction with year suggested a before-after affect that was dependent on the years being compared and a p*ost-hoc* test comparing the relative differences in 2021 to the differences in all pre EVO SRF P2 years was conducted. A magnitude of difference for significant post-hoc comparisons was calculated as:

$$MOD = \frac{\left(Observed_{Exposed\ 2021} - Predicted_{Exposed\ 2021}\right)}{Predicted_{Exposed\ 2021}} \times 100\%$$

where the predicted concentration was calculated as:

$$Predicted_{Exposed\ 2021} = \left(Observed_{Reference\ 2021} + \ Observed_{Exposed\ yeari} - Observed_{Reference\ yeari}\right)$$

and $year_i$ was the earlier year before SFR2 commissioning. All concentrations used in the calculation were estimated marginal means from the ANOVA model. If the Year(BA) x CI was not significant the BA x CI term was assessed with a significant term suggesting an overall before-after effect and a magnitude of difference (MOD) was calculated as:

$$MOD = \frac{\left(Observed_{Exposed\ SRF2} - Predicted_{ExposedPre}\right)}{Predicted_{ExposedPre}} \times 100\%$$

where the predicted concentration was calculated as:

$$Observed_{Exposed\ SRF2} = \left(Observed_{Reference\ SRF2} + \ Observed_{ExposedPre} - Observed_{ReferencePre}\right)$$

All concentrations were estimated marginal means from the ANOVA model. If neither of the BA interaction terms were significant it suggested that there have not been any changes in concentrations relative to the reference area since the EVO SRF P2 commissioning.

When the censoring at the reference area did not allow for use of the relative change model, a simplified temporal change model was used for the mine exposed area and included terms for month (Month), before and after EVO SRF P2 (BA), and year nested in BA (Year[BA]). A significant Year(BA) term suggested differences in concentrations in years proceeding EVO SRF P2 and post-hoc tests comparing concentrations in 2021 to the concentrations in all pre-EVO SRF P2 years were conducted. A magnitude of difference for significant post-hoc comparisons was calculated as:

$$MOD = \frac{\left(MCT_{2021} - MCT_{yeari}\right)}{MCT_{2021}} \times 100\%$$

, where the measure of central tendency (MCT) were estimated marginal means from the ANOVA model. When the Year(BA) was not significant, the BA term was assessed and an MOD was calculated for EVO SRF P2 relative to the combined pre-EVO SRF P2 years when significant.

A1.2 Benthic Invertebrate Tissue (BIT) Selenium

Selenium concentrations measured in benthic invertebrate tissue were plotted over time (including those prior to commissioning the SRF; Minnow 2020a, 2021a) relative to corresponding EVWQP effect benchmarks (Teck 2014; Table A.2) as well as the regional normal ranges[1] for tissue selenium concentrations defined in the RAEMP (Minnow 2020b).

Potential changes in benthic invertebrate composite-taxa selenium concentrations pre- and post- initiation of the SRF were assessed using an ANOVA model with post-hoc contrasts. A *p*-value of 0.05 was used to test for statistical significance. Similarly, spatial differences in benthic invertebrate composite-taxa selenium concentrations were tested among areas using a before-after-control-impact ANOVA with post hoc contrasts. Models compared each mine-exposed area each reference area (RG_ALUSM and RG_MI25) using the same approach as for the relative change model described in section A1.1. Single replicates were present in past evaluations, including sampling in areas: RG_ERCK, RG_GATE, RG_BOCK, RG_MIDGA, and RG_MIDBO (Minnow 2020a, 2021a). Similar to the RAEMP (Minnow 2020b), variability for results in these circumstances were estimated based on monitoring areas and years where

[1] The regional reference normal range (i.e., 1.41 mg/kg dw to 7.79 mg/kg dw) as presented in the RAEMP represents the 2.5th and 97.5th percentiles of reference area data from 1996 to 2019 (Minnow 2020b).

Table A.2: Selenium Benchmarks for Benthic Invertebrate Tissues in the Elk Valley

Tissue Type	Benchmark			Source
	Value (µg/g dw)	Type	Description	
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	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)

Note: µg/g dw = micrograms per gram dry weight.

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

replicates were collected, with the result of that area (i.e., the value of the single replicate) assumed to represent the mean.

Composite-taxa benthic invertebrate tissue selenium results from September 2012 to December 2021 were plotted relative to total selenium concentrations measured in water samples collected at or near the same time (within approximately three days) and location as the tissue samples. A line representing the regional one-step water-to-invertebrate selenium bioaccumulation model was also presented on the plot (Golder 2020b, 2021c). Prediction intervals (95% percentile) for the model were calculated using the formula below (as described in Whitmore 1986):

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

where:

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

Teck has also developed a selenium speciation bioaccumulation tool (B-tool) to help predict and interpret bioaccumulation in areas with detectable organoselenium species (deBruyn and Luoma 2021). For every 2021 biological sampling event, predicted benthic invertebrate tissue selenium concentrations were generated from water quality data (specifically, selenium speciation data and sulphate concentrations) using this bioaccumulation tool and presented alongside field-measured tissue concentrations.

For both the bioaccumulation model and the b-tool a typical range for the relationship between the observed and predicted values was developed for the Elk Valley using a linear mixed-model approach. Specifically, all tissue samples collected in the Elk Valley (Appendix Figure A.1) were matched with a water sample collected at the same station within a five-day buffer. Using this dataset the relationship between the observed-to-predicted concentrations were modelled using a mixed-model with a random intercept term for area and a 95% prediction interval was estimated using the *predictInterval* function in R (R Core Team 2022). Values outside this range can be view as being outside the typical range for this relationship.

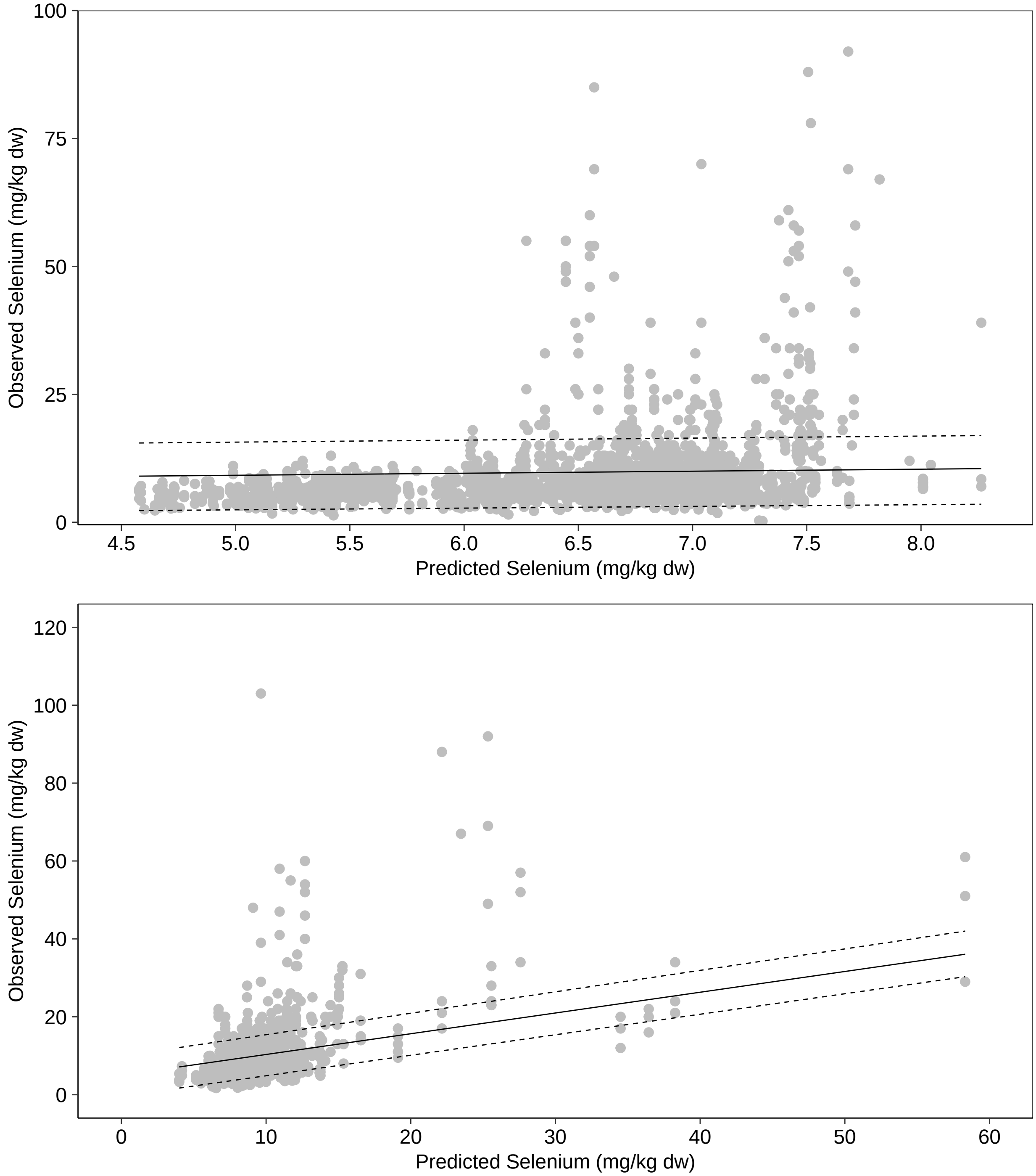

Figure A.1: Observed and Predicted Selenium Concentrations in Benthic Invertebrate Composite Samples for the One Step Bioaccumulation Model (Top) and B−tool Model (Bottom)

Notes: Predicted benthic invertebrate selenium concentrations were estimated using a one−step water to benthic invertebrate selenium accumulation model (Golder 2020c) in the top plot and using the speciation bioaccumulation tool to predict bioaccumulation in areas with detectable organoselenium species (deBruyn and Luoma 2021) in the bottom plot. Mean (solid line) and 95% prediction intervals (dashed lines) are shown for a linear mixed−model of observed to predicted concentrations for Elk Valley samples (2012 to 2021) for each respective relationship. Only water data collected with ± 5 days with tissue samples at each biological area were included in the plots and analysis.

A1.3 Hess Sampling (Density, Biomass, and Community)

To understand the influence of the SRF on productivity measures of biomass and density of benthic invertebrates were evaluated (as well as evaluations of periphyton coverage and water quality as discussed in earlier sections). Overall biomass and density of benthic invertebrates as well as taxa-specific measures (specifically EPT, Ephemeroptera alone, Plectoptera alone, Trichoptera alone, and Chironomidae alone) of these endpoints, determined via Hess sampling, were converted to number of organisms per square metre based on the area sampled. A spatial comparison between areas upstream (RG_ERCKUT) and downstream (RG_ERCKDT) of SRF water treatment were conducted using a Student's t-test, with $\alpha = 0.1$. When the assumption of normality was met, but homogeneity of variance was not, a t-test with unequal variance was used (Ruxton 2006). In instances where normality could not be achieved through data transformation, the non-parametric Mann-Whitney U-test was used. Statistical comparisons were conducted using R (R Core Team 2022). A magnitude of difference (MOD) was calculated for each endpoint as:

$$MOD = \frac{\left(MCT_{Downstream} - MCT_{Upstream}\right)}{SD_{Upstream}} \times 100\%$$

, where the measures of central tendency (MCT) were means (untransformed) or geometric means ($\log_{10}$ transformed) and the SD was standard deviation. The MOD calculations were conducted on the transformed scale when the data were transformed for analysis. When the Mann-Whitney test was used, the MOD was estimated using median values instead of means, and the Median Absolute Deviations (MAD) instead of SD.

A1.4 CABIN Sampling (Community)

Benthic invertebrate community structure was assessed using multivariate ordination techniques including correspondence analysis (CA) and canonical correspondence analysis (CCA). These techniques create synthetic species abundance axes extracted in a sequential manner. In CA, each score (number) on a CA axis is the sum of a weighted vector of species abundances. Species with correlated abundances vary together and have similar weights and scores on a CA axis. When depicted in two-dimensional plots, taxa that tend to co-occur plot together, while those that rarely co-occur plot farther apart. Similarly, areas sharing many taxa plot closest to one another, while those with little in common plot furthest apart. The greatest variation among either taxa or areas is explained by the first axis, with other axes accounting for progressively less variation. Therefore, this type of multivariate analysis describes not only which areas have distinct benthic communities, but also how these benthic communities differ among areas (i.e., which particular taxa differ in abundance).

In CCA, the analysis is taken a step further to look at relationships between the assemblages of species and their environment. The CCA constrained CA axes by a suite of predictor variables by applying a multivariate multiple regression to the CA axis. This resulted in a set of new CCA axes that were linear combinations of predictor variables that explained a subset of variation of the original CA. The scores for environmental variables on each CCA represent the relationship of the variable with the axis such that the position of species and site scores in the ordination plot indicate their association with environmental variables. Two separate CCA analyses were completed for sampling years with available environmental data (i.e., 2018 to 2021), using different suites of constraining environmental variables: one using water chemistry and calcite variables (i.e., nutrients, metals, TDS, alkalinity, and calcite presence and concretion) and another using habitat variables (i.e., watershed and station gradient, watershed area, stream depth, width, and velocity, and substrate size and embeddedness). Habitat variables used in the development of the BIC predictive models (and their transformation; Minnow 2020b) were selected for inclusion in the CCA model with some redundant variables removed through best professional judgement. Key constituents of concern were considered for inclusion from concurrent water data, and only constituents with fewer than 15% of observations below the detection limit were considered. The Variance Inflation Factor (VIF) of the final variables were all below 20 indicating the variable coefficients were not strongly inflated by the presence of correlation among explanatory variables (i.e., no multicollinearity).

Prior to CA and CCA, the BIC data were $\ln_{(x+1)}$ transformed and screened for rare taxa, as these can distort results. Taxa occurring in fewer than 10% of samples and constituting less than 1% of the total organism abundance, were excluded from the analysis. Water quality variables were log10 transformed, and values below reporting limits were substituted at the reporting limit. Scores for both taxa and areas were calculated using the vegan package (Oksanen et al. 2022) in R (R Core Team 2022) to evaluate the associations of organisms and stations.

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APPENDIX B

DATA QUALITY REVIEW

APPENDIX B DATA QUALITY REVIEW

B1 INTRODUCTION

B1.1 Background

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

B1.2 Quality Control Samples

A DQR was conducted on all laboratory data collected as part of the 2021 Elkview Operations (EVO) Local Aquatic Effects Monitoring Program (LAEMP). The objective of a DQR is to define the overall quality of the data presented in the report, and, by extension, the confidence with which the data can be used to derive conclusions. A DQR involves the examination of analytical results associated with several types of Quality Control (QC) samples collected or

Table B.1: Laboratory Data Quality Objectives for the EVO LAEMP, 2021

Quality Control Measure	Quality Control Sample Type	Study Component				
		Water Chemistry	Selenium Speciation	Sediment Chemistry	Benthic Invertebrate Community	Benthic Invertebrate Tissue Chemistry
		ALS Environmental	Brooks Applied Labs	ALS	Cordillera Consulting	TrichAnalytics
Analytical Laboratory LRLs	Comparison of actual LRL versus target LRL	LRL for each parameter should be at least as low as applicable guidelines, benchmarks, and screening values	LRL for each parameter should be at least as low as applicable guidelines, 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, Trip, or Laboratory Blank	Concentrations measured in blank samples should be < LRL	Concentrations measured in blank samples should be < LRL	Concentrations measured in blank samples should be < LRL	-	-
Laboratory Precision	Laboratory Duplicates	<4% (pH) <10% (conductivity) ≤15% RPD or <2x LRL (ORP, turbidity) ≤20% RPD or <2x LRL (all remaining analytes)	≤25% RPD (selenium species) ≤20% RPD (total selenium)	0.2 (pH) ≤5% to 25% RPD (particle size) ≤20% RPD (inorganic and total carbon, moisture) ≤30% RPD (all remaining analytes) ≤40% RPD (aluminum, barium, lead, mercury, molybdenum, potassium, silver, sodium, strontium, tin, titanium) ≤50% RPD (PAHs)	-	≤60% RPD (calcium and strontium) ≤40% RPD (all remaining analytes)
	Organism Sorting Efficiency	-	-	-	≥ 95%	-
	Organism Sub-Sampling Precision and Accuracy	-	-	-	<20% between subsamples	-
Accuracy	Recovery of Blank Spike	-	75% to 125% (methylseleninic acid, selenate, selenite, selenocyanate, selenomethionine, total selenium)	-	-	-
	Recovery of Matrix Spike	70% to 130% (TKN, orthophosphate, phosphorus, TOC, DOC, total and dissolved metals) 75% to 125% (ammonia, bromide, chloride, fluoride, nitrate, nitrite, sulphate)	75% to 125% (selenate, selenite, selenocyanate, selenomethionine, total selenium)	-	-	-
	Matrix Spike Duplicate	-	75% to 125% (selenate, selenite, selenocyanate, selenomethionine, total selenium)		-	-
	Recovery of Certified Reference Material	-	75% to 125% (total selenium)	0.15 mg/kg to 0.55 mg/kg (Se) 0.16 mg/kg to 0.36 mg/kg (Ag) 0.2 mg/kg to 4.2 mg/kg (Sn) 1 mg/kg to 2 mg/kg (W) 70% to 130% (all other metals) 7.7 to 8.3 pH units (pH) 50% to 130% (Naphthalene) 80% to 120% (Inorganic Carbon, Total Carbon) 60% to 130% (all other PAHs) 0% to 26.5% (particle size)	-	60% to 140% (antimony, barium, boron, silver, tin, titanium) 90% to 110% (selenium) 70% to 130% (all remaining analytes)
	Recovery of Surrogate	-	-	60% to 130% (d10-acenaphthene, d12-chrysene, d8-naphthalene, d10-phenanthrene)	-	-
	Laboratory Control Sample	6.9 to 7.1 (pH) 75% to 125% (TKN) 80% to 120% (orthophosphate, phosphorus, DOC, TOC, total and dissolved metals) 85% to 115% (acidity, alkalinity, ammonia, bromide, TDS, TSS, turbidity) 90% to 110% (conductivity, chloride, fluoride, nitrate, nitrite, sulphate) 95.4% to 104% (ORP)	-	0 to 26.5 (particle size) 60% to 130% (PAHs) 80% to 120% (inorganic carbon, total carbon) 7.4 to 8 (pH 1:2 soil:water)	-	-
	Taxonomic Accuracy	-	-	-	<5% TIR	-

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

prepared in the field and laboratory. General QC samples collected for this project include the following:

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

the analytical method is accurate in a purified reference sample. The results are reported as the percent of the known concentration that was recovered in the analysis.

- **Laboratory Sorting Duplicates** are randomly selected grabs of the initially sorted community material. These samples are recounted and the number of invertebrates that were not recovered during the initial sort was determined. In order to reduce bias, recounting is conducted by an analyst uninvolved in the initial sample processing. This check is performed on 10% of samples and determines the accuracy through assessment of recovery (sorting) efficiency and quantifies any under-estimation of organism enumeration.
- **Taxonomic Quality Control Samples** are a randomly selected portion of a benthic invertebrate community field sample to be assessed by the laboratory using an internal quality control audit. A blind re-enumeration and re-identification of random samples is performed by an analyst uninvolved in the original sample processing. This assessment quantifies taxonomic misidentification among laboratory analysts and ensures accurate organism identities are reported.
- **Laboratory Subsamples** are community samples prepared by the laboratory to ensure that the fraction of the total sample examined was an accurate representation of the total number of organisms. By comparing the amount recovered between at least two sub-samples, one can assess the analytical precision. In addition, comparisons of the sub-samples from the whole community sample allows for an evaluation of sub-sampling accuracy.

B2 WATER CHEMISTRY

B2.1 Laboratory Reporting Limits

The analytical reports for water chemistry from ALS Environmental (ALS; Appendix H) and Brooks Applied Labs (BAL; Appendix H) were examined to assess LRLs relative to analyte concentrations and applicable guidelines (Tables B.2 and B.3). Water quality data from 2021 were entered directly into Teck's EQuIS database and thus were assessed as part of Teck's annual water quality reporting for 2021. The LRLs for water quality analytes were assessed relative to British Columbia Water Quality Guidelines (BC WQG; BCMOECCS 2021a, BCMOECCS 2021b) for the protection of freshwater aquatic life, Elk Valley Water Quality Plan (EVWQP) benchmarks, screening values for water quality (Teck 2014), and relevant site-specific benchmarks. Several analytes were reported at concentrations below the LRL in 100% of samples (Tables B.2 and B.3). For those analytes with one or more result(s) below the LRL, achieved LRLs were consistently lower than the BC WQG, EVWQP benchmarks, and screening values for water quality, if relevant guidelines exist. Therefore, the achieved LRLs were appropriate for this study.

B2.2 Laboratory and Field Blanks

A total of 133 method blank (MB) samples were analyzed in the ALS laboratory reports for water chemistry (Appendix H). Of the 693 reported method blank results, only one result did not meet the laboratory DQO (total arsenic, see laboratory report CG210419). The above MB result for total arsenic caused the LRL to be adjusted in total arsenic samples in laboratory report CG2104194 that were below five-times the MB result concentration. Total arsenic concentrations in the two water samples analyzed in the above laboratory report were below detection, possibly due to the adjusted LRL. Overall, as only 0.14% of MB samples did not meet the laboratory DQO and all MB results for analytes of concern met the laboratory DQO, these results do not suggest significant laboratory contamination.

A total of 41 MB samples were analyzed in the BAL laboratory reports (Appendix H). Of the 177 reported method blank results, seven had detectable concentrations: total selenium in four blank samples and selenite in three blank samples (see laboratory reports 2109233 and 2109308 in Appendix H). For all 12 of the above results, concentrations were below the LRL despite exceeding the method detection limit, and so met the DQO. Therefore, all BAL MB samples met the laboratory DQO.

Table B.2: Laboratory Reporting Limit (LRL) Evaluation for Water Chemistry Analyses, EVO LAEMP, 2021

Parameter	Units	BC WQG[a]		EVWQP Level 1 Benchmarks/ Relevant Screening Values[b]	Range of LRLs	No. LRLs > Guideline[c]	No. Sample Results <LRL
		Long-term	Short-term				
Physical Tests							
Total Suspended Solids	mg/L	-	-	-	1	-	6 (30.0%)
Turbidity	NTU	-	-	-	0.1	-	1 (5.00%)
Anions and Nutrients							
Acidity (as $CaCO_3$)	mg/L	-	-	-	2	-	15 (75.0%)
Alkalinity, Carbonate (as CO_3)	mg/L	-	-	-	1	-	8 (40.0%)
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	-	-	-	1	-	8 (40.0%)
Alkalinity, Hydroxide (as $CaCO_3$)	mg/L	-	-	-	1	-	20 (100%)
Alkalinity, Hydroxide (as OH)	mg/L	-	-	-	1	-	20 (100%)
Bromide	mg/L	-	-	-	0.25	-	20 (100%)
Fluoride	mg/L	-	1.52	-	0.1	0	1 (5.00%)
Ammonia, Total (as N)[d]	mg/L	0.102	0.752	-	0.005	0	5 (25.0%)
Nitrite (as N)	mg/L	0.02	0.06	-	0.005	0	11 (55.0%)
Total Kjeldahl Nitrogen	mg/L	-	-	-	0.05	-	8 (40.0%)
Orthophosphate	mg/L	-	-	-	0.001	-	6 (30.0%)
Phosphorus - Total	mg/L	-	-	-	0.002 to 0.01	-	1 (5.00%)
Total Metals							
Aluminum	mg/L	-	-	-	0.003	-	7 (35.0%)
Antimony	mg/L	0.009	-	-	0.0001	0	6 (30.0%)
Arsenic	mg/L	-	0.005	-	0.0001 to 0.0004	0	2 (10.0%)
Beryllium	µg/L	0.13	-	-	0.02	0	20 (100%)
Bismuth	mg/L	-	-	-	0.00005	-	20 (100%)
Boron	mg/L	1.2	-	-	0.01	0	4 (20.0%)
Chromium[e]	mg/L	0.001	-	-	0.0001	0	4 (20.0%)
Cobalt	µg/L	4	110	-	0.1	0	12 (60.0%)
Copper	mg/L	-	-	-	0.0005	-	20 (100%)
Iron	mg/L	-	1	-	0.01	0	10 (50.0%)
Lead[g]	mg/L	0.0091	0.149	-	0.00005	0	18 (90.0%)
Manganese[f]	mg/L	1.31	2.3	-	0.0001	0	3 (15.0%)
Mercury[g]	µg/L	0.00125	-	-	0.0005 to 0.5	0	16 (80.0%)
Nickel[f]	mg/L	0.137	-	0.0053	0.0005	0	3 (15.0%)
Silver[f]	mg/L	0.0015	0.003	-	0.00001	0	20 (100%)
Thallium	mg/L	0.0008	-	-	0.00001	0	12 (60.0%)
Tin	mg/L	-	-	-	0.0001	-	20 (100%)
Titanium	mg/L	-	-	-	0.0003	-	17 (85.0%)
Vanadium	mg/L	-	-	-	0.0005	-	19 (95.0%)
Zinc[f]	mg/L	0.06	0.0855	-	0.003	0	15 (75.0%)
Dissolved Metals							
Aluminum[h]	mg/L	0.05	0.1	-	0.001	0	16 (80.0%)
Antimony	mg/L	-	-	-	0.0001	-	5 (25.0%)
Beryllium	µg/L	-	-	-	0.02	-	20 (100%)
Bismuth	mg/L	-	-	-	0.00005	-	14 (100%)
Boron	mg/L	-	-	-	0.01	-	2 (14.3%)
Cadmium[f]	µg/L	0.299	0.954	0.199	0.005	0	1 (5.00%)
Chromium	mg/L	-	-	-	0.0001	-	4 (20.0%)
Cobalt	µg/L	-	-	-	0.1	-	10 (71.4%)
Copper	mg/L	-	-	-	0.0002	-	17 (85.0%)
Iron	mg/L	-	0.35	-	0.01	0	19 (95.0%)
Lead	mg/L	-	-	-	0.00005	-	14 (100%)
Manganese	mg/L	-	-	-	0.0001	-	3 (15.0%)
Mercury	µg/L	-	-	-	0.000005	-	20 (100%)
Nickel	mg/L	-	-	-	0.0005	-	2 (10.0%)
Silver	mg/L	-	-	-	0.00001	-	20 (100%)
Thallium	mg/L	-	-	-	0.00001	-	11 (55.0%)
Tin	mg/L	-	-	-	0.0001	-	14 (100%)
Titanium	mg/L	-	-	-	0.0003	-	19 (95.0%)
Vanadium	mg/L	-	-	-	0.0005	-	20 (100%)
Zinc	mg/L	-	-	-	0.001	-	6 (30.0%)

Notes: Only analytes with at least one result < Laboratory Reporting Limit (LRL) were displayed. The total number of samples in 2021 (n) was 19, which included three field duplicate samples. EVWQP = Elk Valley Water Quality Plan; "-" = no applicable guideline exists.

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

[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] Guideline is the most conservative (lowest), based on estimates of a maximum temperature of 20°C and a minimum pH of 8.04.

[e] Guideline for Chromium VI (0.001 mg/L) was selected, as this is the principal species found in surface waters.

[f] Hardness-based guidelines calculated using the minimum hardness observed for all samples (402 mg/L).

[g] The most conservative guideline (0.125 µg/L) was applied.

[h] Guideline based on minimum field pH (8.04).

Table B.3: Laboratory Reporting Limit (LRL) Evaluation for Selenium Speciation Analyses, EVO LAEMP, 2021

Parameter	Units	BC WQG[a]		EVWQP Level 1 Benchmarks/ Relevant Screening Values[b]	Range of LRLs	No. LRLs > Guideline	No. Sample Results < LRL
		Long-term	Short-term				
DMSeO - Dimethylselenoxide	mg/L	-	-	-	0.01	-	18 (85.7%)
DMSe - Dimethyl Selenide	mg/L	-	-	-	0.022	-	5 (100%)
DMDSe- Dimethyl Diselenide	mg/L	-	-	-	0.022	-	5 (100%)
MeSe(IV) - Methylseleninic Acid	mg/L	-	-	-	0.01	-	13 (61.9%)
MeSe(VI) - Methaneselenonic Acid	mg/L	-	-	-	0.01	-	21 (100%)
Se(IV) - Selenite	mg/L	-	-	-	0.01	-	0
Se(VI) - Selenate	mg/L	-	-	-	0.01	-	0
SeCN - Selenocyanate	mg/L	-	-	-	0.01	-	21 (100%)
SeMe - Selenomethionine	mg/L	-	-	-	0.01	-	21 (100%)
Selenosulfate	mg/L	-	-	-	0.01	-	21 (100%)
Selenium Unknown	mg/L	-	-	-	0.01	-	21 (100%)

Notes: Only analytes with at least one result < LRL or an LRL above guidelines were displayed. The total number of samples in 2021 (n) was 19 including three field duplicate samples. EVWQP = Elk Valley Water Quality Plan; LRL = Laboratory Reporting Limit, "-" = no applicable guideline exists.

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

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

As the overall number of DQO exceedances was low (ALS: 0.14%; BAL: 0%), the impacted results were considered to have a negligible impact on data interpretability and laboratory precision was considered excellent.

Three field blank samples and three trip blank samples were submitted to ALS for water chemistry analyses to assess the potential for field sampling contamination (Table B.4). Of the 291 field blank individual analyte results, 98.2% were below detection and so met the DQO (Table B.1). Of the 226 trip blank individual analyte results, 98.6% were below detection and so met the DQO (Table B.1). Analyte results in field blank samples that did not meet the laboratory DQO included one result for dissolved molybdenum and two results for acidity and total ammonia. Analyte results in trip blank samples that did not meet the laboratory DQO included one result for total ammonia and two results for acidity. Overall, the low frequency of detectable concentrations in both field and trip blanks does not suggest significant field contamination.

One field blank sample was submitted to BAL to assess the potential for field sampling contamination associated with selenium speciation samples (Table B.5). Of the 13 analyte results, two (15.4%) did not meet the laboratory DQO. These consisted of one result for selenate and one result for total selenium. The relatively high number of DQO exceedances for samples submitted to BAL (15.4%) indicates potential field sampling contamination, and this will be taken into account during data interpretation. However, the high percentage of DQO exceedances associated with BAL field blank samples is in part due to the small sample size, and in future studies more field blanks will be submitted to BAL to gain a better understanding of potential field sampling contamination. Trip blank samples were not collected for selenium speciation.

B2.3 Data Precision

A total of 19 laboratory duplicate samples were used to evaluate precision within the ALS laboratory reports (Appendix H). Out of 695 individual analyte results, only three did not meet the laboratory DQO. These three TKN results were biased low due to interference from high nitrate in the parent sample that was used, which causes a negative bias in TKN (see laboratory reports CG2104194, CG2104005, and CG2106846 in Appendix H). As these three DQO exceedances only represent 0.43% of laboratory duplicate results, ALS laboratory analytical precision was overall considered excellent.

A total of five laboratory duplicate samples were used to evaluate precision within the BAL laboratory reports (Appendix H). Out of the 32 individual analyte results, all met the laboratory DQO. Therefore, BAL laboratory analytical precision was considered excellent.

Table B.4: Field Blank and Trip Blank Evaluation for Water Chemistry Analyses, EVO LAEMP, 2021

Parameter	Units	Range of LRLs	No. Field Blank Results > LRL	No. Trip Blank Results > LRL
Anions and Nutrients				
Acidity (as $CaCO_3$)	mg/L	2	2 (66.7%)	2 (66.7%)
Ammonia, Total (as N)	mg/L	0.005	2 (66.7%)	1 (33.3%)
Dissolved Metals				
Molybdenum	mg/L	0.00005	1 (33.3%)	0 (0%)

Notes: LRL = Laboratory Reporting Limit. Three field blank samples and three trip blank sample were collected in 2021. Only analytes with at least one blank results > LRL were displayed. Calcium, magnesium, potassium, and sodium are the only dissolved metals measured in trip blank samples.

Table B.5: Field Blank Evaluation for Selenium Speciation Analyses, EVO LAEMP, 2021

Parameter	Units	Range of LRLs	No. LRLs > Guideline	No. Field Blank Results > LRL
Se(VI) - Selenate	mg/L	0.01	-	1 (100%)
Selenium (Se) - Total	µg/L	0.01	0	1 (100%)

Notes: LRL = Laboratory Reporting Limit. One field blank sample was collected in 2021. Only analytes with at least one blank results > LRL were displayed.

Three sets of field duplicate samples were collected to assess field sampling precision for water chemistry analyzed by ALS (Table B.6). Several relative percent differences (RPDs) could not be calculated as analyte concentrations in both samples were below the LRL. Of the 194 RPDs that could be calculated, 18 analyte sets had RPDs greater than 30% (9.3% of all pairs; Table B.6). Of the comparisons with RPDs greater than 30%, five RPDs resulted from analyte concentrations near and below the LRL, where greater variability is expected. RPDs for analytes of primary concern that exceeded the DQO included one RPD for total phosphorus, dissolved organic carbon (DOC), total boron, total mercury, and total and dissolved aluminum, and two RPDs for total suspended solids (TSS), turbidity, Total Kjeldahl Nitrogen (TKN), and total ammonia. RPDs for analytes that are not of primary concern that exceeded the DQO included three RPDs for cation-anion difference. Overall, as only 9.3% of calculable RPDs exceeded the DQO, water chemistry samples submitted to ALS were considered to have adequate field precision and reproducibility.

Three sets of field duplicate samples were collected to assess field sampling precision for water chemistry analyzed by BAL (Table B.7). Several relative percent differences (RPDs) could not be calculated as analyte concentrations in both samples were below the LRL. Of the 14 RPDs that could be calculated, two analyte sets had RPDs greater than 30% (14.3% of all pairs; Table B.7). Both of the RPDs greater than 30% were for methaneselenonic acid. Overall, as 14.3% of calculable RPDs exceeded the DQO, water chemistry samples submitted to BAL were considered to have adequate field precision and reproducibility.

B2.4 Data Accuracy

Data accuracy within the ALS water chemistry reports was evaluated based on the results of 152 laboratory control samples (LCS) and 21 matrix spike (MS) samples (Appendix H). All 684 LCS results and 612 MS results met the laboratory DQO. Recovery could not be calculated in numerous MS samples as background levels were greater than or equal to one-times spike levels. However, as several other QC tests were successful and do not imply uncertainties as to ALS data accuracy, MS recovery not being calculable in several MS samples does not present a great concern as to the reliability of the data. Overall, all results met the laboratory DQO, ALS laboratory analytical precision was considered excellent.

Data accuracy within the BAL laboratory reports was evaluated based on results of 21 LCS, six MS samples, six Matrix Spike Duplicate (MSD) samples, and 14 Reference Material (RM) samples (Appendix H). All 39 LCS results, 13 MS results, 12 MSD results, and 14 RM results met the laboratory DQO. Therefore, BAL laboratory analytical accuracy was considered excellent.

Table B.6: Field Duplicate Results for Water Chemistry Analyses, EVO LAEMP, 2021

Parameter	Units	RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_1330	RG_RIVER_WS_LAEMP_EVO_2021-09_1330	RPD (%)	RG_MIDER_WS_LAEMP_EVO_2021-09-09_1435	RG_RIVER_WS_2021-09-09_1435	RPD (%)	RG_MICOMP_WS_LAEMP_EVO_2021-09-13_1600	RG_RIVER_WS_2021-09-13_1600	RPD (%)
Physical Tests										
Conductivity	µS/cm	1,960	1,990	1.52	398	402	1.00	529	536	1.31
Hardness (as $CaCO_3$)	mg/L	1,390	1,420	2.14	214	210	1.89	271	284	4.68
pH	pH	7.76	8.22	5.76	8.42	8.42	0	8.51	8.51	0
ORP	mV	439	421	4.19	488	449	8.32	491	453	8.05
Total Suspended Solids	mg/L	1,670	1,720	2.95	261	251	3.91	348	337	3.21
Total Dissolved Solids	mg/L	2.60	7.60	98.0	<1.0	<1.0	-	2.50	1.60	43.9
Turbidity	NTU	<0.10	2.08	182	0.350	0.290	18.8	0.180	0.250	32.6
Anions and Nutrients										
Acidity (as $CaCO_3$)	mg/L	8.40	10.5	22.2	<2.0	<2.0	-	<2.0	<2.0	-
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	484	478	1.25	149	147	1.35	160	164	2.47
Alkalinity, Bicarbonate (as HCO_3)	mg/L	590	583	1.19	182	179	1.66	196	200	2.02
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	<1.0	<1.0	-	11.8	12.4	4.96	9.00	12.0	28.6
Alkalinity, Carbonate (as CO_3)	mg/L	<1.0	<1.0	-	7.10	7.40	4.14	5.40	7.20	28.6
Alkalinity, Hydroxide (as $CaCO_3$)	mg/L	<1.0	<1.0	-	<1.0	<1.0	-	<1.0	<1.0	-
Alkalinity, Hydroxide (as OH)	mg/L	<1.0	<1.0	-	<1.0	<1.0	-	<1.0	<1.0	-
Alkalinity, Total (as $CaCO_3$)	mg/L	484	478	1.25	161	160	0.623	175	176	0.570
Bromide	mg/L	<0.250	<0.250	-	<0.050	<0.050	-	<0.050	<0.050	-
Chloride	mg/L	6.46	6.24	3.46	1.11	1.12	0.897	2.21	2.24	1.35
Fluoride	mg/L	0.130	0.112	14.9	0.127	0.127	0	0.172	0.175	1.73
Ammonia, Total (as N)	mg/L	0.00600	0.00910	41.1	0.0311	0.0162	63.0	0.0172	0.0222	25.4
Nitrate (as N)	mg/L	17.5	17.6	0.570	0.153	0.131	15.5	0.704	0.703	0.142
Nitrite (as N)	mg/L	<0.0050	<0.0050	-	<0.0010	<0.0010	-	0.00380	0.00480	23.3
Total Kjeldahl Nitrogen	mg/L	<0.050	0.377	153	0.112	0.0920	19.6	0.156	0.291	60.4
Orthophosphate	mg/L	0.0222	0.0215	3.20	0.00300	0.00270	10.5	<0.0010	0.00120	18.2
Phosphorus, Total	mg/L	0.0229	0.0215	6.31	0.00480	0.00580	18.9	0.00440	0.00320	31.6
Sulphate	mg/L	802	807	0.622	62.4	62.0	0.643	116	117	0.858
Anion Sum	meq/L	27.8	27.8	0	4.56	4.54	0.440	6.03	6.08	0.826
Cation Sum	meq/L	28.1	28.6	1.76	4.47	4.40	1.58	5.60	5.88	4.88
Cation - Anion Difference	%	0.537	1.42	90.2	0.997	1.56	44.0	3.70	1.67	75.6
Cation - Anion Ratio	%	101	103	1.96	98.0	96.9	1.13	92.9	96.7	4.01
Organic / Inorganic Carbon										
Dissolved Organic Carbon	mg/L	0.680	0.810	17.4	1.75	1.81	3.37	0.860	1.20	33.0
Total Organic Carbon	mg/L	0.670	0.680	1.48	1.80	1.80	0	0.980	1.00	2.02
Total Metals										
Aluminum	mg/L	<0.0030	<0.0060	-	0.00550	0.00750	30.8	0.00360	<0.0030	18.2
Antimony	mg/L	0.000200	<0.00020	0	<0.00010	<0.00010	-	0.000120	0.000120	0
Arsenic	mg/L	0.000250	0.000270	7.69	0.000190	0.000180	5.41	0.000200	0.000170	16.2
Barium	mg/L	0.0652	0.0664	1.82	0.113	0.114	0.881	0.116	0.115	0.866
Beryllium	µg/L	<0.020	<0.040	-	<0.020	<0.020	-	<0.020	<0.020	-
Bismuth	mg/L	<0.000050	<0.000100	-	<0.000050	<0.000050	-	<0.000050	<0.000050	-
Boron	mg/L	0.0140	<0.020	35.3	0.0110	0.0110	0	0.0140	0.0140	0
Cadmium	µg/L	0.0819	0.104	23.8	0.0227	0.0192	16.7	0.0263	0.0247	6.27
Calcium	mg/L	263	267	1.51	53.7	55.0	2.39	69.2	68.4	1.16
Chromium	mg/L	0.000200	<0.00020	0	0.000120	0.000120	0	0.000140	0.000120	15.4
Cobalt	µg/L	<0.10	<0.20	-	<0.10	<0.10	-	<0.10	<0.10	-
Copper	mg/L	<0.00050	<0.00100	-	<0.00050	<0.00050	-	<0.00050	<0.00050	-
Iron	mg/L	<0.010	<0.020	-	<0.010	<0.010	-	0.0130	<0.010	26.1
Lead	mg/L	<0.000050	<0.000100	-	<0.000050	<0.000050	-	<0.000050	<0.000050	-
Lithium	mg/L	0.0281	0.0288	2.46	0.00660	0.00670	1.50	0.0114	0.0114	0
Magnesium	mg/L	156	157	0.639	16.3	16.6	1.82	26.8	26.7	0.374
Manganese	mg/L	<0.00010	<0.00020	-	0.00141	0.00144	2.11	0.00322	0.00288	11.1
Mercury	µg/L	0.850	<0.50	51.9	0.000530	0.000530	0	<0.00050	<0.00050	-
Molybdenum	mg/L	0.00104	0.00108	3.77	0.000858	0.000877	2.19	0.00173	0.00179	3.41
Nickel	mg/L	0.000900	<0.00100	10.5	0.000700	0.000710	1.42	0.00191	0.00188	1.58
Potassium	mg/L	2.73	2.72	0.367	0.680	0.684	0.587	1.06	1.07	0.939
Selenium	µg/L	169	161	4.85	2.03	1.90	6.62	7.28	7.14	1.94
Silicon	mg/L	3.98	3.97	0.252	2.15	2.25	4.55	2.34	2.32	0.858
Silver	mg/L	<0.000010	<0.000020	-	<0.000010	<0.000010	-	<0.000010	<0.000010	-
Sodium	mg/L	3.48	3.45	0.866	3.58	3.59	0.279	3.92	3.94	0.509
Strontium	mg/L	0.245	0.240	2.06	0.159	0.164	3.10	0.178	0.180	1.12
Sulphur	mg/L	312	303	2.93	21.0	21.6	2.82	39.3	39.0	0.766
Thallium	mg/L	<0.000010	<0.000020	-	<0.000010	<0.000010	-	<0.000010	<0.000010	-
Tin	mg/L	<0.00010	<0.00020	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Titanium	mg/L	<0.00030	<0.00060	-	<0.00030	<0.00030	-	<0.00030	<0.00030	-
Uranium	mg/L	0.00895	0.00822	8.50	0.000841	0.000863	2.58	0.00156	0.00157	0.639
Vanadium	mg/L	<0.00050	<0.00100	-	<0.00050	<0.00050	-	<0.00050	<0.00050	-
Zinc	mg/L	<0.0030	<0.0060	-	<0.0030	<0.0030	-	<0.0030	<0.0030	-

Indicates RPD exceeded 30%.

Notes: RPD = relative percent difference; "-"= no data/not calculated; LRL = Laboratory Reporting Limit. 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. Turbidity was not analyzed in duplicate samples.

Table B.6: Field Duplicate Results for Water Chemistry Analyses, EVO LAEMP, 2021

Parameter	Units	RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_1330	RG_RIVER_WS_LAEMP_EVO_2021-09_1330	RPD (%)	RG_MIDER_WS_LAEMP_EVO_2021-09-09_1435	RG_RIVER_WS_2021-09-09_1435	RPD (%)	RG_MICOMP_WS_LAEMP_EVO_2021-09-13_1600	RG_RIVER_WS_2021-09-13_1600	RPD (%)
Dissolved Metals										
Aluminum	mg/L	<0.0010	0.00730	152	<0.0010	<0.0010	-	<0.0010	<0.0010	-
Antimony	mg/L	0.000180	0.000170	5.71	<0.00010	<0.00010	-	0.000110	0.000110	0
Arsenic	mg/L	0.000250	0.000290	14.8	0.000170	0.000170	0	0.000190	0.000180	5.41
Barium	mg/L	0.0672	0.0682	1.48	0.108	0.110	1.83	0.112	0.117	4.37
Beryllium	µg/L	<0.020	<0.020	-	<0.020	<0.020	-	<0.020	<0.020	-
Bismuth	mg/L	-	-	-	<0.000050	<0.000050	-	<0.000050	<0.000050	-
Boron	mg/L	-	-	-	0.0100	0.0100	0	0.0120	0.0130	8.00
Cadmium	µg/L	0.0884	0.101	13.3	0.0190	0.0173	9.37	0.0191	0.0183	4.28
Calcium	mg/L	291	294	1.03	54.9	53.8	2.02	65.0	68.7	5.53
Chromium	mg/L	0.000200	0.000230	14.0	0.000120	0.000150	22.2	0.000120	0.000110	8.70
Cobalt	µg/L	-	-	-	<0.10	<0.10	-	<0.10	<0.10	-
Copper	mg/L	<0.00020	<0.00020	-	<0.00020	0.000220	-	<0.00020	<0.00020	-
Iron	mg/L	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Lead	mg/L	-	-	-	<0.000050	<0.000050	-	<0.000050	<0.000050	-
Lithium	mg/L	0.0292	0.0288	1.38	0.00660	0.00650	1.53	0.0111	0.0117	5.26
Magnesium	mg/L	162	166	2.44	18.7	18.5	1.08	26.3	27.3	3.73
Manganese	mg/L	<0.00010	<0.00010	-	0.000940	0.000940	0	0.00172	0.00170	1.17
Mercury	µg/L	<0.0000050	<0.0000050	-	<0.0000050	<0.0000050	-	<0.0000050	<0.0000050	-
Molybdenum	mg/L	0.00110	0.00105	4.65	0.000895	0.000909	1.55	0.00169	0.00174	2.92
Nickel	mg/L	0.000920	0.000940	2.15	0.000960	0.000930	3.17	0.00178	0.00179	0.560
Potassium	mg/L	2.93	3.07	4.67	0.701	0.714	1.84	0.997	1.08	7.99
Selenium	µg/L	204	199	2.48	2.10	1.75	18.2	7.52	7.61	1.19
Silicon	mg/L	4.04	4.04	0	2.23	2.21	0.901	2.19	2.20	0.456
Silver	mg/L	<0.000010	<0.000010	-	<0.000010	<0.000010	-	<0.000010	<0.000010	-
Sodium	mg/L	3.60	3.72	3.28	3.96	3.97	0.252	3.84	4.00	4.08
Strontium	mg/L	0.242	0.241	0.414	0.160	0.163	1.86	0.172	0.177	2.87
Sulphur	mg/L	306	297	2.99	22.0	20.9	5.13	36.9	35.8	3.03
Thallium	mg/L	<0.000010	<0.000010	-	<0.000010	<0.000010	-	0.0000130	<0.000010	26.1
Tin	mg/L	-	-	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Titanium	mg/L	<0.00030	<0.00030	-	<0.00030	<0.00030	-	<0.00030	<0.00030	-
Uranium	mg/L	0.00874	0.00873	0.114	0.000786	0.000785	0.127	0.00144	0.00146	1.38
Vanadium	mg/L	<0.00050	<0.00050	-	<0.00050	<0.00050	-	<0.00050	<0.00050	-
Zinc	mg/L	0.00180	0.00370	69.1	<0.0010	<0.0010	-	<0.0010	<0.0010	-

Indicates RPD exceeded 30%.

Notes: RPD = relative percent difference; "-"= no data/not calculated; LRL = Laboratory Reporting Limit. 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. Turbidity was not analyzed in duplicate samples.

B2.5 Hold Times

The recommended hold times for pH and ORP analyses (0.25 to 0.34 hrs) were exceeded in all samples collected. As *in situ* pH and ORP were used for data interpretation, these hold time exceedances had no impact on data interpretability. The hold time for turbidity was exceeded by less than one day in two samples (see laboratory report CG2104005 in Appendix H) and by one day in two additional samples (see laboratory report CG2104077). Hold times for nitrite and nitrate were exceeded by one day in two samples (see laboratory report CG2104077) and by three days in three samples (see laboratory reports CG2104114). The hold time for nitrate was exceeded in one additional sample by two days (see laboratory report CG2104214). For three of the above nitrite hold time exceedances and four of the above nitrate hold time exceedances, nitrite and nitrate initially did not exceed hold times but exceeded hold times when re-analyzed or during dilution. The hold time for dissolved orthophosphate was exceeded by one day in six samples (see laboratory reports CG2104077 and CG2104214). The only analytes of primary concern for which hold times were exceeded were nitrate and nitrite, and these hold time exceedances will be taken into consideration during data interpretation. All hold times were met for selenium speciation samples.

B2.6 Other Concerns

Five results for TKN were flagged by ALS as possibly being biased low due to interference from high nitrate concentrations (see laboratory reports CG2104214 and CG2104194 in Appendix H). One result for selenosulfate was flagged as an estimate by BAL (see laboratory report 2100308 in Appendix H). This result was affected by chromatic interference, as indicated by elevated baselines or co-eluting peaks. The volatile selenium sample from RG_ERCKUT in December, 2021, was not submitted to BAL; therefore, volatile selenium data is not available for this sample.

B2.7 Data Quality Statement

Water chemistry data collected for the 2021 EVO LAEMP were of acceptable quality as characterized by appropriate LRLs, negligible analyte concentrations in method blanks, excellent laboratory precision and accuracy, adequate field precision and reproducibility, and few hold time exceedances. Field duplicates submitted to BAL indicated potential issues with field sampling accuracy that will be taken into consideration during data interpretation. Overall, the associated data can be used with a high level of confidence in the derivation of conclusions.

B3 SEDIMENT CHEMISTRY

B3.1 Laboratory Reporting Limits

The analytical reports for sediment chemistry from ALS (Appendix H) were examined to assess LRLs relative to analyte concentrations and applicable guidelines (Table B.8). The LRLs for these analytes were assessed relative to existing British Columbia Working Sediment Quality Guidelines (BC WSQG; BCMOECCS 2021b). Bismuth, tungsten, and quinoline were reported at concentrations below the LRL in 100% of samples (Table B.8); however, no relevant guidelines exist for these analytes. All LRLs for metals were above relevant guidelines, but several LRLs for polycyclic aromatic hydrocarbons (PAHs) including acenaphthene, acenaphthylene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, fluorene, naphthalene, and pyrene exceeded the lower BC WSQG (i.e., Interim Sediment Quality Guideline) in 16.0 to 80.0% of samples. The LRLs for acenaphthene also exceeded the upper BC WSQG (i.e., Probable Effect Limit) in 6.67% of samples. The reason for these high LRLs was due to a combination of chromatographic interference due to PAH co-elution effects and high moisture content (resulting in low sample volume) in specific sediment samples. Sediment LRLs were overall considered appropriate for this study, and relatively high LRLs for PAHs will be considered during data interpretation.

B3.2 Laboratory Blanks

A total of 27 MB samples were analyzed in the ALS laboratory reports (Appendix H). All 463 individual analyte results met the laboratory DQO, indicating no inadvertent contamination of sediment samples during analysis. Therefore, laboratory precision as determined by laboratory blanks was considered excellent.

B3.3 Data Precision

Ten laboratory duplicate samples were used to evaluate precision within the ALS laboratory reports (Appendix H). All 102 individual analyte results met the laboratory DQO (Table B.1). Therefore, ALS laboratory analytical precision was considered excellent.

Three sets of field duplicate samples were collected to assess field sampling precision for sediment chemistry (Table B.9). Samples were collected as split samples (i.e., a larger sample was homogenized and then split into two duplicate sub-samples), and some variability was expected based on the inherent heterogeneity of sediments. Several relative percent differences (RPDs) could not be calculated as both analyte concentrations in the pair were below the LRL. Of the 191 RPDs that could be calculated, 38 RPDs were greater than 30% (19.9% of comparisons; Table B.9). Of the RPDs greater than 30%, 10 were from

Table B.7: Field Duplicate Results for Selenium Speciation Analyses, EVO, 2021

Parameter	Units	RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_1330	RG_RIVER_WS_LAEMP_EVO_2021-12-14_1330	RPD (%)	RG_MIDGA_WS_LAEMP_EVO_2021-09-11_1530	RG_RIVER_WS_2021-09-11_1530	RPD (%)	RG_MICOMP_WS_LAEMP_EVO_2021-09-13_1600	RG_RIVER_WS_2021-09-13_1600	RPD (%)
Dimethylselenoxide	mg/L	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
MeSe(IV) - Methylseleninic Acid	mg/L	<0.010	<0.010	-	0.008	0.011	31.6	0.014	0.009	43.5
Methaneselenonic Acid	mg/L	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Se(IV) - Selenite	mg/L	0.03	0.024	22.2	0.163	0.149	9.0	0.174	0.194	10.9
Se(VI) - Selenate	mg/L	139	134	3.7	3.01	3	0.3	6.97	6.94	0.4
SeCN - Selenocyanate	mg/L	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
SeMe - Selenomethionine	mg/L	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Selenosulfate	mg/L	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Unknown Selenium Species	mg/L	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Total Selenium	µg/L	137	138	0.7	3.12	2.98	4.6	6.33	6.61	4.3
Dissolved Selenium	µg/L	129	135	4.5	2.96	2.81	5.2	6.47	6.83	5.4

Indicates RPD exceeded 30%.

Notes: RPD = relative percent difference; LRL = Laboratory Reporting Limit; "-" = no data/not calculated. 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.

Table B.8: Laboratory Reporting Limit (LRL) Evaluation for Sediment Chemistry Analyses, EVO LAEMP, 2021

Parameter	Units	BC WSQGs		Range of LRLs	No. LRLs > ISQG	No. LRLs > PEL	No. Sample Results < LRL
		ISQG	PEL				
Particle Size							
% Gravel (>2 mm)	%	-	-	1	-	-	16 (47.1%)
% Sand (2.00 mm - 1.00 mm)	%	-	-	1	-	-	9 (26.5%)
Metals							
Bismuth	mg/kg	-	-	0.2	-	-	34 (100%)
Boron	mg/kg	-	-	5	-	-	9 (26.5%)
Mercury	mg/kg	0.17	0.486	0.005	0	0	1 (2.94%)
Silver	mg/kg	0.5	-	0.1	0	-	4 (11.8%)
Sulphur	mg/kg	-	-	1000	-	-	24 (70.6%)
Tin	mg/kg	-	-	2	-	-	33 (97.1%)
Tungsten	mg/kg	-	-	0.5	-	-	34 (100%)
Zirconium	mg/kg	-	-	1	-	-	25 (73.5%)
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	0.00671	0.0889	0.005 to 0.095	24 (80.0%)	2 (6.67%)	30 (88.2%)
Acenaphthylene	mg/kg	0.00587	0.128	0.005 to 0.05	13 (54.2%)	0	24 (70.6%)
Acridine	mg/kg	-	-	0.01 to 0.22	-	-	31 (91.2%)
Anthracene	mg/kg	0.0469	0.245	0.004 to 0.04	0	0	30 (88.2%)
Benzo(a)anthracene	mg/kg	-	-	0.01	-	-	13 (38.2%)
Benzo(a)pyrene	mg/kg	0.0319	0.782	0.01 to 0.1	4 (16.0%)	0	25 (73.5%)
Benzo(b&j)fluoranthene	mg/kg	-	-	0.01 to 0.1	-	-	4 (11.8%)
Benzo(b+j+k)fluoranthene	mg/kg	-	-	0.015 to 0.14	-	-	7 (20.6%)
Benzo(g,h,i)perylene	mg/kg	0.17	0.32	0.01 to 0.1	0	0	19 (55.9%)
Benzo(k)fluoranthene	mg/kg	0.24	13.4	0.01 to 0.1	0	0	33 (97.1%)
Benzo(e)pyrene	mg/kg	-	-	0.01 to 0.1	-	-	5 (14.7%)
Chrysene	mg/kg	0.0571	0.862	0.01 to 0.39	3 (75.0%)	0	4 (11.8%)
Dibenz(a,h)anthracene	mg/kg	0.00622	0.135	0.005 to 0.05	14 (58.3%)	0	24 (70.6%)
Fluoranthene	mg/kg	0.111	2.36	0.01 to 0.1	0	0	11 (32.4%)
Fluorene	mg/kg	0.0212	0.144	0.01 to 0.1	5 (29.4%)	0	17 (50.0%)
Indeno(1,2,3-c,d)pyrene	mg/kg	0.2	3.2	0.01 to 0.1	0	0	32 (94.1%)
Perylene	mg/kg	-	-	0.01 to 0.1	-	-	29 (85.3%)
Pyrene	mg/kg	0.053	0.875	0.01 to 0.1	3 (37.5%)	0	8 (23.5%)
Quinoline	mg/kg	-	-	0.015 to 0.1	-	-	34 (100%)
B(a)P Total Potency Equivalent	mg/kg	-	-	0.02 to 0.096	-	-	11 (32.4%)

Notes: "-" = no applicable guideline exists, BC WSQGs = British Columbia Sediment Quality Guidelines (BCMOECCS 2021b); ISQG = Interim Sediment Quality Guideline; PEL = Probable Effects Limit. Only analytes with at least one result < Laboratory Reporting Limit (LRL) or LRL were above guidelines were displayed. The total number of samples in 2021 (n) was 34, which included three field duplicate samples.

Table B.9: Field Duplicate Results for Sediment Chemistry Analyses, EVO LAEMP, 2021

Parameter	Units	RG_ERCKDT_SE-1_2021-09-14_1100	RG_RIVER_SE_2021-09-14_1100	RPD (%)	RG_MICOMP_SE-2_2021-09-13_1045	RG_RIVER_SE_2021-09-13_1045	RPD (%)	RG_MI3_SE-3_2021-09-12_1440	RG_RIVER_SE-4_2021-09-12_1440	RPD (%)
Physical Tests										
Moisture	%	86.4	85.8	0.697	75.3	72.1	4.34	44.5	45.2	1.56
pH (1:2 soil:water)	pH	8.01	8.03	0.249	8.17	8.18	0.122	7.33	7.32	0.137
Particle Size										
% Gravel (>2 mm)	%	<1.0	<1.0	-	<1.0	<1.0	-	4.30	1.90	77.4
% Sand (2.00 mm - 1.00 mm)	%	<1.0	<1.0	-	2.40	<1.0	82.4	3.30	2.00	49.1
% Sand (1.00 mm - 0.50 mm)	%	<1.0	<1.0	-	6.50	1.50	125	7.30	3.40	72.9
% Sand (0.50 mm - 0.25 mm)	%	<1.0	<1.0	-	19.0	3.00	145	8.30	5.90	33.8
% Sand (0.25 mm - 0.125 mm)	%	3.20	2.80	13.3	15.3	3.80	120	16.6	17.7	6.41
% Sand (0.125 mm - 0.063 mm)	%	4.70	5.00	6.19	9.60	5.60	52.6	23.2	26.2	12.1
% Silt (0.063 mm - 0.0312 mm)	%	24.7	27.7	11.5	20.1	37.4	60.2	18.4	21.3	14.6
% Silt (0.0312 mm - 0.004 mm)	%	50.8	50.4	0.791	22.1	40.5	58.8	16.2	18.8	14.9
% Clay (<4 µm)	%	15.5	13.6	13.1	5.00	7.90	45.0	2.40	2.80	15.4
Organic / Inorganic Carbon										
Total Organic Carbon	%	11.8	11.1	6.11	4.40	7.17	47.9	3.22	5.81	57.4
Metals										
Aluminum	mg/kg	3,610	4,110	13.0	5,780	4,660	21.5	7,920	7,900	0.253
Antimony	mg/kg	0.950	1.08	12.8	0.590	0.630	6.56	0.840	0.860	2.35
Arsenic	mg/kg	14.5	14.6	0.687	4.71	4.79	1.68	6.18	6.03	2.46
Barium	mg/kg	178	173	2.85	216	202	6.70	219	247	12.0
Beryllium	mg/kg	0.460	0.480	4.26	0.450	0.420	6.90	0.580	0.570	1.74
Bismuth	mg/kg	<0.20	<0.20	-	<0.20	<0.20	-	<0.20	<0.20	-
Boron	mg/kg	8.50	10.4	20.1	6.00	<5.0	18.2	6.50	6.40	1.55
Cadmium	mg/kg	3.85	3.60	6.71	1.21	1.20	0.830	1.40	1.46	4.20
Calcium	mg/kg	67,400	64,000	5.18	39,300	42,400	7.59	29,100	29,000	0.344
Chromium	mg/kg	8.58	9.97	15.0	10.7	8.99	17.4	15.7	16.2	3.13
Cobalt	mg/kg	63.6	57.7	9.73	7.57	7.12	6.13	6.82	6.55	4.04
Copper	mg/kg	15.4	14.5	6.02	12.0	11.8	1.68	12.7	13.1	3.10
Iron	mg/kg	25,700	24,300	5.60	12,800	12,400	3.17	14,300	14,200	0.702
Lead	mg/kg	7.56	7.04	7.12	9.41	8.76	7.15	10.3	9.07	12.7
Lithium	mg/kg	5.50	5.70	3.57	7.10	6.40	10.4	8.60	7.60	12.3
Magnesium	mg/kg	8,620	8,020	7.21	5,190	5,120	1.36	5,400	5,210	3.58
Manganese	mg/kg	1,290	1,140	12.3	313	309	1.29	215	233	8.04
Mercury	mg/kg	0.0366	0.0314	15.3	0.0417	0.0443	6.05	0.0385	0.0640	49.8
Molybdenum	mg/kg	1.72	1.83	6.20	1.03	1.07	3.81	1.39	1.51	8.28
Nickel	mg/kg	98.0	91.9	6.42	33.4	32.1	3.97	28.0	27.4	2.17
Phosphorus	mg/kg	1,170	1,160	0.858	981	1,040	5.84	1,150	1,260	9.13
Potassium	mg/kg	1,100	1,290	15.9	1,260	900	33.3	1,670	1,720	2.95
Selenium	mg/kg	32.1	32.9	2.46	1.66	1.57	5.57	1.08	1.18	8.85
Silver	mg/kg	0.190	0.180	5.41	0.160	0.160	0	0.180	0.180	0
Sodium	mg/kg	84.0	75.0	11.3	72.0	67.0	7.19	88.0	89.0	1.13
Strontium	mg/kg	71.4	68.9	3.56	67.6	69.8	3.20	61.7	71.8	15.1
Sulfur	mg/kg	2,100	1,800	15.4	<1,000	<1,000	-	<1,000	<1,000	-
Thallium	mg/kg	0.355	0.394	10.4	0.193	0.173	10.9	0.233	0.271	15.1
Tin	mg/kg	<2.0	15.8	155	<2.0	<2.0	-	<2.0	<2.0	-
Titanium	mg/kg	5.60	9.70	53.6	16.3	9.10	56.7	40.3	37.9	6.14
Tungsten	mg/kg	<0.50	<0.50	-	<0.50	<0.50	-	<0.50	<0.50	-
Uranium	mg/kg	1.55	1.55	0	0.875	0.892	1.92	1.11	1.31	16.5
Vanadium	mg/kg	18.9	21.3	11.9	27.2	23.0	16.7	41.3	41.9	1.44
Zinc	mg/kg	243	227	6.81	90.1	87.5	2.93	96.9	96.4	0.517
Zirconium	mg/kg	<1.0	<1.0	-	<1.0	<1.0	-	1.10	1.10	0
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	mg/kg	<0.085	<0.085	-	<0.025	<0.015	-	0.0173	<0.020	14.5
Acenaphthylene	mg/kg	<0.018	<0.018	-	0.0110	<0.0085	25.6	0.00520	0.00530	1.90
Acridine	mg/kg	<0.22	<0.22	-	<0.030	0.0190	44.9	<0.020	<0.020	-
Anthracene	mg/kg	<0.020	<0.014	-	0.0119	<0.0068	54.5	<0.0040	0.00440	9.52
Benz(a)anthracene	mg/kg	0.102	0.272	90.9	0.0420	0.0260	47.1	0.0290	0.0240	18.9
Benzo(a)pyrene	mg/kg	0.0640	<0.035	58.6	0.0360	0.0200	57.1	0.0150	<0.010	40.0
Benzo(b&j)fluoranthene	mg/kg	0.162	0.152	6.37	0.0900	0.0560	46.6	0.0520	0.0400	26.1
Benzo(b+j+k)fluoranthene	mg/kg	0.162	0.152	6.37	0.0900	0.0560	46.6	0.0520	0.0400	26.1
Benzo(e)pyrene	mg/kg	0.156	0.147	5.94	0.0740	0.0540	31.3	0.0570	0.0480	17.1
Benzo(g,h,i)perylene	mg/kg	0.0730	0.0560	26.4	0.0320	<0.017	61.2	0.0170	0.0130	26.7
Benzo(k)fluoranthene	mg/kg	<0.035	<0.035	-	<0.020	<0.017	-	<0.010	<0.010	-
Chrysene	mg/kg	<0.39	0.212	59.1	0.0670	0.0500	29.1	0.111	0.0850	26.5
Dibenz(a,h)anthracene	mg/kg	0.0190	<0.018	5.41	<0.010	<0.0085	-	<0.0050	<0.0050	-
Fluoranthene	mg/kg	0.0810	0.0600	29.8	<0.050	0.0380	27.3	0.0420	<0.040	4.88
Fluorene	mg/kg	0.274	0.302	9.72	<0.050	0.0350	35.3	<0.030	<0.020	-
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.035	<0.035	-	<0.020	<0.017	-	<0.010	<0.010	-
1-Methylnaphthalene	mg/kg	0.751	0.836	10.7	0.166	0.131	23.6	0.294	0.215	31.0
2-Methylnaphthalene	mg/kg	1.48	1.55	4.62	0.234	0.201	15.2	0.372	0.257	36.6
Naphthalene	mg/kg	0.374	0.380	1.59	0.113	0.0990	13.2	0.159	0.127	22.4
Perylene	mg/kg	<0.035	<0.035	-	<0.020	<0.017	-	<0.010	<0.010	-
Phenanthrene	mg/kg	1.06	1.12	5.50	0.291	0.233	22.1	0.370	0.330	11.4
Pyrene	mg/kg	0.101	0.112	10.3	0.0550	<0.050	9.52	0.0460	<0.040	14.0
Quinoline	mg/kg	<0.035	<0.035	-	<0.020	<0.017	-	<0.050	<0.050	-
d10-Acenaphthene	%	123	122	0.570	99.3	101	1.70	81.7	86.6	5.82
d12-Chrysene	%	119	N/A	-	111	110	1.18	103	107	3.89
d8-Naphthalene	%	115	115	0.0870	92.4	94.6	2.35	83.6	84.5	1.07
d10-Phenanthrene	%	110	N/A	-	108	105	2.73	95.0	100	5.23
B(a)P Total Potency Equivalent	mg/kg	0.116	0.0750	42.9	0.0570	0.0350	47.8	0.0280	<0.020	33.3

Indicates RPD exceeded 30%.

Notes: RPD = relative percent difference; "-"= no data/not calculated; LRL = Laboratory Reporting Limit. 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.

pairs where one analyte concentration was below the LRL, where greater variability is expected. Additionally, of the RPDs greater than 30%, 22 were from one set of field duplicate samples, indicating poor homogenization of this pair of samples. Polycyclic aromatic hydrocarbons (PAHs) overall had more RPDs greater than 30% than did metals. The greater variability observed for PAHs is likely attributed to residual heterogeneity in the samples. Subtle differences in the distribution of fine particulate matter and associated PAHs amongst split samples may exist even after homogenization in the field. As 19.9%% of calculable RPDs exceeded the DQO, the data were considered to have adequate field precision and reproducibility.

B3.4 Data Accuracy

Data accuracy for sediment chemistry analyses completed by ALS was evaluated based on the analysis of 29 LCS, four CRM samples, and 24 Internal Reference Material (IRM) samples. All 395 LCS, 132 CRM, and 256 IRM individual analyte results met the laboratory DQO (Table B.1). Therefore, the accuracy achieved by the laboratory was considered excellent.

B3.5 Hold Times

All recommended hold times were met for all samples.

B3.6 Data Quality Statement

Sediment chemistry data collected for the 2021 EVO LAEMP were of acceptable quality as characterized by appropriate LRLs, excellent laboratory precision and accuracy, adequate field precision and reproducibility, and no hold time exceedances. Overall, the associated data were considered acceptable for this study.

B4 BENTHIC INVERTEBRATE COMMUNITY

B4.1 Organism Sorting Efficiency

The analytical reports from Cordillera Consulting Inc. (benthic invertebrate community structure; see Appendix H for laboratory reports) were examined to assess subsampling accuracy. 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. The proportion of subsampled material ranged from 5% to 12% of the total sample material (Table B.10). Both the precision and accuracy of the subsamples randomly chosen for subsample assessment (approximately 10% of samples that were subsampled; n = 3) met the DQO in all subsamples (<20%; Table B.11). Thus, the precision and accuracy for sub-sampling of the benthic invertebrate community samples was considered excellent.

B4.2 Subsampling Accuracy and Accuracy

To measure the effectiveness of the sorters, at least 10% of samples (n = 3) were selected at random for resorting analysis by a different sorter. As average sorting efficiency of benthic invertebrate samples (96.7%, Table B.12) was above the laboratory DQO (95%), organism sorting efficiency was considered excellent.

B4.3 Taxonomic Identification Accuracy

Cordillera Consulting Inc. performed an internal audit of taxonomic identification for approximately 10% of all community structure samples (n = 3; Table B.13). The analysts reported a total identification error rate (TIR) of 0% for all relevant samples, a percent difference in enumeration (PDE) of 0% to 0.128%, a percent taxonomic disagreement (PTD) of 0.415% to 1.02%, and a Bray Curtis Dissimilarity Index (BCDI, a measure of the differences in identifications between different analysts) of 0.003 to 0.009 (Table B.13). The laboratory DQO was based on TIR as per CABIN laboratory methods (<5% TIR; Environment Canada 2014). As the TIR was below 5% for all samples examined, the taxonomic accuracy of the analysis was considered excellent.

B4.4 Data Quality Statement

Benthic community data collected for the 2021 EVO LAEMP and analyzed by Cordillera Consulting Inc. were of good quality as characterized by excellent sorting efficiency, subsampling precision and accuracy, and taxonomic identification accuracy. Therefore, the associated data can be used with a high level of confidence in the derivation of conclusions.

Table B.10: Percent of Sample Sorted and the Total Number of Invertebrates Recovered from the Sampled Fraction, EVO LAEMP, 2021

Sample ID	Laboratory ID	Proportion Sampled (%)	Number of Invertebrates Sampled
RG_ERCKUT_BIC-1_2021-09-15	CC221287	5	556
RG_ERCKUT_BIC-2_2021-09-15	CC221288	5	722
RG_ERCKUT_BIC-3_2021-09-15	CC221289	5	373
RG_MIDBO_BIC-1_2021-09-11	CC221290	5	524
RG_MIDBO_BIC-2_2021-09-11	CC221291	5	404
RG_MIDBO_BIC-3_2021-09-11	CC221292	5	400
RG_ERCKDT_BIC-1_2021-09-15	CC221293	5	942
RG_ERCKDT_BIC-2_2021-09-15	CC221294	5	599
RG_ERCKDT_BIC-3_2021-09-15	CC221295	5	782
RG_MIDER_BIC-1_2021-09-09	CC221296	12	417
RG_MIDER_BIC-2_2021-09-09	CC221297	8	324
RG_MIDER_BIC-3_2021-09-09	CC221298	5	340
RG_ERCK_BIC-1_2021-09-10	CC221299	5	868
RG_ALUSM_BIC-1_2021-09-12	CC221300	5	475
RG_ALUSM_BIC-2_2021-09-12	CC221301	5	427
RG_ALUSM_BIC-3_2021-09-12	CC221302	5	362
RG_MIDGA_BIC-1_2021-09-11	CC221303	5	647
RG_MIDGA_BIC-2_2021-09-11	CC221304	5	391
RG_MIDGA_BIC-3_2021-09-11	CC221305	5	400
RG_MI3_BIC-1_2021-09-11	CC221306	5	356
RG_MI3_BIC-2_2021-09-11	CC221307	5	633
RG_MI3_BIC-3_2021-09-11	CC221308	5	474
RG_MICOMP_BIC-1_2021-09-13	CC221309	5	800
RG_MICOMP_BIC-2_2021-09-13	CC221310	5	399
RG_MICOMP_BIC-3_2021-09-13	CC221311	5	561
RG_MICOMP_BIC-4_2021-09-13	CC221312	5	671
RG_MICOMP_BIC-5_2021-09-13	CC221313	5	784

Table B.11: Benthic Invertebrate Community Sub-sampling Precision and Accuracy, EVO LAEMP, 2021

Station ID		Organisms in Subsample (n)																				Total	Precision Error		Accuracy Error	
Sample ID	Laboratory ID	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		Min (%)	Max (%)	Min (%)	Max (%)
RG_MIDBO_BIC-2_2021-09-11	CC221291	384	369	370	413	369	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,905	0	10.7	0.79	8.4
RG_MI3_BIC-3_2021-09-11	CC221308	437	447	446	435	433	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,198	0.22	3.1	0.59	1.68
RG_ALUSM_BIC-2_2021-09-12	CC221301	414	410	392	380	415	408	418	425	426	373	378	377	414	400	440	364	409	384	385	410	8,022	0.00	17.3	0.27	9.70
																							0.07	**10.4**	**0.55**	**6.59**

Note: "-" indicates subsample was not analyzed.

Table B.12: Benthic Invertebrate Community Sorting Efficiency, EVO LAEMP, 2021

Sample ID	Laboratory ID	Number of Organisms Recovered (Initial Sort)	Number of Organisms in Re-sort	Sorting Efficiency (%)
RG_ALUSM_BIC-1_2021-09-12	CC221300	18	475	96.0
RG_MIDGA_BIC-1_2021-09-11	CC221303	30	647	95.0
RG_MI3_BIC-1_2021-09-11	CC221306	5	356	99.0
				96.7

Table B.13: Percent Benthic Invertebrate Community Organism Recovery[a], EVO LAEMP, 2021

Sample ID	Laboratory ID	Percent Sampled (%)	Taxa Identified (n)	TIR (%)	PDE (%)	PTD (%)	BCDI
RG_ERCKUT_BIC-2_2021-09-15	CC221288	5	723	0	0	0.415	0.003
RG_ERCKDT_BIC-2_2021-09-15	CC221294	5	599	0	0	0.501	0.005
RG_MIDGA_BIC-2_2021-09-11	CC221304	5	392	0	0.128	1.02	0.009

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

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

Quality control procedures were not conducted on benthic invertebrate community structure and density data analyzed by Zeas.

B5 BENTHIC INVERTEBRATE TISSUE CHEMISTRY

B5.1 Laboratory Reporting Limits

Analytical reports of benthic invertebrate tissue metal concentrations from TrichAnalytics (see laboratory reports in Appendix H) were examined to provide an inventory of analyte results below the LRL and to compare the LRLs for these analytes to available benchmarks (Table B.14). Arsenic and mercury were the only analytes that had at least one result below the LRL (Table B.14). However, the sole focus of interpretation of benthic invertebrate tissue chemistry results for the EVO LAEMP was selenium. Selenium was detectable (i.e., above the LRL) in all benthic invertebrate samples, therefore comparison of the selenium LRL to the applicable guidelines was not necessary to assess whether adequate detectability was achieved. Overall, the detectability of selenium in all samples (i.e., below the LRL) indicates that the achieved LRLs were suitable for the study.

B5.2 Data Accuracy and Precision

Data accuracy and precision were evaluated based on the analysis of six CRM samples (see laboratory reports in Appendix H). As all 180 CRM results met the laboratory DQO, laboratory accuracy and precision as determined by CRM analyses were considered excellent. Laboratory precision was also evaluated by duplicate analysis of seven benthic invertebrate tissue samples see laboratory reports in Appendix H). As all 210 duplicate results met the laboratory DQO, laboratory accuracy and precision as determined by duplicate analyses were considered excellent.

B5.3 Data Quality Statement

Benthic invertebrate tissue data collected for the 2021 EVO LAEMP were of good quality as characterized by appropriate LRLs and excellent laboratory precision and accuracy. Therefore, the associated data can be used with a good level of confidence in the derivation of conclusions for this study.

Table B.14: Laboratory Reporting Limit (LRL) Evaluation for Benthic Invertebrate Tissue Chemistry Analyses, FRO LAEMP, 2021

Parameter	Units	Range of LRLs	No. Sample Results < LRL
Arsenic	mg/kg dw	0.441 to 0.451	17 (28.8%)
Mercury	mg/kg dw	0.023 to 0.025	4 (6.78%)

Notes: "-" = no applicable guideline exists; LRL = Laboratory Reporting Limit; dw = dry weight. Only analytes with at least one sample results < LRL are displayed. Total number of samples was 59. The only guidelines that exist for benthic invertebrate tissue are for selenium, and LRLs for selenium were below the applicable guidelines.

B6 DATA QUALITY REVIEW SUMMARY

Overall, the quality of the data collected for this project was considered acceptable for the derivation of conclusions associated with the objectives of the 2021 EVO LAEMP. Field sampling precision was relatively low in water chemistry samples submitted to BAL, suggesting potential field contamination. However, the number of QA/QC samples submitted to BAL was low, which may be contributing to a false perception that samples submitted to BAL were of a lower quality. In future studies, more QC samples will be submitted to BAL to gain a clearer understanding of field contamination or inaccuracies associated with these samples. Additionally, some water chemistry samples exceeded hold times for nitrite and nitrate. Sediment LRLs for PAHs were relatively high, and RPDs for sediment were also relatively high, largely contributed to by one field duplicate set. All of the above will be taken into consideration during data interpretation.

B7 REFERENCES

BCMOECCS (British Columbia Ministry of Environment and Climate Change Strategy). 2021a. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife and Agriculture – Guideline Summary. Water Quality Guideline Series, WQG-20. Water Protection and Sustainability Branch, Province of British Columbia, Victoria, B.C.

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APPENDIX C
PHYSICAL HABITAT

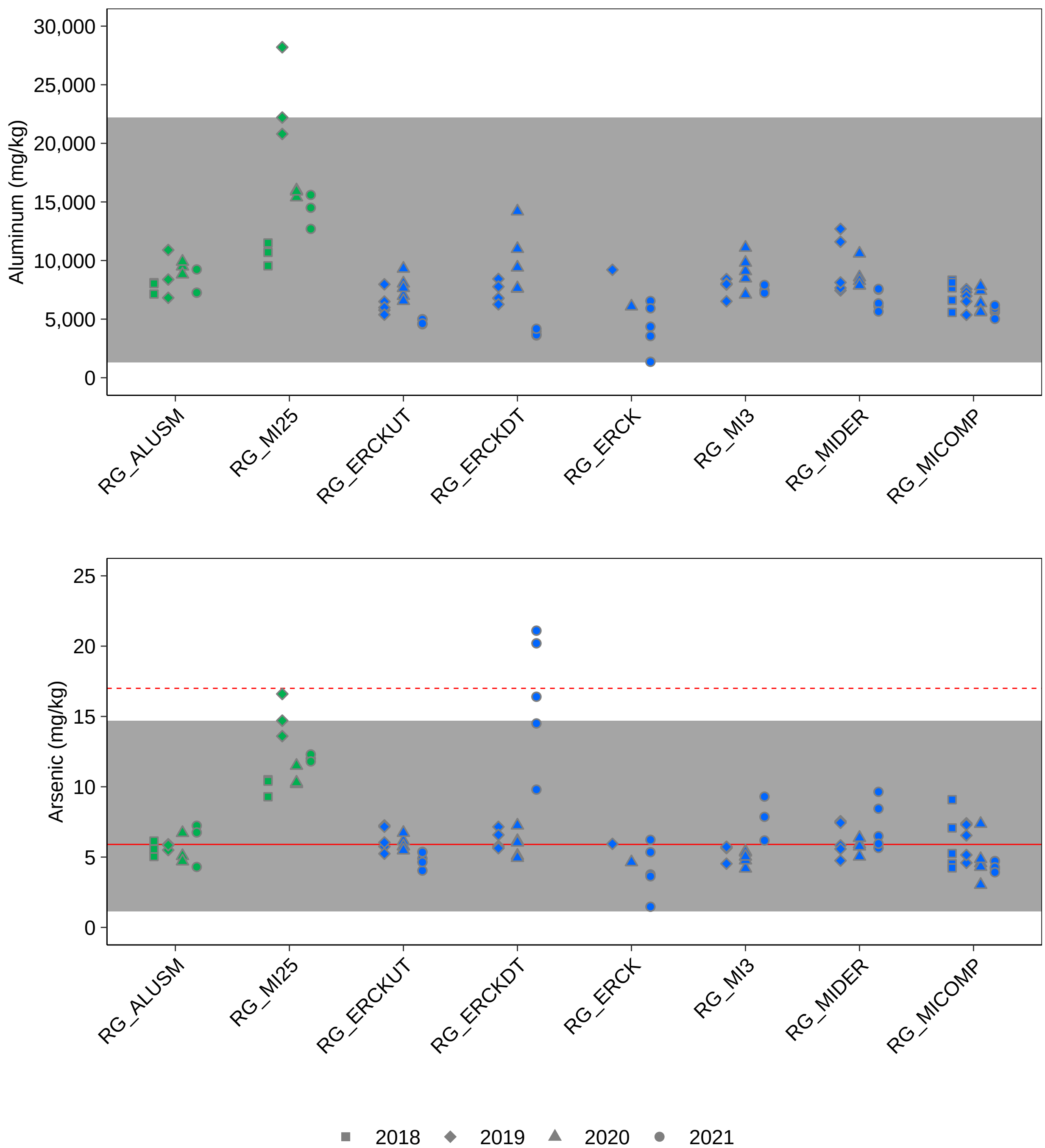
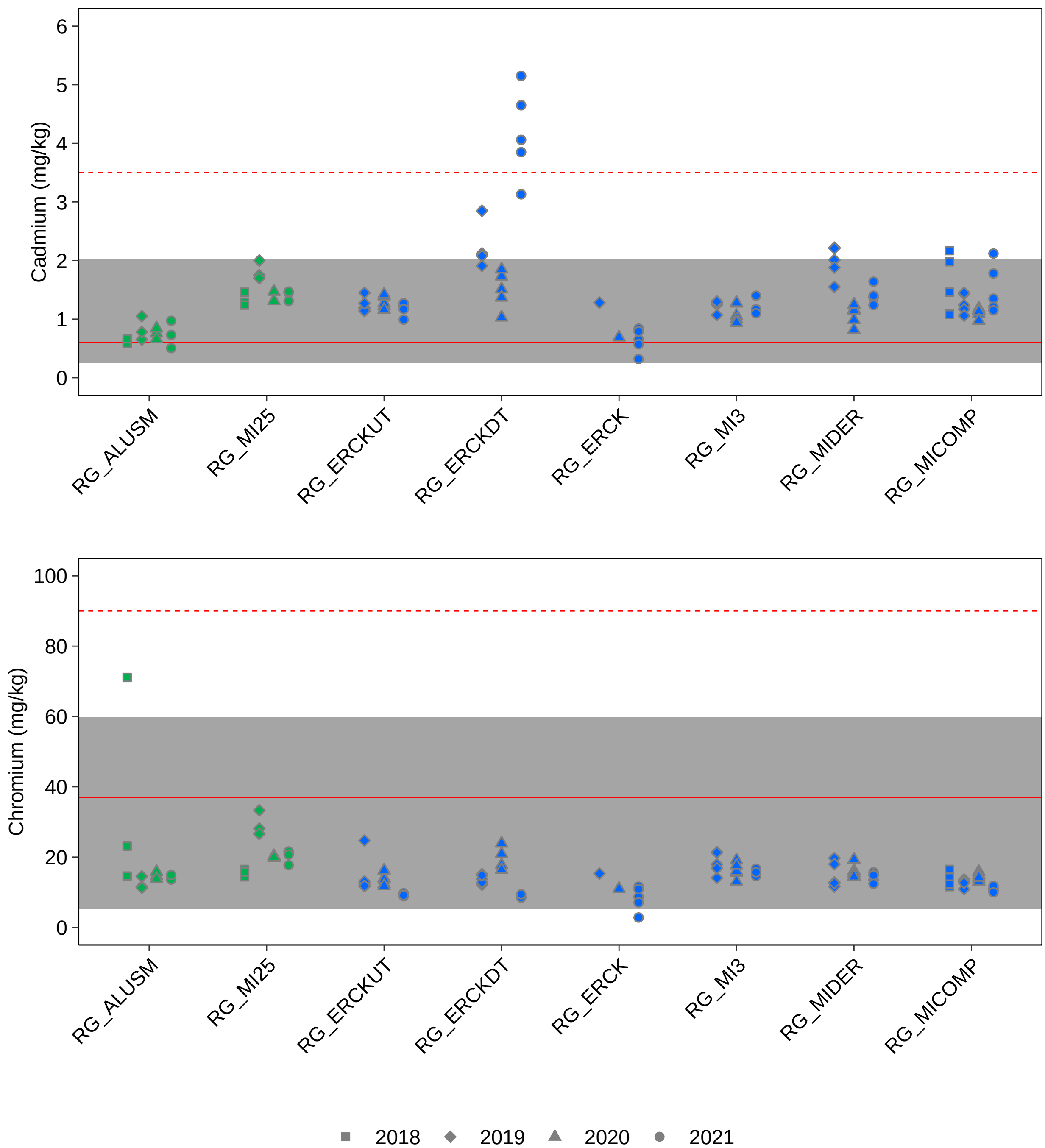


Figure C.1: Sediment Metal and Polycyclic Aromatic Hydrocarbon (PAH) Concentrations, EVO LAEMP, 2018 to 2021

Notes: Green symbols represent reference areas and blue symbols represent exposed areas. Solid red line = Lower BC WSQG; broken red line = Upper BC WSQG. BC WSQG = British Columbia Working Sediment Quality Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b). Shading represents the normal range which represents the 2.5th to 97.5th percentiles of 2017 and 2020 regional reference area data. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL value.



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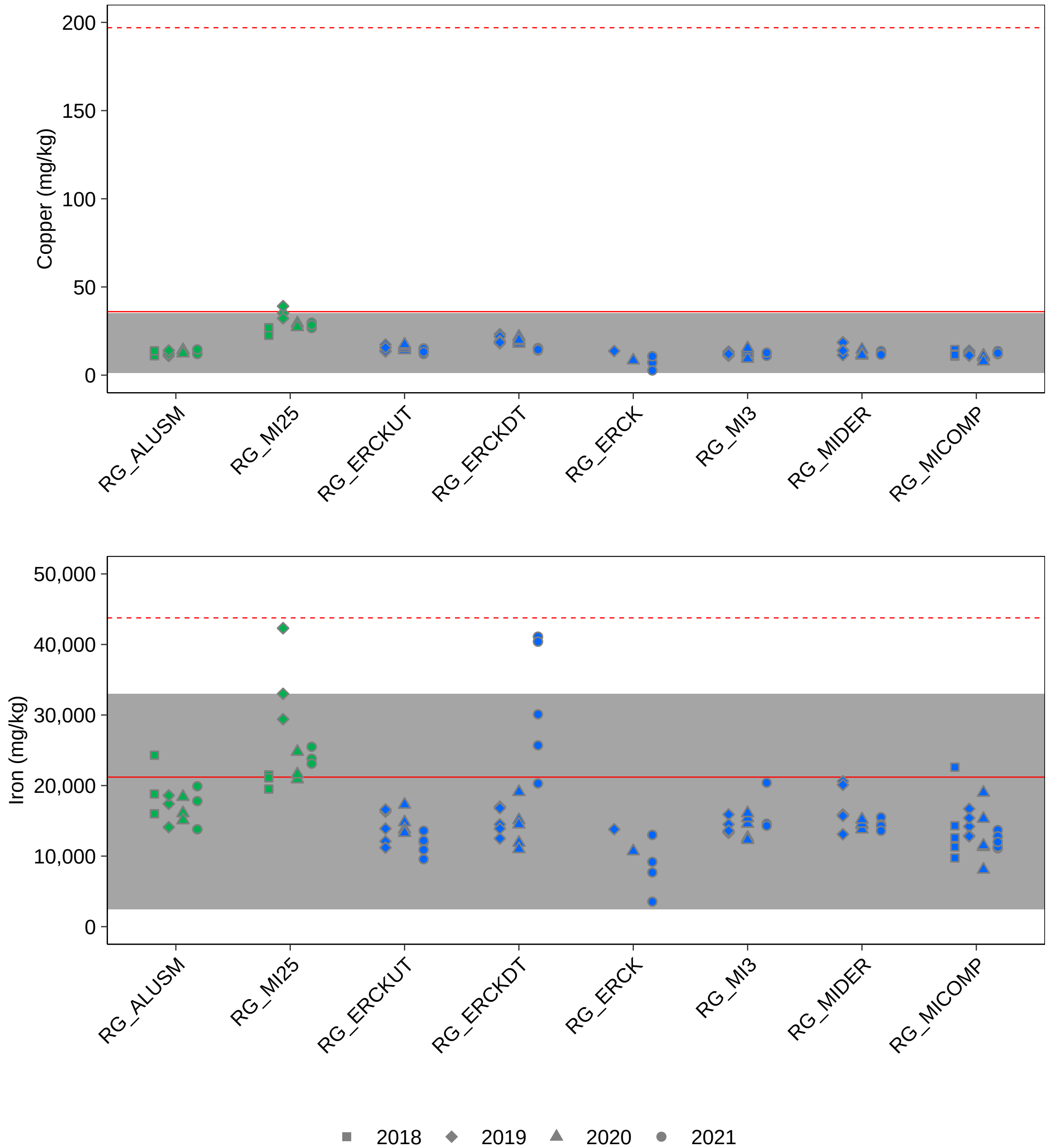

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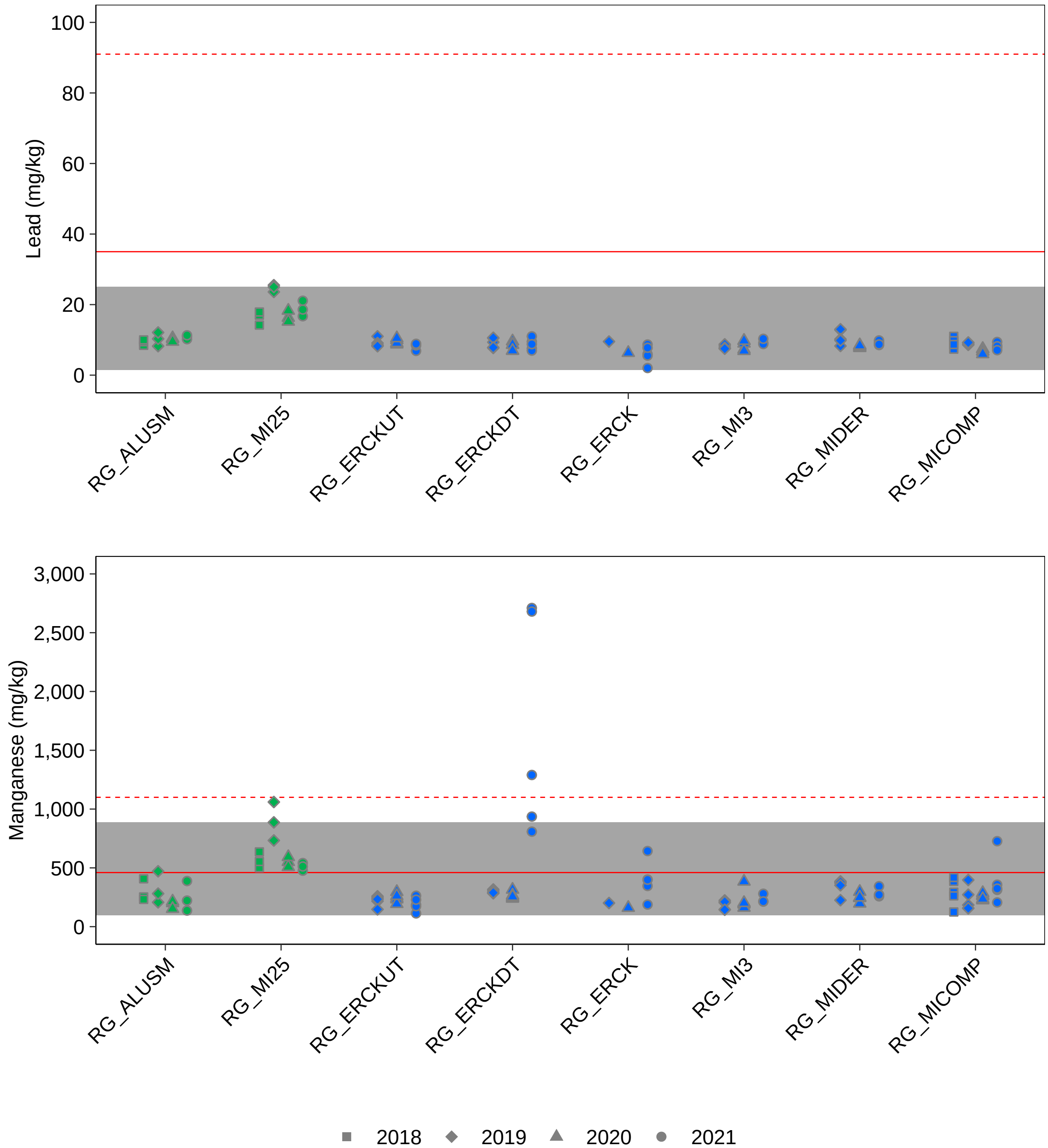

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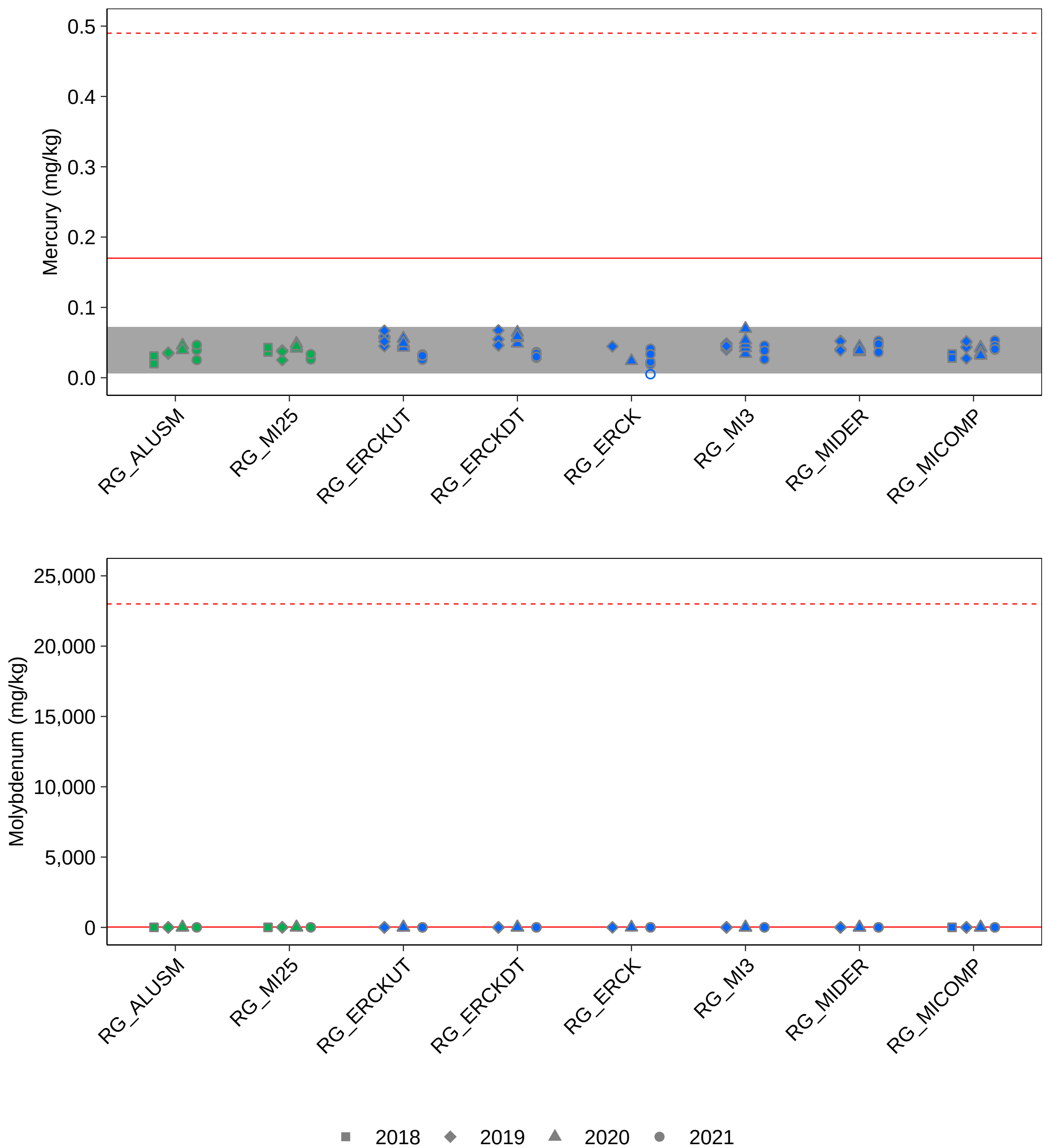

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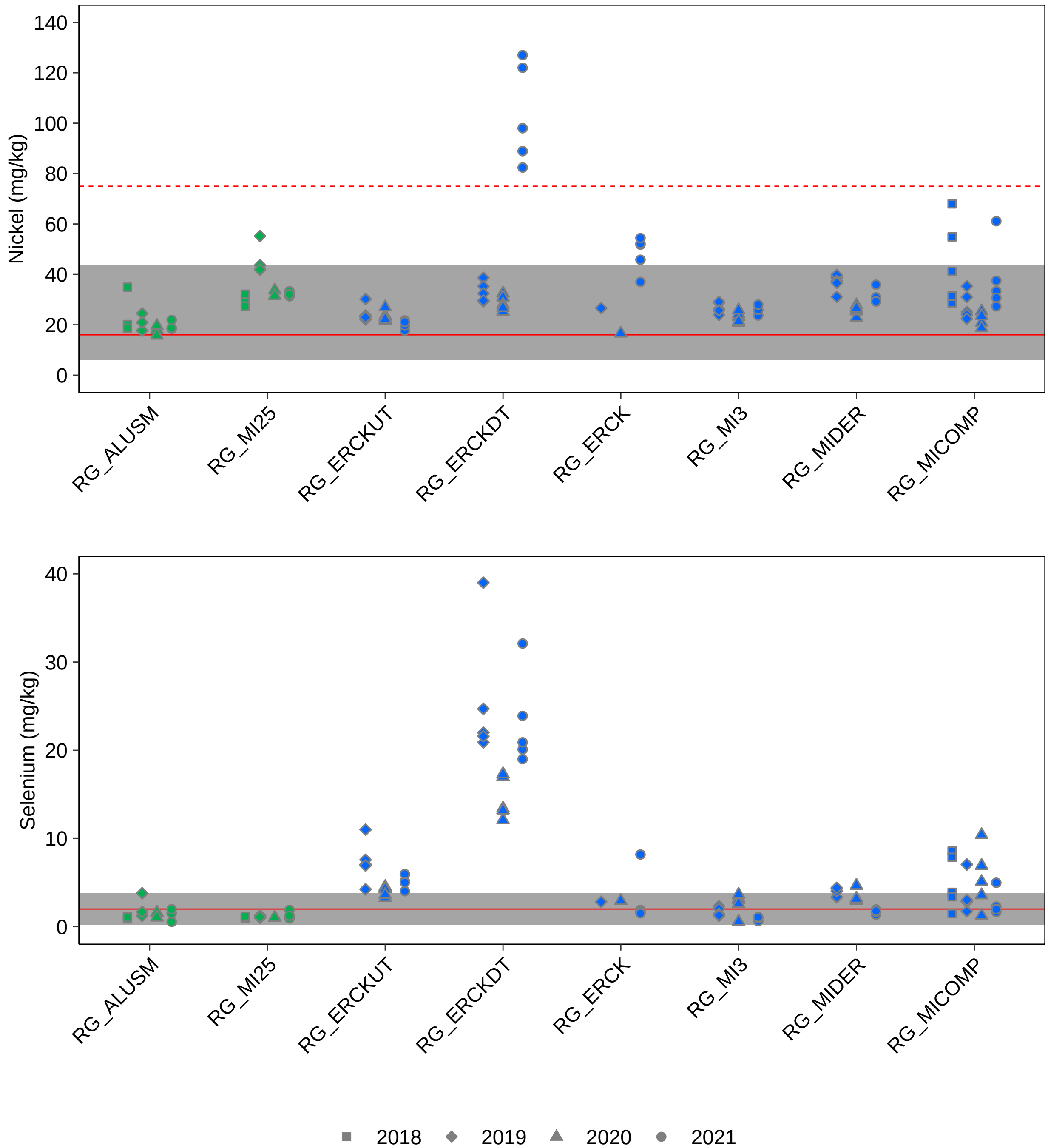

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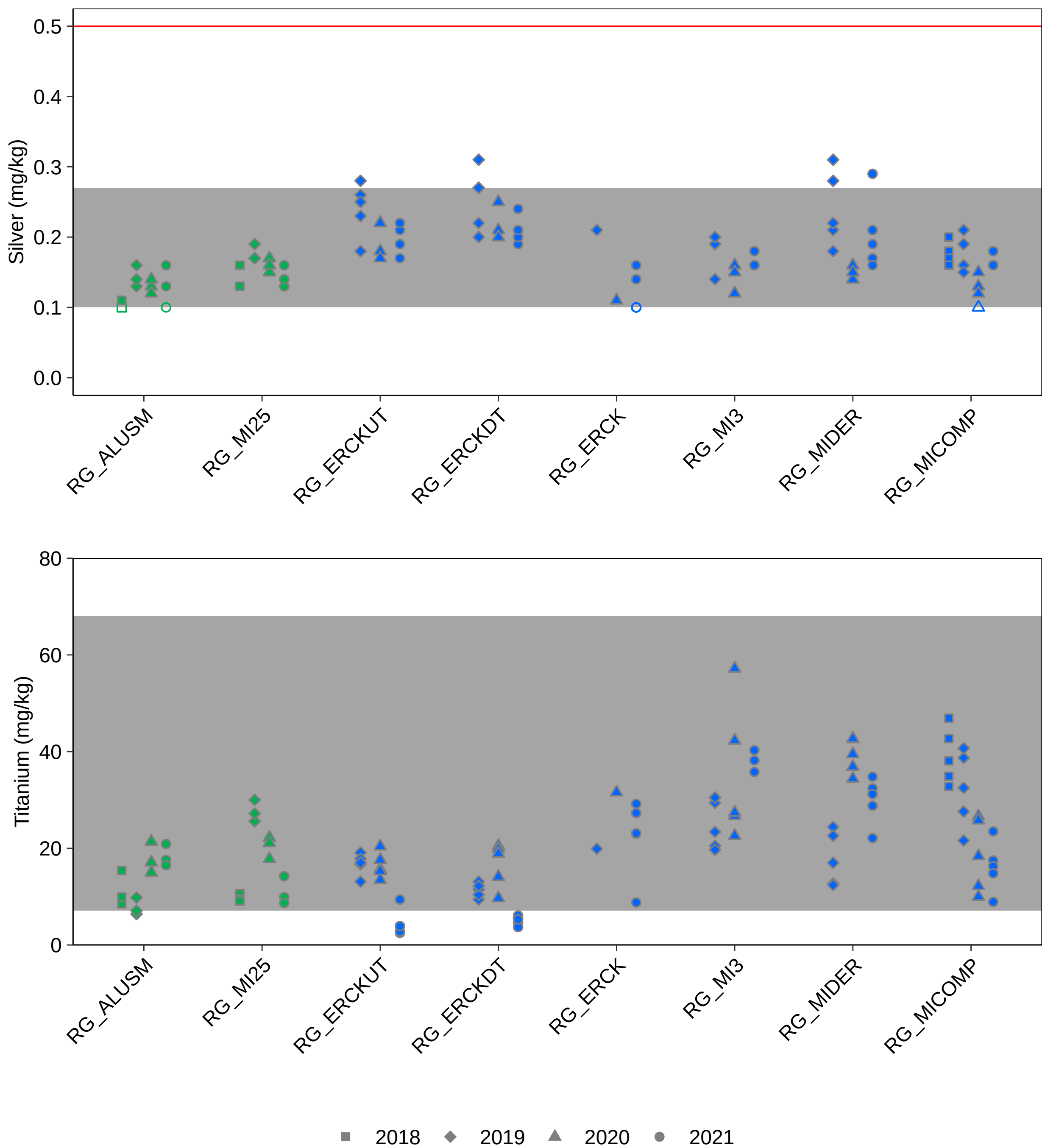

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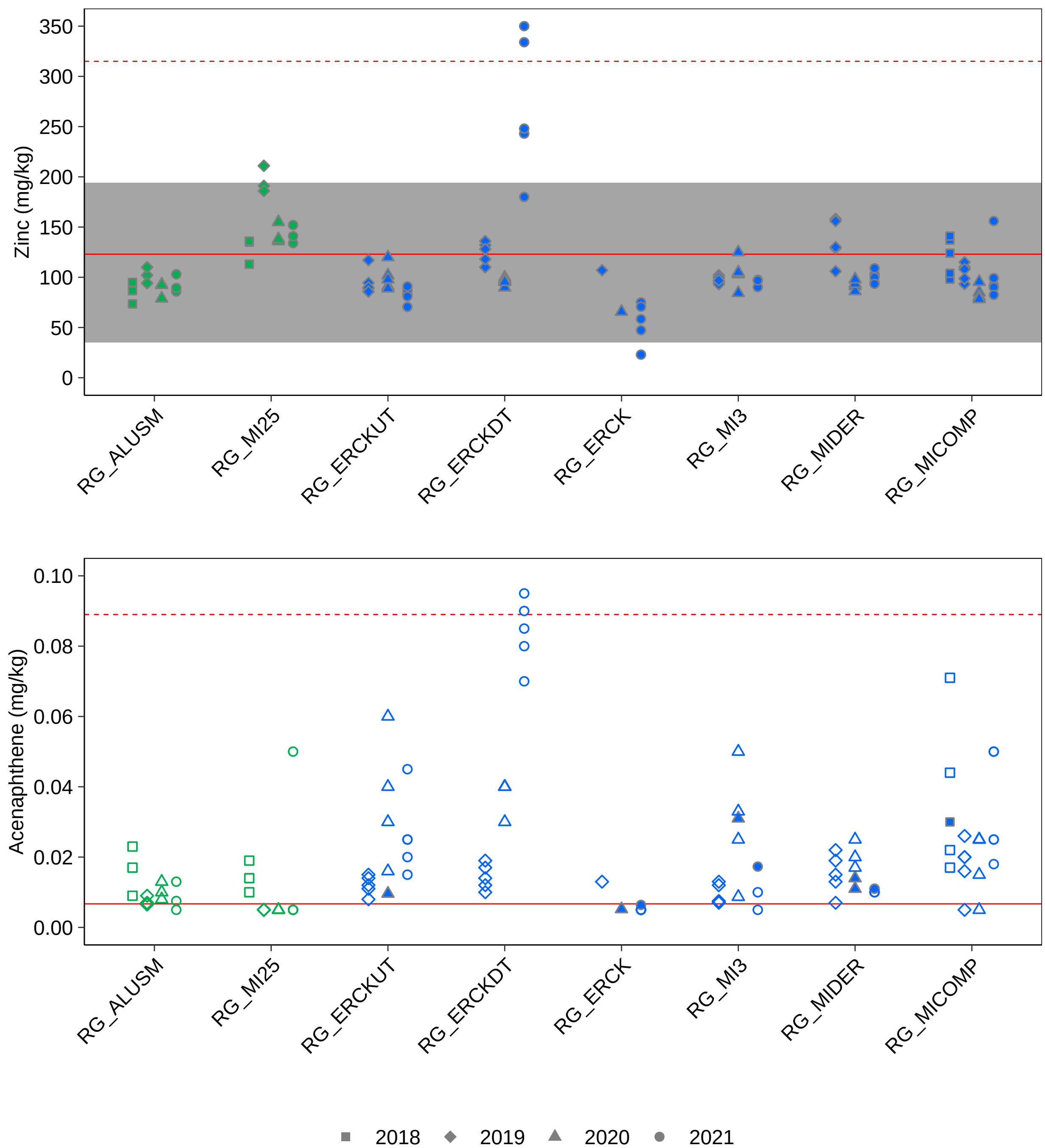

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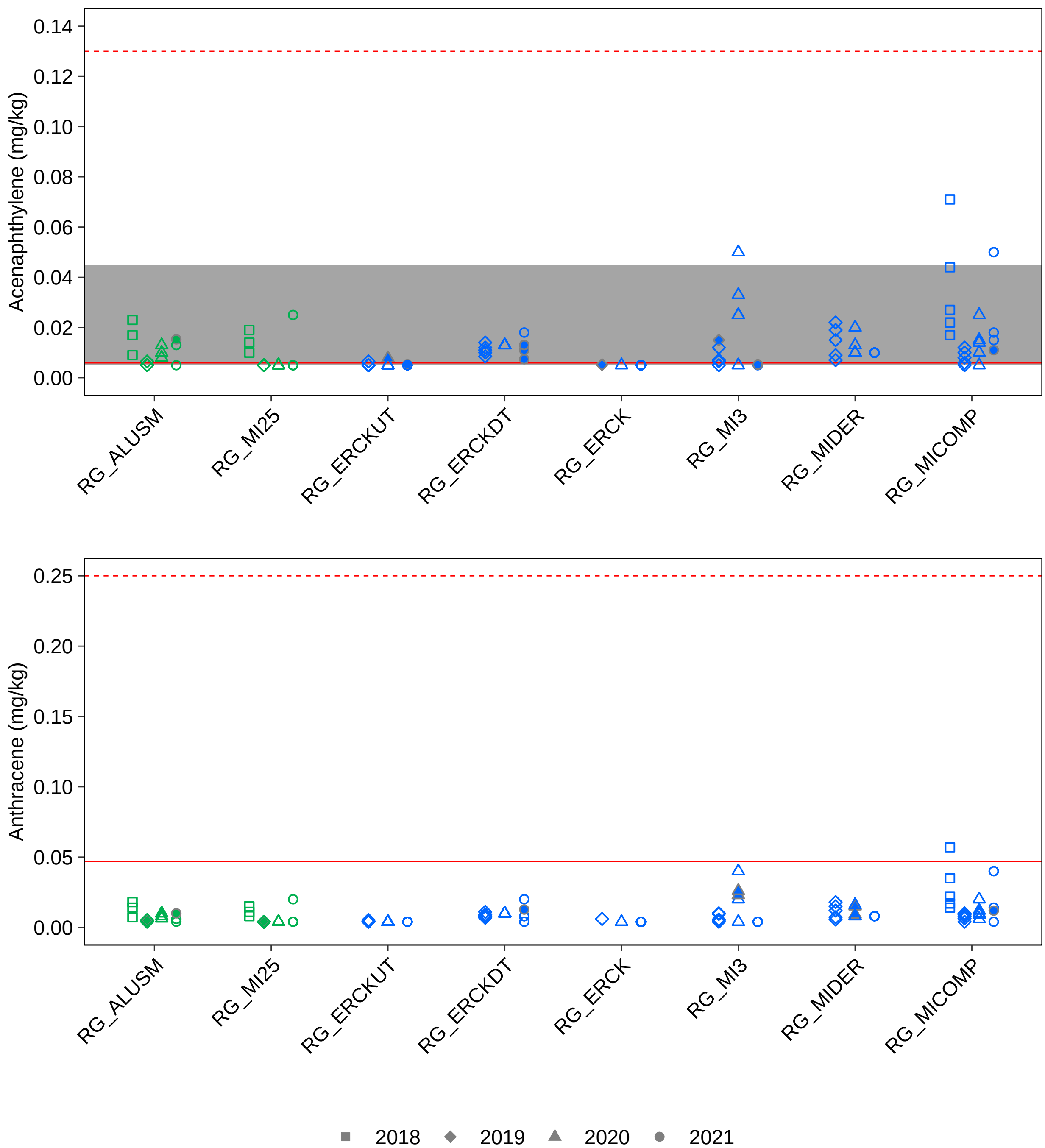

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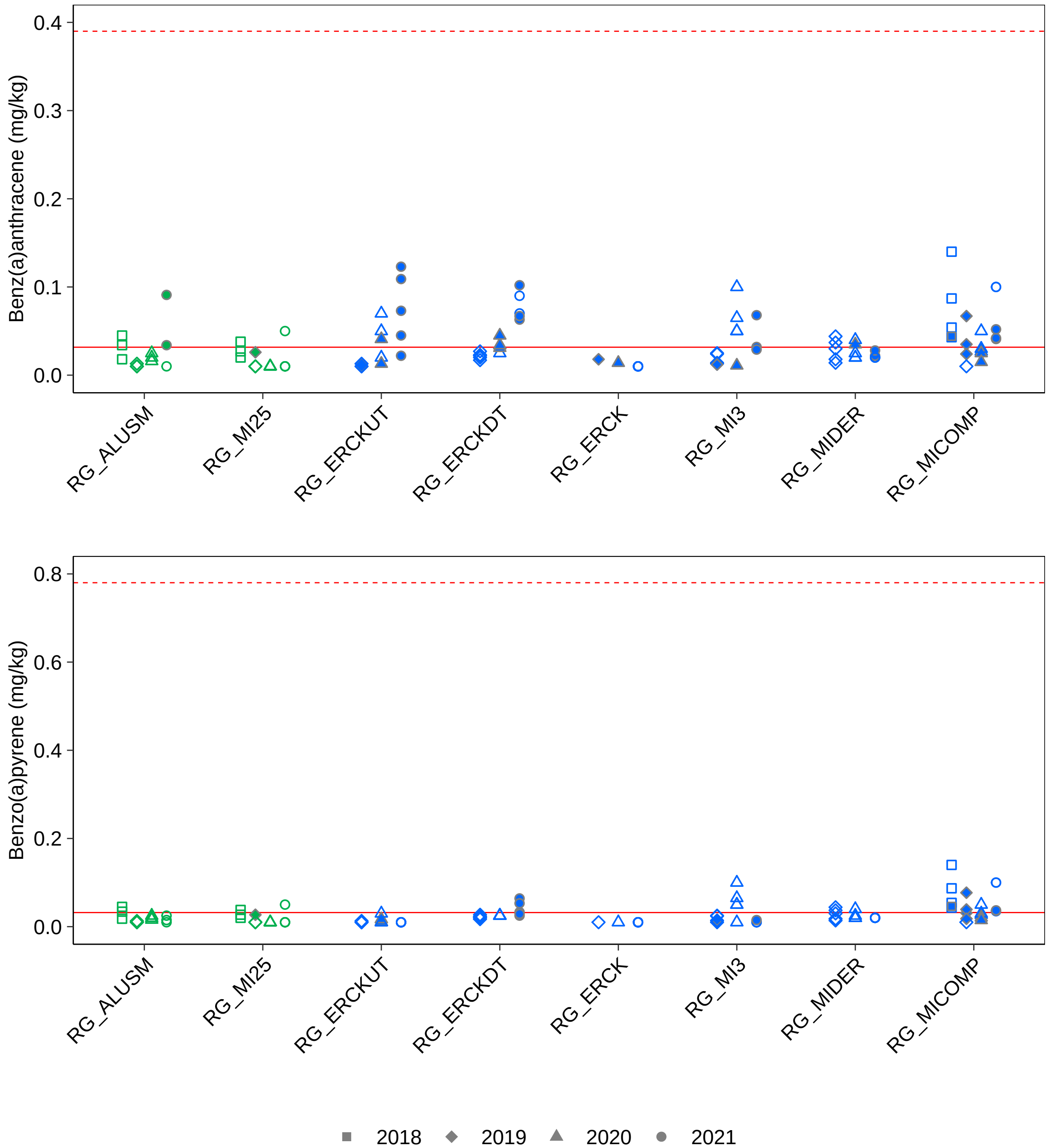

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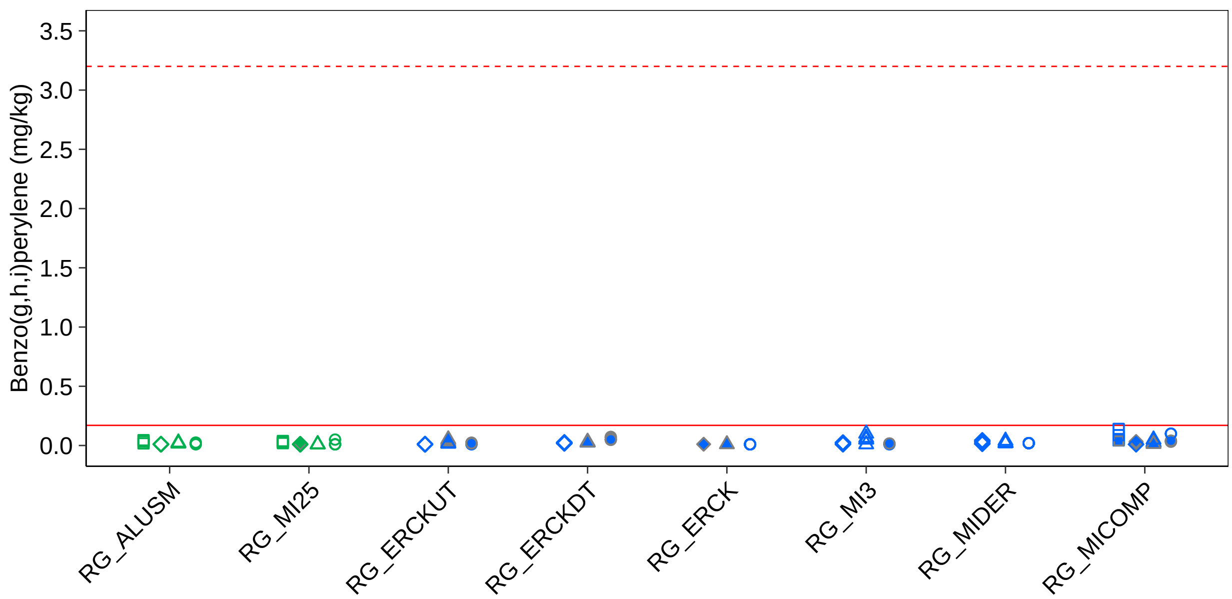

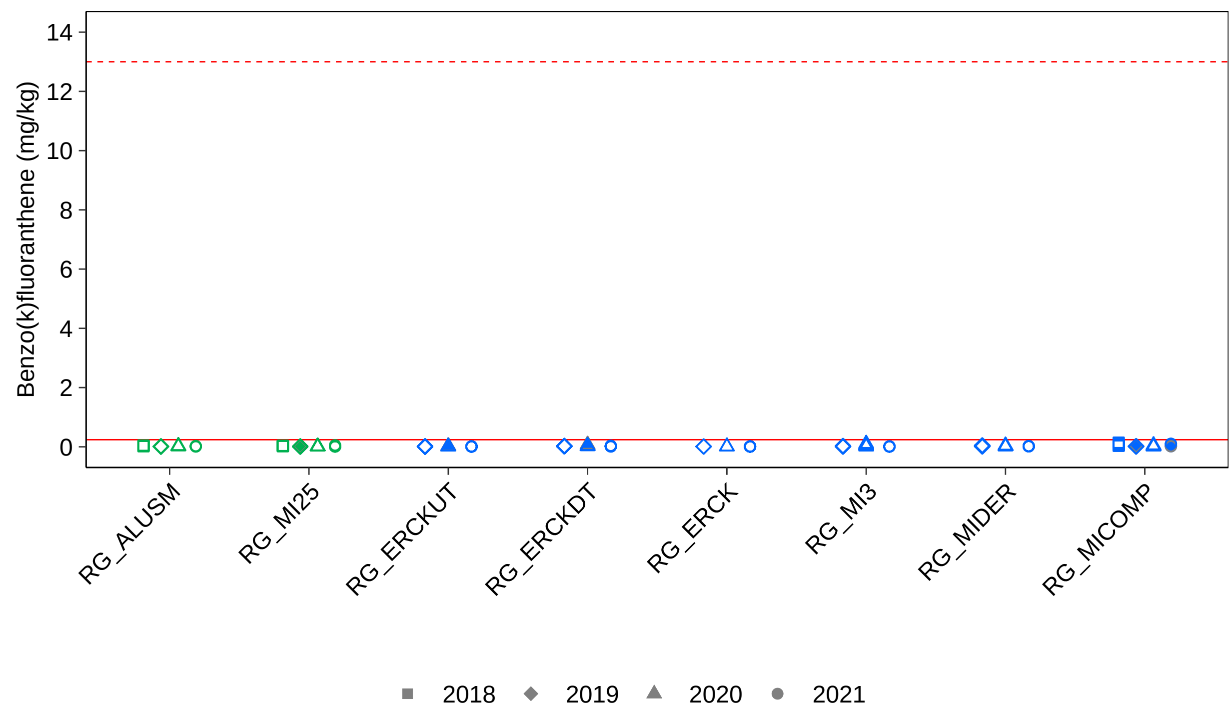

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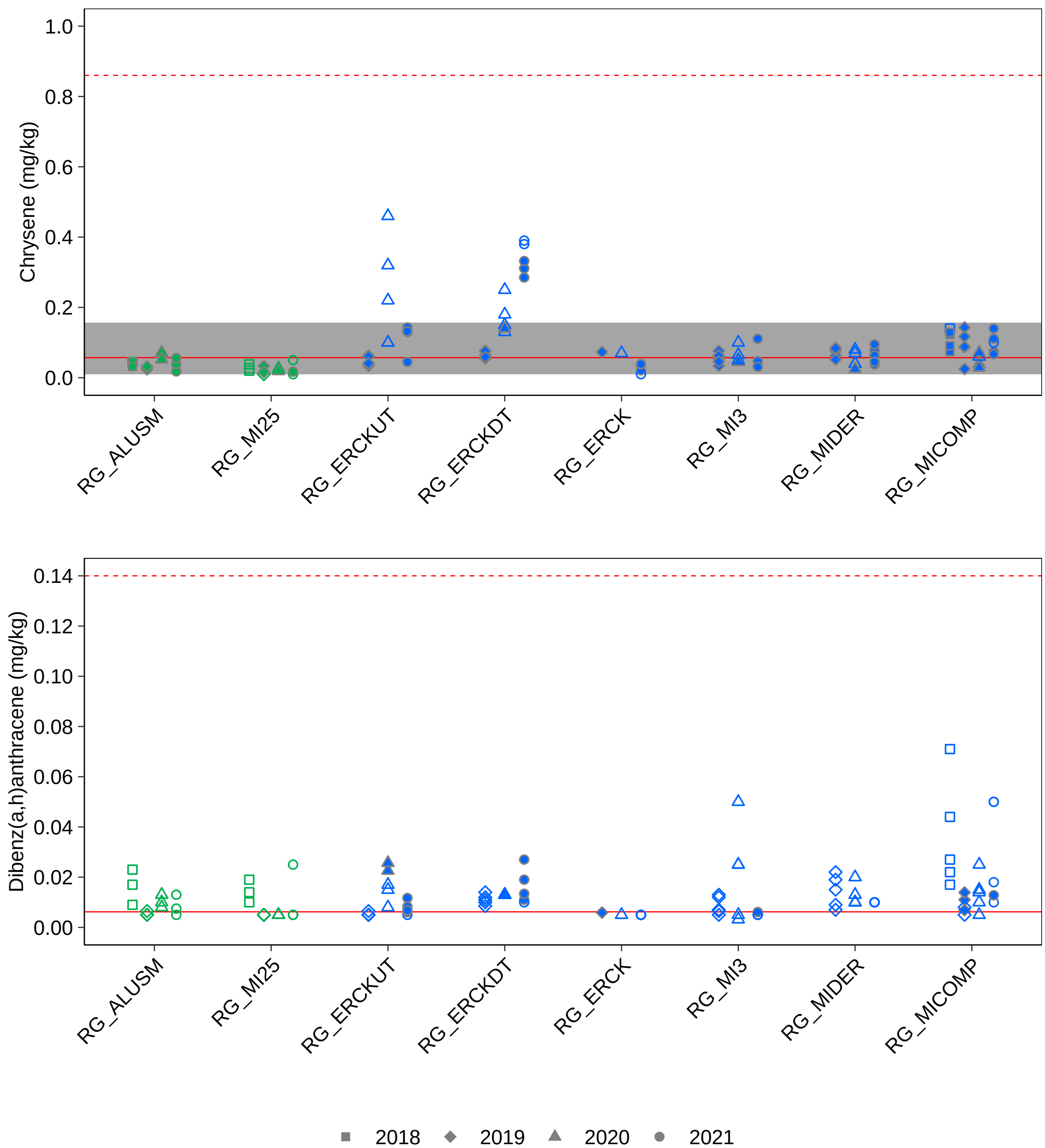

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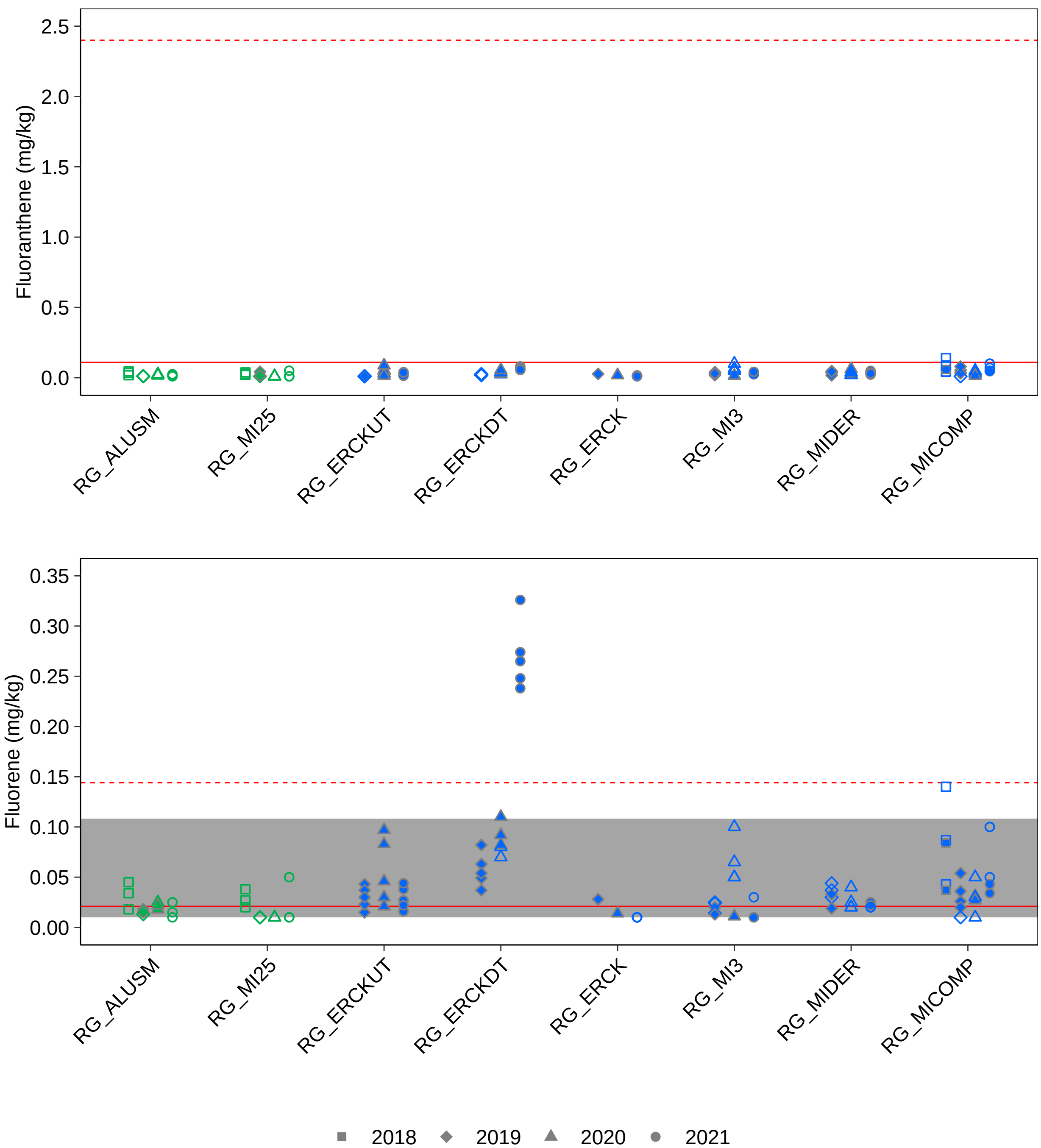

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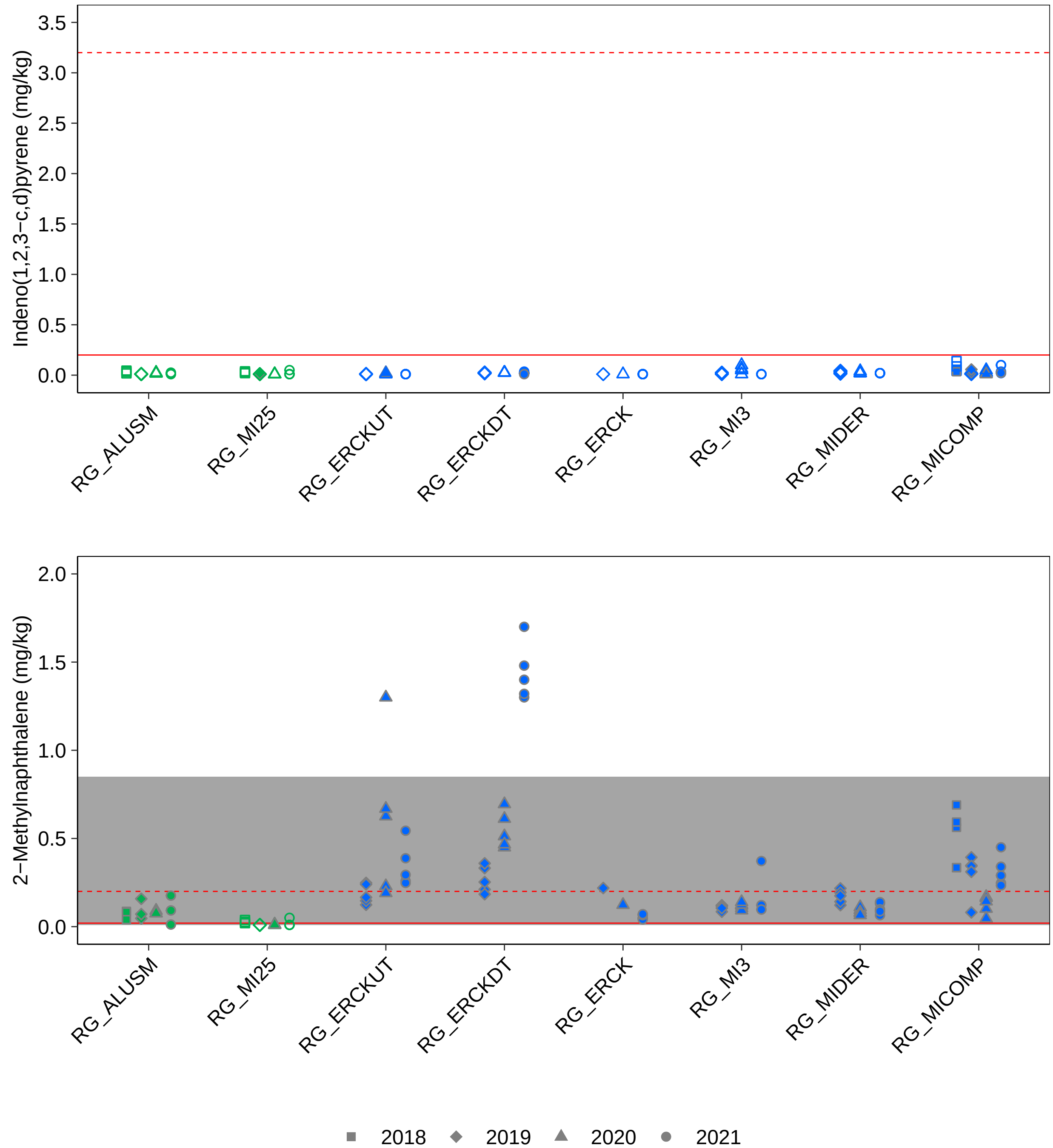

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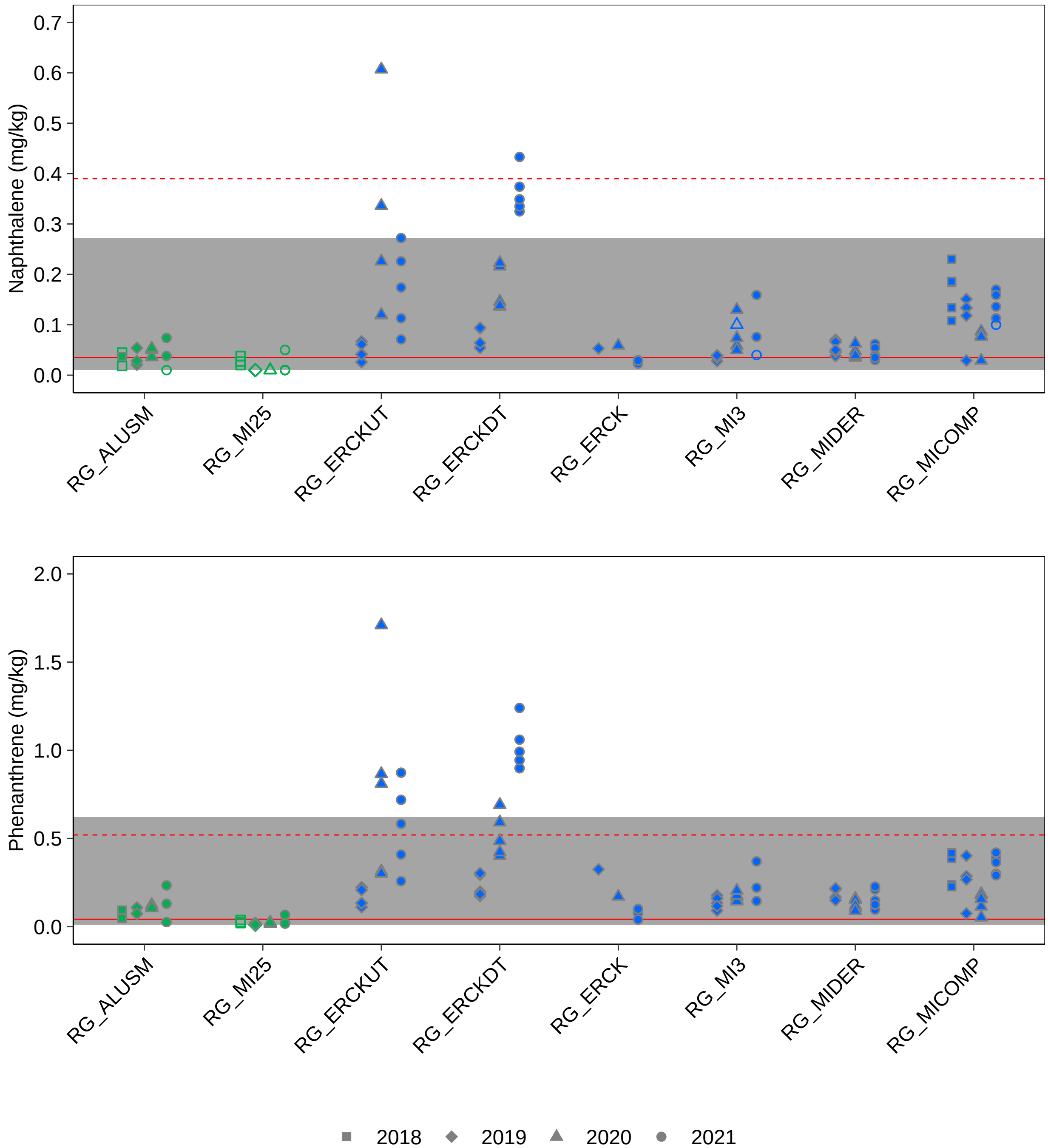

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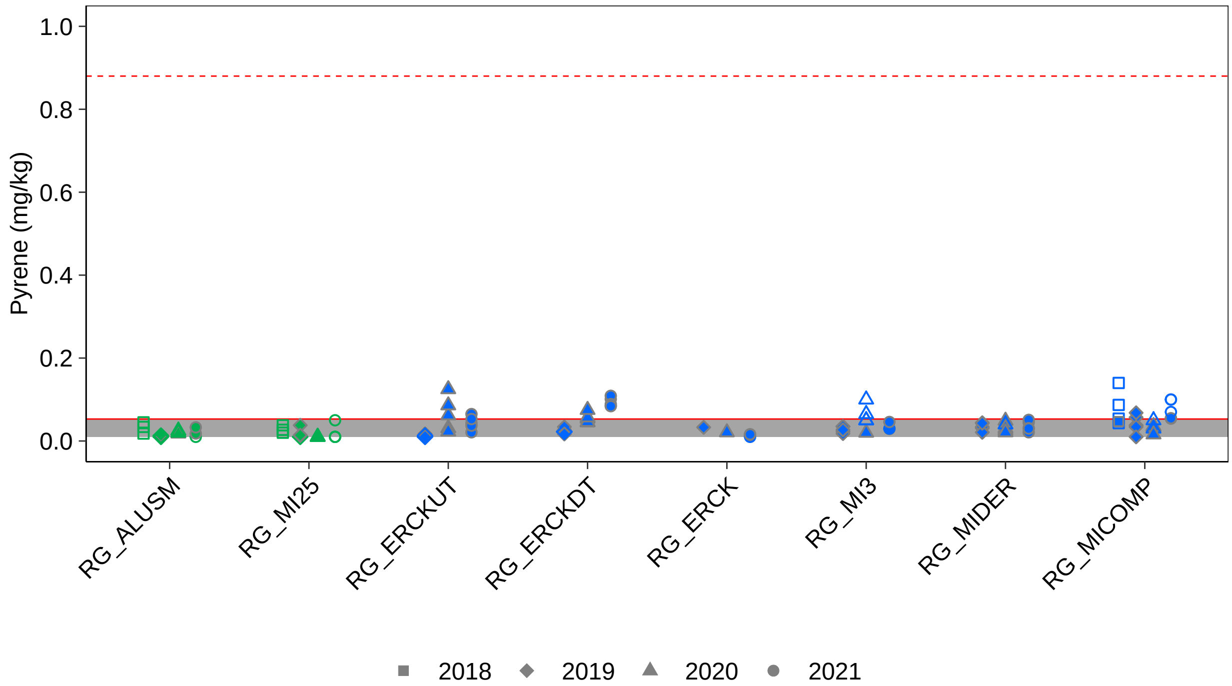

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Table C.1: Summary of Maximum Daily Temperature Exceedances in Erickson Creek, EVO LAEMP, 2021

Month	Threshold	RG_ERCK (Logger 1)			RG_ERCK (Logger 2)			EV_EC1 Logger		
		Number of Days	Number of Days Exceeding Threshold	Number of Days Exceeding Threshold (%)	Number of Days	Number of Days Exceeding Threshold	Number of Days Exceeding Threshold (%)	Number of Days	Number of Days Exceeding Threshold	Number of Days Exceeding Threshold (%)
August	13	19	3	15.8	19	1	5.26	19	0	0
September	10	27	18	66.7	30	16	53.3	30	15	50
October	10	31	0	0	31	0	0	31	0	0
November	7	30	0	0	30	0	0	30	0	0
December	7	14	0	0	14	0	0	31	0	0

Notes: "-" = no data available. Exceedances were only assessed after the SPO came into effect on August 13, 2021.

Table C.2: Sediment Physical and Chemical Data and Summary Statistics for EVO LAEMP, 2021

	Analyte	Units	LRL	BC Sediment Quality Guidelines: Lower WSQG	BC Sediment Quality Guidelines: Upper WSQG	Reference: RG_ALUSM: RG_ALUSM_1 (12-Sep)	RG_ALUSM_2 (12-Sep)	RG_ALUSM_3 (12-Sep)	Minimum	Median	Maximum	Mean	Standard Deviation	95th Percentile	Reference: RG_MI25: RG_MI25_1 (15-Sep)	RG_MI25_2 (15-Sep)	RG_MI25_3 (15-Sep)	Minimum	Median	Maximum	Mean	Standard Deviation	95th Percentile
Physical Tests	% Moisture	%	0.25	-	-	34.1	65.0	82.7	34.1	65.0	82.7	60.6	24.6	82.7	38.0	48.2	90.3	38.0	48.2	90.3	58.8	27.7	90.3
	pH (1:2 soil:water)	pH	0.1	-	-	7.63	7.26	7.32	7.26	7.32	7.63	7.40	0.199	7.63	8.13	8.15	7.64	7.64	8.13	8.15	7.97	0.289	8.15
Particle Size	% Gravel (>2mm)	%	1	-	-	1.70	19.4	8.50	1.70	8.50	19.4	9.87	8.93	19.4	4.00	5.70	6.20	4.00	5.70	6.20	5.30	1.15	6.20
	% Sand (2.00mm - 1.00mm)	%	1	-	-	4.50	3.20	<1	<1	3.20	4.50	2.90	0.867	4.50	5.10	7.50	1.40	1.40	5.10	7.50	4.67	3.07	7.50
	% Sand (1.00mm - 0.50mm)	%	1	-	-	10.9	<1	<1	<1	<1	10.9	4.30	-	10.9	5.80	9.90	1.80	1.80	5.80	9.90	5.83	4.05	9.90
	% Sand (0.50mm - 0.25mm)	%	1	-	-	19.1	1.30	1.30	1.30	1.30	19.1	7.23	10.3	19.1	11.7	14.4	6.20	6.20	11.7	14.4	10.8	4.18	14.4
	% Sand (0.25mm - 0.125mm)	%	1	-	-	16.9	5.70	4.00	4.00	5.70	16.9	8.87	7.01	16.9	17.6	13.8	13.4	13.4	13.8	17.6	14.9	2.32	17.6
	% Sand (0.125mm - 0.063mm)	%	1	-	-	11.5	11.5	7.70	7.70	11.5	11.5	10.2	2.19	11.5	12.9	10.8	8.80	8.80	10.8	12.9	10.8	2.05	12.9
	% Silt (0.063mm - 0.0312mm)	%	1	-	-	15.1	25.7	32.2	15.1	25.7	32.2	24.3	8.63	32.2	15.9	14.2	27.9	14.2	15.9	27.9	19.3	7.47	27.9
	% Silt (0.0312mm - 0.004mm)	%	1	-	-	16.4	28.0	39.1	16.4	28.0	39.1	27.8	11.4	39.1	20.6	18.3	29.0	18.3	20.6	29.0	22.6	5.63	29.0
	% Clay (<4um)	%	1	-	-	3.80	4.30	6.60	3.80	4.30	6.60	4.90	1.49	6.60	6.40	5.40	5.20	5.20	5.40	6.40	5.67	0.643	6.40
Organic Carbon	Total Organic Carbon	%	0.05	-	-	-	-	-	2.23	5.89	7.50	5.21	2.70	7.50	-	-	-	1.64	1.96	2.12	1.91	0.244	2.12
Metals	Aluminum	mg/kg	50	-	-	9,240	7,250	7,260	7,250	7,260	9,240	7,917	1,146	9,240	12,700	15,600	14,500	12,700	14,500	15,600	14,267	1,464	15,600
	Antimony	mg/kg	0.1	-	-	0.400	0.360	0.600	0.360	0.400	0.600	0.453	0.129	0.600	0.640	0.660	0.670	0.640	0.660	0.670	0.657	0.0153	0.670
	Arsenic	mg/kg	0.1	5.9	17	7.23	4.30	6.75	4.30	6.75	7.23	6.09	1.57	7.23	12.0	12.3	11.8	11.8	12.0	12.3	12.0	0.252	12.3
	Barium	mg/kg	0.5	-	-	149	149	177	149	149	177	158	16.2	177	151	165	171	151	165	171	162	10.3	171
	Beryllium	mg/kg	0.1	-	-	0.600	0.500	0.540	0.500	0.540	0.600	0.547	0.0503	0.600	0.830	1.00	0.910	0.830	0.910	1.00	0.913	0.0850	1.00
	Bismuth	mg/kg	0.2	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2	0.220	0.240	0.220	0.220	0.220	0.240	0.227	0.0115	0.240
	Boron	mg/kg	5	-	-	8.50	7.20	7.40	7.20	7.40	8.50	7.70	0.700	8.50	8.60	13.0	11.2	8.60	11.2	13.0	10.9	2.21	13.0
	Cadmium	mg/kg	0.02	0.6	3.5	0.505	0.731	0.972	0.505	0.731	0.972	0.736	0.234	0.972	1.31	1.45	1.47	1.31	1.45	1.47	1.41	0.0872	1.47
	Calcium	mg/kg	50	-	-	28,800	34,000	41,000	28,800	34,000	41,000	34,600	6,122	41,000	15,000	14,700	15,200	14,700	15,000	15,200	14,967	252	15,200
	Chromium	mg/kg	0.5	37.3	90	13.8	13.6	14.9	13.6	13.8	14.9	14.1	0.700	14.9	17.7	21.6	20.7	17.7	20.7	21.6	20.0	2.04	21.6
	Cobalt	mg/kg	0.1	-	-	5.61	5.12	6.18	5.12	5.61	6.18	5.64	0.531	6.18	8.65	8.92	8.79	8.65	8.79	8.92	8.79	0.135	8.92
	Copper	mg/kg	0.5	35.7	197	12.8	12.0	14.6	12.0	12.8	14.6	13.1	1.33	14.6	26.7	29.8	28.4	26.7	28.4	29.8	28.3	1.55	29.8
	Iron	mg/kg	50	21200	43766	19,900	13,800	17,800	13,800	17,800	19,900	17,167	3,099	19,900	23,800	25,500	23,100	23,100	23,800	25,500	24,133	1,234	25,500
	Lead	mg/kg	0.5	35	91.3	10.9	10.2	11.3	10.2	10.9	11.3	10.8	0.557	11.3	16.7	18.6	21.1	16.7	18.6	21.1	18.8	2.21	21.1
	Lithium	mg/kg	2	-	-	14.3	10.8	10.9	10.8	10.9	14.3	12.0	1.99	14.3	21.7	23.6	22.5	21.7	22.5	23.6	22.6	0.954	23.6
	Magnesium	mg/kg	20	-	-	8,450	9,590	9,250	8,450	9,250	9,590	9,097	585	9,590	6,530	6,390	5,910	5,910	6,390	6,530	6,277	325	6,530
	Manganese	mg/kg	1	460	1100	137	222	388	137	222	388	249	128	388	476	541	512	476	512	541	510	32.6	541
	Mercury	mg/kg	0.005	0.17	0.486	0.0252	0.0393	0.0467	0.0252	0.0393	0.0467	0.0371	0.0109	0.0467	0.0270	0.0260	0.0335	0.0260	0.0270	0.0335	0.0288	0.00407	0.0335
	Molybdenum	mg/kg	0.1	25	23000	1.71	1.01	1.58	1.01	1.58	1.71	1.43	0.372	1.71	5.74	5.94	5.28	5.28	5.74	5.94	5.65	0.338	5.94
	Nickel	mg/kg	0.5	16	75	18.4	18.7	21.9	18.4	18.7	21.9	19.7	1.94	21.9	31.3	33.3	32.1	31.3	32.1	33.3	32.2	1.01	33.3
	Phosphorus	mg/kg	50	-	-	1,020	1,040	1,200	1,020	1,040	1,200	1,087	98.7	1,200	1,500	1,450	1,460	1,450	1,460	1,500	1,470	26.5	1,500
	Potassium	mg/kg	100	-	-	2,090	1,520	1,460	1,460	1,520	2,090	1,690	348	2,090	2,270	3,380	3,030	2,270	3,030	3,380	2,893	567	3,380
	Selenium	mg/kg	0.2	2	-	0.550	1.51	1.98	0.550	1.51	1.98	1.35	0.729	1.98	0.940	1.90	1.24	0.940	1.24	1.90	1.36	0.491	1.90
	Silver	mg/kg	0.1	0.5	-	<0.1	0.130	0.160	<0.1	0.130	0.160	0.130	0.0200	0.160	0.130	0.140	0.160	0.130	0.140	0.160	0.143	0.0153	0.160
	Sodium	mg/kg	50	-	-	177	100	100	100	100	177	126	44.5	177	86.0	98.0	92.0	86.0	92.0	98.0	92.0	6.00	98.0
	Strontium	mg/kg	0.5	-	-	66.4	45.7	59.5	45.7	59.5	66.4	57.2	10.5	66.4	46.2	43.6	46.7	43.6	46.2	46.7	45.5	1.66	46.7
	Sulphur	mg/kg	1,000	-	-	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	-	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	-	<1,000
	Thallium	mg/kg	0.05	-	-	0.216	0.224	0.228	0.216	0.224	0.228	0.223	0.00611	0.228	0.645	0.747	0.715	0.645	0.715	0.747	0.702	0.0522	0.747
	Tin	mg/kg	2	-	-	<2	<2	<2	<2	<2	<2	<2	-	<2	<2	<2	<2	<2	<2	<2	<2	-	<2
	Titanium	mg/kg	1	-	-	17.6	16.5	20.9	16.5	17.6	20.9	18.3	2.29	20.9	9.90	14.2	8.70	8.70	9.90	14.2	10.9	2.89	14.2
	Tungsten	mg/kg	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5
	Uranium	mg/kg	0.05	-	-	0.661	0.754	0.996	0.661	0.754	0.996	0.804	0.173	0.996	0.860	0.878	0.914	0.860	0.878	0.914	0.884	0.0275	0.914
	Vanadium	mg/kg	0.2	-	-	23.3	18.5	23.7	18.5	23.3	23.7	21.8	2.89	23.7	32.0	38.8	36.6	32.0	36.6	38.8	35.8	3.47	38.8
	Zinc	mg/kg	2	123	315	85.9	89.4	103	85.9	89.4	103	92.8	9.03	103	134	152	141	134	141	152	142	9.07	152
	Zirconium	mg/kg	1	-	-	1.20	1.10	1.30	1.10	1.20	1.30	1.20	0.100	1.30	<1	<1	<1	<1	<1	<1	<1	-	<1

Indicates values is greater than the lower British Columbia Working Sediment Quality Guidelines.

Indicates values is greater than the upper British Columbia Working Sediment Quality Guidelines.

Notes: "-" indicates data not available. LRL = laboratory reporting limit. BC WSQG = British Columbia Working Sediment Quality Guidelines (BCMOECCS 2021b) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021a). All data and summary statistics are displayed to three significant digits.

Table C.2: Sediment Physical and Chemical Data and Summary Statistics for EVO LAEMP, 2021

	Analyte	Units	LRL	BC Sediment Quality Guidelines		Reference																	
						RG_ALUSM									RG_MI25								
				Lower WSQG	Upper WSQG	RG_ALUSM_1	RG_ALUSM_2	RG_ALUSM_3	Minimum	Median	Maximum	Mean	Standard Deviation	95th Percentile	RG_MI25_1	RG_MI25_2	RG_MI25_3	Minimum	Median	Maximum	Mean	Standard Deviation	95th Percentile
						12-Sep	12-Sep	12-Sep							15-Sep	15-Sep	15-Sep						
Polycyclic Aromatic Hydrocarbons	Acenaphthene	mg/kg	0.005	0.0067	0.0889	<0.005	<0.0075	<0.013	<0.005	<0.0075	<0.013	<0.005	-	<0.013	<0.005	<0.005	<0.05	<0.005	<0.005	<0.05	<0.005	-	<0.05
	Acenaphthylene	mg/kg	0.005	0.0059	0.128	<0.005	0.0153	<0.013	<0.005	<0.013	0.0153	0.00843	-	0.0153	<0.005	<0.005	<0.025	<0.005	<0.005	<0.025	<0.005	-	<0.025
	Acridine	mg/kg	0.01	-	-	<0.01	<0.015	<0.025	<0.01	<0.015	<0.025	<0.01	-	<0.025	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	-	<0.05
	Anthracene	mg/kg	0.004	0.0469	0.245	<0.004	<0.006	0.0100	<0.004	<0.006	0.0100	0.00600	-	0.0100	<0.004	<0.004	<0.02	<0.004	<0.004	<0.02	<0.004	-	<0.02
	Benzo(a)anthracene	mg/kg	0.01	0.0317	0.385	<0.01	0.0340	0.0910	<0.01	0.0340	0.0910	0.0450	0.0380	0.0910	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	-	<0.05
	Benzo(a)pyrene	mg/kg	0.01	0.0319	0.782	<0.01	<0.015	<0.025	<0.01	<0.015	<0.025	<0.01	-	<0.025	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	-	<0.05
	Benzo(b&j)fluoranthene	mg/kg	0.01	-	-	<0.01	0.0330	0.0670	<0.01	0.0330	0.0670	0.0367	0.0227	0.0670	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	-	<0.05
	Benzo(b+j+k)fluoranthene	mg/kg	0.015	-	-	<0.015	0.0330	0.0670	<0.015	0.0330	0.0670	0.0383	0.0227	0.0670	<0.015	<0.015	<0.075	<0.015	<0.015	<0.075	<0.015	-	<0.075
	Benzo(e)pyrene	mg/kg	0.01	-	-	<0.01	0.0310	0.0520	<0.01	0.0310	0.0520	0.0310	0.0140	0.0520	<0.01	0.0110	<0.05	<0.01	0.0105	<0.05	0.0105	-	0.0110
	Benzo(g,h,i)perylene	mg/kg	0.01	0.17	3.2	<0.01	<0.015	<0.025	<0.01	<0.015	<0.025	<0.01	-	<0.025	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	-	<0.05
	Benzo(k)fluoranthene	mg/kg	0.01	0.24	13.4	<0.01	<0.015	<0.025	<0.01	<0.015	<0.025	<0.01	-	<0.025	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	-	<0.05
	Chrysene	mg/kg	0.01	0.0571	0.862	0.0180	0.0390	0.0560	0.0180	0.0390	0.0560	0.0377	0.0190	0.0560	<0.01	0.0170	<0.05	<0.01	0.0135	<0.05	0.0135	-	0.0170
	Dibenz(a,h)anthracene	mg/kg	0.005	0.0062	0.135	<0.005	<0.0075	<0.013	<0.005	<0.0075	<0.013	<0.005	-	<0.013	<0.005	<0.005	<0.025	<0.005	<0.005	<0.025	<0.005	-	<0.025
	Fluoranthene	mg/kg	0.01	0.111	2.355	<0.01	<0.015	<0.025	<0.01	<0.015	<0.025	<0.01	-	<0.025	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	-	<0.05
	Fluorene	mg/kg	0.01	0.021	0.144	<0.01	<0.015	<0.025	<0.01	<0.015	<0.025	<0.01	-	<0.025	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	-	<0.05
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.01	0.2	3.2	<0.01	<0.015	<0.025	<0.01	<0.015	<0.025	<0.01	-	<0.025	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	-	<0.05
	1-Methylnaphthalene	mg/kg	0.01	-	-	<0.05	0.0480	0.0940	0.0480	0.0480	0.0940	0.0633	0.0307	0.0940	<0.05	<0.05	0.0250	0.0250	0.0250	<0.05	0.0250	-	0.0250
	2-Methylnaphthalene	mg/kg	0.01	0.0202	0.201	0.0120	0.0920	0.176	0.0120	0.0920	0.176	0.0933	0.0820	0.176	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	-	<0.05
	Naphthalene	mg/kg	0.01	0.0346	0.391	<0.01	0.0380	0.0740	<0.01	0.0380	0.0740	0.0407	0.0240	0.0740	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	-	<0.05
	Perylene	mg/kg	0.01	-	-	<0.01	0.0340	0.0610	<0.01	0.0340	0.0610	0.0350	0.0180	0.0610	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	-	<0.05
	Phenanthrene	mg/kg	0.01	0.0419	0.515	0.0260	0.130	0.234	0.0260	0.130	0.234	0.130	0.104	0.234	<0.02	0.0170	0.0670	0.0170	0.0170	0.0670	0.0337	0.0333	0.0670
	Pyrene	mg/kg	0.01	0.053	0.875	<0.01	0.0180	0.0330	<0.01	0.0180	0.0330	0.0203	0.0100	0.0330	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	-	<0.05
	Quinoline	mg/kg	0.01	-	-	<0.05	<0.015	<0.025	<0.015	<0.025	<0.05	<0.015	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05
	d10-Acenaphthene	%	-	-	-	79.5	110	105	79.5	105	110	98.3	16.5	110	78.6	75.9	67.0	67.0	75.9	78.6	73.8	6.07	78.6
	d12-Chrysene	%	-	-	-	86.0	-	-	86.0	86.0	86.0	86.0	-	86.0	97.0	92.6	80.1	80.1	92.6	97.0	89.9	8.77	97.0
	d8-Naphthalene	%	-	-	-	74.3	106	98.0	74.3	98.0	106	92.7	16.4	106	79.6	76.3	74.6	74.6	76.3	79.6	76.8	2.54	79.6
	d10-Phenanthrene	%	-	-	-	82.6	122	119	82.6	119	122	108	21.9	122	90.5	88.4	78.3	78.3	88.4	90.5	85.7	6.52	90.5
	B(a)P Total Potency Equivalent	mg/kg	0.02	-	-	<0.02	<0.02	0.0380	<0.02	<0.02	0.0380	0.0260	-	0.0380	<0.02	<0.02	<0.048	<0.02	<0.02	<0.048	<0.02	-	<0.048

Indicates values is greater than the lower British Columbia Working Sediment Quality Guidelines.

Indicates values is greater than the upper British Columbia Working Sediment Quality Guidelines.

Notes: "-" indicates data not available. LRL = laboratory reporting limit. BC WSQG = British Columbia Working Sediment Quality Guidelines (BCMOECCS 2021b) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021a). All data and summary statistics are displayed to three significant digits.

Table C.2: Sediment Physical and Chemical Data and Summary Statistics for EVO LAEMP, 2021

	Analyte	Units	LRL	BC Sediment Quality Guidelines Lower WSQG	BC Sediment Quality Guidelines Upper WSQG	Mine-exposed RG_ERCKUT RG_ERCKUT_1 15-Sep	RG_ERCKUT_2 15-Sep	RG_ERCKUT_3 15-Sep	RG_ERCKUT_4 15-Sep	RG_ERCKUT_5 15-Sep	Minimum	Median	Maximum	Mean	Standard Deviation	RG_ERCKDT RG_ERCKDT_1 14-Sep	RG_ERCKDT_2 14-Sep	RG_ERCKDT_3 14-Sep	RG_ERCKDT_4 14-Sep	RG_ERCKDT_5 14-Sep	Minimum	Median	Maximum	Mean	Standard Deviation
Physical Tests	% Moisture	%	0.25	-	-	56.4	58.1	58.5	56.5	48.9	48.9	56.5	58.5	55.7	3.90	86.4	78.9	83.9	80.3	73.8	73.8	80.3	86.4	80.7	4.84
	pH (1:2 soil:water)	pH	0.1	-	-	8.13	7.72	7.51	7.53	7.63	7.51	7.63	8.13	7.70	0.253	8.01	7.91	8.05	7.82	8.04	7.82	8.01	8.05	7.97	0.0986
Particle Size	% Gravel (>2mm)	%	1	-	-	8.30	6.00	<1	4.10	<1	<1	4.10	8.30	4.08	2.04	<1	2.10	2.20	<1	<1	<1	<1	2.20	1.46	0.0566
	% Sand (2.00mm - 1.00mm)	%	1	-	-	2.20	2.80	1.50	3.50	2.10	1.50	2.20	3.50	2.42	0.760	<1	1.60	6.40	<1	<1	<1	<1	6.40	2.20	2.72
	% Sand (1.00mm - 0.50mm)	%	1	-	-	4.10	5.40	5.50	8.00	5.50	4.10	5.50	8.00	5.70	1.42	<1	3.10	5.90	<1	<1	<1	<1	5.90	2.40	1.58
	% Sand (0.50mm - 0.25mm)	%	1	-	-	9.30	18.7	16.7	14.9	17.8	9.30	16.7	18.7	15.5	3.73	<1	7.70	4.30	1.30	2.00	<1	2.00	7.70	3.26	2.83
	% Sand (0.25mm - 0.125mm)	%	1	-	-	14.9	23.3	27.3	18.8	28.3	14.9	23.3	28.3	22.5	5.67	3.20	10.5	4.10	4.30	6.50	3.20	4.30	10.5	5.72	2.93
	% Sand (0.125mm - 0.063mm)	%	1	-	-	13.8	11.4	14.8	13.1	15.0	11.4	13.8	15.0	13.6	1.46	4.70	7.80	5.00	7.10	8.00	4.70	7.10	8.00	6.52	1.56
	% Silt (0.063mm - 0.0312mm)	%	1	-	-	21.5	14.2	15.9	15.1	14.9	14.2	15.1	21.5	16.3	2.96	24.7	18.3	21.5	24.5	23.1	18.3	23.1	24.7	22.4	2.64
	% Silt (0.0312mm - 0.004mm)	%	1	-	-	22.1	15.3	15.5	17.3	13.9	13.9	15.5	22.1	16.8	3.19	50.8	35.0	39.2	48.9	45.9	35.0	45.9	50.8	44.0	6.67
	% Clay (<4um)	%	1	-	-	3.70	2.90	2.80	5.30	2.50	2.50	2.90	5.30	3.44	1.13	15.5	13.9	11.5	13.2	12.9	11.5	13.2	15.5	13.4	1.46
Organic Carbon	Total Organic Carbon	%	0.05	-	-	-	-	-	-	-	6.34	7.99	10.4	8.57	1.71	-	-	-	-	-	7.66	8.97	11.8	9.42	1.57
Metals	Aluminum	mg/kg	50	-	-	4,580	5,000	4,560	4,980	4,630	4,560	4,630	5,000	4,750	221	3,610	3,700	3,950	3,660	4,180	3,610	3,700	4,180	3,820	240
	Antimony	mg/kg	0.1	-	-	0.340	0.930	0.900	0.610	0.860	0.340	0.860	0.930	0.728	0.251	0.950	0.800	0.660	0.820	0.730	0.660	0.800	0.950	0.792	0.108
	Arsenic	mg/kg	0.1	5.9	17	4.04	4.90	5.37	4.64	5.34	4.04	4.90	5.37	4.86	0.551	14.5	21.1	20.2	9.80	16.4	9.80	16.4	21.1	16.4	4.57
	Barium	mg/kg	0.5	-	-	133	174	167	179	154	133	167	179	161	18.4	178	197	199	193	207	178	197	207	195	10.7
	Beryllium	mg/kg	0.1	-	-	0.510	0.580	0.550	0.610	0.560	0.510	0.560	0.610	0.562	0.0370	0.460	0.560	0.590	0.470	0.520	0.460	0.520	0.590	0.520	0.0561
	Bismuth	mg/kg	0.2	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-
	Boron	mg/kg	5	-	-	<5	5.40	<5	<5	<5	<5	<5	5.40	5.08	-	8.50	<5	<5	6.10	6.00	<5	6.00	8.50	6.12	1.21
	Cadmium	mg/kg	0.02	0.6	3.5	0.992	1.23	1.26	1.27	1.17	0.992	1.23	1.27	1.18	0.114	3.85	4.65	5.15	3.13	4.06	3.13	4.06	5.15	4.17	0.772
	Calcium	mg/kg	50	-	-	22,400	42,800	22,700	18,800	30,400	18,800	22,700	42,800	27,420	9,581	67,400	75,800	71,900	79,500	81,300	67,400	75,800	81,300	75,180	5,652
	Chromium	mg/kg	0.5	37.3	90	8.87	9.73	9.25	9.18	9.16	8.87	9.18	9.73	9.24	0.311	8.58	8.76	8.46	8.51	9.42	8.46	8.58	9.42	8.75	0.394
	Cobalt	mg/kg	0.1	-	-	4.48	4.98	6.25	5.70	5.55	4.48	5.55	6.25	5.39	0.681	63.6	123	121	45.7	55.3	45.7	63.6	123	81.7	37.3
	Copper	mg/kg	0.5	35.7	197	12.0	13.4	15.2	15.0	13.2	12.0	13.4	15.2	13.8	1.34	15.4	14.0	15.1	14.9	14.5	14.0	14.9	15.4	14.8	0.545
	Iron	mg/kg	50	21200	43766	9,560	12,000	12,200	10,900	13,600	9,560	12,000	13,600	11,652	1,513	25,700	41,100	40,400	20,300	30,100	20,300	30,100	41,100	31,520	9,116
	Lead	mg/kg	0.5	35	91.3	6.88	8.60	8.75	8.44	8.89	6.88	8.60	8.89	8.31	0.818	7.56	9.52	11.0	6.97	8.79	6.97	8.79	11.0	8.77	1.60
	Lithium	mg/kg	2	-	-	5.70	6.40	5.80	6.30	6.00	5.70	6.00	6.40	6.04	0.305	5.50	6.20	6.50	5.90	6.10	5.50	6.10	6.50	6.04	0.371
	Magnesium	mg/kg	20	-	-	3,720	3,560	3,380	2,840	3,480	2,840	3,480	3,720	3,396	335	8,620	9,890	8,830	9,720	9,360	8,620	9,360	9,890	9,284	550
	Manganese	mg/kg	1	460	1100	113	186	263	174	229	113	186	263	193	57.0	1,290	2,710	2,680	808	936	808	1,290	2,710	1,685	939
	Mercury	mg/kg	0.005	0.17	0.486	0.0333	0.0298	0.0255	0.0258	0.0313	0.0255	0.0298	0.0333	0.0291	0.00342	0.0366	0.0340	0.0345	0.0282	0.0298	0.0282	0.0340	0.0366	0.0326	0.00349
	Molybdenum	mg/kg	0.1	25	23000	0.850	1.16	1.17	0.980	1.09	0.850	1.09	1.17	1.05	0.135	1.72	2.49	2.31	1.65	1.97	1.65	1.97	2.49	2.03	0.365
	Nickel	mg/kg	0.5	16	75	17.7	20.5	21.7	19.7	21.1	17.7	20.5	21.7	20.1	1.55	98.0	122	127	82.4	88.9	82.4	98.0	127	104	19.9
	Phosphorus	mg/kg	50	-	-	865	1,040	1,090	971	1,050	865	1,040	1,090	1,003	88.3	1,170	1,200	1,160	1,270	1,340	1,160	1,200	1,340	1,228	76.0
	Potassium	mg/kg	100	-	-	1,170	1,360	1,200	1,250	1,250	1,170	1,250	1,360	1,246	72.3	1,100	1,160	1,280	1,150	1,330	1,100	1,160	1,330	1,204	96.6
	Selenium	mg/kg	0.2	2	-	5.14	5.93	5.96	5.02	4.02	4.02	5.14	5.96	5.21	0.797	32.1	20.1	23.9	20.9	19.0	19.0	20.9	32.1	23.2	5.30
	Silver	mg/kg	0.1	0.5	-	0.190	0.190	0.210	0.220	0.170	0.170	0.190	0.220	0.196	0.0195	0.190	0.200	0.240	0.200	0.210	0.190	0.200	0.240	0.208	0.0192
	Sodium	mg/kg	50	-	-	<50.0	54.0	55.0	53.0	51.0	<50	53.0	55.0	52.6	1.85	84.0	82.0	89.0	82.0	90.0	82.0	84.0	90.0	85.4	3.85
	Strontium	mg/kg	0.5	-	-	37.4	51.0	46.1	39.0	45.7	37.4	45.7	51.0	43.8	5.58	71.4	89.5	88.3	80.4	86.2	71.4	86.2	89.5	83.2	7.45
	Sulphur	mg/kg	1,000	-	-	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	-	2,100	1,200	1,800	1,700	1,500	1,200	1,700	2,100	1,660	336
	Thallium	mg/kg	0.05	-	-	0.151	0.183	0.174	0.160	0.171	0.151	0.171	0.183	0.168	0.0125	0.355	0.297	0.302	0.249	0.281	0.249	0.297	0.355	0.297	0.0386
	Tin	mg/kg	2	-	-	<2	<2	<2	<2	<2	<2	<2	<2	<2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2	-
	Titanium	mg/kg	1	-	-	2.50	9.40	3.90	2.80	3.90	2.50	3.90	9.40	4.50	2.81	5.60	4.60	3.70	6.10	5.30	3.70	5.30	6.10	5.06	0.934
	Tungsten	mg/kg	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-
	Uranium	mg/kg	0.05	-	-	1.26	1.49	1.43	1.24	1.13	1.13	1.26	1.49	1.31	0.147	1.55	2.06	2.10	1.57	1.73	1.55	1.73	2.10	1.80	0.264
	Vanadium	mg/kg	0.2	-	-	20.5	25.3	24.1	23.2	23.8	20.5	23.8	25.3	23.4	1.78	18.9	19.2	20.2	18.6	21.6	18.6	19.2	21.6	19.7	1.22
	Zinc	mg/kg	2	123	315	70.5	82.5	86.8	81.0	90.9	70.5	82.5	90.9	82.3	7.67	243	334	350	180	248	180	248	350	271	70.4
	Zirconium	mg/kg	1	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	-

Indicates values is greater than the lower British Columbia Working Sediment Quality Guidelines.

Indicates values is greater than the upper British Columbia Working Sediment Quality Guidelines.

Notes: "-" indicates data not available. LRL = laboratory reporting limit. BC WSQG = British Columbia Working Sediment Quality Guidelines (BCMOECCS 2021b) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021a). All data and summary statistics are displayed to three significant digits.

Table C.2: Sediment Physical and Chemical Data and Summary Statistics for EVO LAEMP, 2021

	Analyte	Units	LRL	BC Sediment Quality Guidelines		Mine-exposed																				
						RG_ERCKUT										RG_ERCKDT										
				Lower WSQG	Upper WSQG	RG_ERCKUT_1	RG_ERCKUT_2	RG_ERCKUT_3	RG_ERCKUT_4	RG_ERCKUT_5	Minimum	Median	Maximum	Mean	Standard Deviation	RG_ERCKDT_1	RG_ERCKDT_2	RG_ERCKDT_3	RG_ERCKDT_4	RG_ERCKDT_5	Minimum	Median	Maximum	Mean	Standard Deviation
						15-Sep	15-Sep	15-Sep	15-Sep	15-Sep						14-Sep	14-Sep	14-Sep	14-Sep	14-Sep					
Polycyclic Aromatic Hydrocarbons	Acenaphthene	mg/kg	0.005	0.0067	0.0889	<0.025	<0.015	<0.02	<0.045	<0.025	<0.015	<0.025	<0.045	<0.015	-	<0.085	<0.07	<0.09	<0.095	<0.08	<0.07	<0.085	<0.095	<0.07	-
	Acenaphthylene	mg/kg	0.005	0.0059	0.128	<0.005	<0.005	<0.005	0.00520	<0.005	<0.005	<0.005	0.00520	0.00504	-	<0.018	0.0130	0.0110	0.0130	0.00740	0.00740	0.0120	<0.018	0.0111	0.00295
	Acridine	mg/kg	0.01	-	-	<0.02	<0.04	<0.03	<0.05	<0.03	<0.02	<0.03	<0.05	<0.02	-	<0.22	<0.19	<0.2	<0.2	<0.18	<0.18	<0.2	<0.22	<0.18	-
	Anthracene	mg/kg	0.004	0.0469	0.245	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.02	<0.008	<0.008	0.0127	<0.004	<0.004	<0.008	<0.02	0.00618	-
	Benzo(a)anthracene	mg/kg	0.01	0.0317	0.385	0.0730	0.0450	0.0220	0.109	0.123	0.0220	0.0730	0.123	0.0744	0.0423	0.102	0.0630	<0.09	<0.07	0.0670	0.0630	0.0670	0.102	0.0724	0.0184
	Benzo(a)pyrene	mg/kg	0.01	0.0319	0.782	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	0.0640	0.0330	0.0530	0.0250	0.0290	0.0250	0.0330	0.0640	0.0408	0.0169
	Benzo(b&j)fluoranthene	mg/kg	0.01	-	-	0.0810	0.0370	0.0640	0.112	0.0960	0.0370	0.0810	0.112	0.0780	0.0290	0.162	0.112	0.160	0.125	0.125	0.112	0.125	0.162	0.137	0.0227
	Benzo(b+j+k)fluoranthene	mg/kg	0.015	-	-	0.0810	0.0370	0.0640	0.112	0.0960	0.0370	0.0810	0.112	0.0780	0.0290	0.162	0.112	0.160	0.125	0.125	0.112	0.125	0.162	0.137	0.0227
	Benzo(e)pyrene	mg/kg	0.01	-	-	0.0690	0.0330	0.0590	0.0990	0.0810	0.0330	0.0690	0.0990	0.0682	0.0247	0.156	0.123	0.163	0.130	0.127	0.123	0.130	0.163	0.140	0.0183
	Benzo(g,h,i)perylene	mg/kg	0.01	0.17	3.2	0.0140	<0.01	0.0180	0.0240	0.0190	<0.01	0.0180	0.0240	0.0170	0.00428	0.0730	0.0480	0.0670	0.0490	0.0510	0.0480	0.0510	0.0730	0.0576	0.0116
	Benzo(k)fluoranthene	mg/kg	0.01	0.24	13.4	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.035	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02	<0.035	<0.01	-
	Chrysene	mg/kg	0.01	0.0571	0.862	0.130	0.0450	0.140	0.143	0.132	0.0450	0.132	0.143	0.118	0.0412	<0.39	0.285	<0.38	0.311	0.332	0.285	0.311	<0.39	0.309	0.0304
	Dibenz(a,h)anthracene	mg/kg	0.005	0.0062	0.135	0.00830	<0.005	0.00600	0.0117	0.00680	<0.005	0.00680	0.0117	0.00756	0.00247	0.0190	0.0110	0.0270	<0.01	0.0134	<0.01	0.0134	0.0270	0.0161	0.00705
	Fluoranthene	mg/kg	0.01	0.111	2.355	0.0350	0.0140	<0.03	0.0400	0.0370	0.0140	0.0350	0.0400	0.0280	0.0133	0.0810	0.0620	0.0680	0.0550	0.0570	0.0550	0.0620	0.0810	0.0646	0.0105
	Fluorene	mg/kg	0.01	0.021	0.144	0.0160	0.0270	0.0380	0.0440	0.0220	0.0160	0.0270	0.0440	0.0294	0.0115	0.274	0.248	0.326	0.238	0.265	0.238	0.265	0.326	0.270	0.0342
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.01	0.2	3.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.035	<0.02	<0.02	<0.02	0.0100	0.0100	0.0100	<0.035	0.0100	-
	1-Methylnaphthalene	mg/kg	0.01	-	-	0.177	0.156	0.190	0.329	0.250	0.156	0.190	0.329	0.220	0.0700	0.751	0.655	0.873	0.718	0.698	0.655	0.718	0.873	0.739	0.0826
	2-Methylnaphthalene	mg/kg	0.01	0.0202	0.201	0.259	0.248	0.294	0.544	0.388	0.248	0.294	0.544	0.347	0.123	1.48	1.30	1.70	1.32	1.40	1.30	1.40	1.70	1.44	0.162
	Naphthalene	mg/kg	0.01	0.0346	0.391	0.174	0.0710	0.113	0.272	0.226	0.0710	0.174	0.272	0.171	0.0815	0.374	0.325	0.433	0.335	0.349	0.325	0.349	0.433	0.363	0.0431
	Perylene	mg/kg	0.01	-	-	0.0220	<0.01	<0.01	0.0500	<0.01	<0.01	<0.01	0.0500	0.0204	0.0158	<0.035	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02	<0.035	<0.01	-
	Phenanthrene	mg/kg	0.01	0.0419	0.515	0.583	0.258	0.409	0.873	0.719	0.258	0.583	0.873	0.568	0.244	1.06	0.898	1.24	0.944	0.992	0.898	0.992	1.24	1.03	0.133
	Pyrene	mg/kg	0.01	0.053	0.875	0.0430	0.0210	0.0370	0.0650	0.0530	0.0210	0.0430	0.0650	0.0438	0.0166	0.101	0.0850	0.109	0.0890	0.0840	0.0840	0.0890	0.109	0.0936	0.0109
	Quinoline	mg/kg	0.01	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.035	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.05	<0.02	-
	d10-Acenaphthene	%	-	-	-	92.2	83.5	86.9	84.0	89.5	83.5	86.9	92.2	87.2	3.68	123	97.0	114	124	100	97.0	114	124	112	12.5
	d12-Chrysene	%	-	-	-	116	102	108	102	107	102	107	116	107	5.72	119	117	-	126	122	117	121	126	121	4.04
	d8-Naphthalene	%	-	-	-	90.1	83.3	86.6	87.0	87.4	83.3	87.0	90.1	86.9	2.43	115	95.1	111	119	95.7	95.1	111	119	107	11.0
	d10-Phenanthrene	%	-	-	-	107	96.2	101	96.9	99.5	96.2	99.5	107	100	4.33	110	109	129	88.6	113	88.6	110	129	110	14.5
	B(a)P Total Potency Equivalent	mg/kg	0.02	-	-	0.0310	<0.02	0.0220	0.0410	0.0360	<0.02	0.0310	0.0410	0.0300	0.00872	0.116	0.0670	0.104	0.0510	0.0670	0.0510	0.0670	0.116	0.0810	0.0276

Indicates values is greater than the lower British Columbia Working Sediment Quality Guidelines.

Indicates values is greater than the upper British Columbia Working Sediment Quality Guidelines.

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Table C.2: Sediment Physical and Chemical Data and Summary Statistics for EVO LAEMP, 2021

	Analyte	Units	LRL	BC Sediment Quality Guidelines		Mine-exposed									
						RG_ERCK									
				Lower WSQG	Upper WSQG	RG_ERCK_1	RG_ERCK_2	RG_ERCK_3	RG_ERCK_4	RG_ERCK_5	Minimum	Median	Maximum	Mean	Standard Deviation
						10-Sep	10-Sep	10-Sep	10-Sep	10-Sep					
Physical Tests	% Moisture	%	0.25	-	-	61.3	44.8	55.4	40.8	47.1	40.8	47.1	61.3	49.9	8.32
Physical Tests	pH (1:2 soil:water)	pH	0.1	-	-	6.95	7.44	7.12	7.55	7.42	6.95	7.42	7.55	7.30	0.251
Particle Size	% Gravel (>2mm)	%	1	-	-	4.70	2.00	3.30	<1	<1	<1	2.00	4.70	2.40	1.32
Particle Size	% Sand (2.00mm - 1.00mm)	%	1	-	-	7.40	2.90	5.60	<1	1.10	<1	2.90	7.40	3.60	2.89
Particle Size	% Sand (1.00mm - 0.50mm)	%	1	-	-	8.20	5.90	7.30	1.30	5.00	1.30	5.90	8.20	5.54	2.67
Particle Size	% Sand (0.50mm - 0.25mm)	%	1	-	-	15.6	19.4	21.8	20.8	20.2	15.6	20.2	21.8	19.6	2.38
Particle Size	% Sand (0.25mm - 0.125mm)	%	1	-	-	27.3	30.6	30.4	36.5	19.5	19.5	30.4	36.5	28.9	6.20
Particle Size	% Sand (0.125mm - 0.063mm)	%	1	-	-	13.9	13.8	11.1	15.4	12.4	11.1	13.8	15.4	13.3	1.63
Particle Size	% Silt (0.063mm - 0.0312mm)	%	1	-	-	11.1	11.7	9.40	12.0	17.8	9.40	11.7	17.8	12.4	3.18
Particle Size	% Silt (0.0312mm - 0.004mm)	%	1	-	-	10.0	11.4	9.20	11.1	19.6	9.20	11.1	19.6	12.3	4.20
Particle Size	% Clay (<4um)	%	1	-	-	1.70	2.20	1.90	2.30	3.50	1.70	2.20	3.50	2.32	0.701
Organic Carbon	Total Organic Carbon	%	0.05	-	-	-	-	-	-	-	2.10	2.33	4.58	2.72	1.05
Metals	Aluminum	mg/kg	50	-	-	4,360	3,550	1,360	6,550	5,920	1,360	4,360	6,550	4,348	2,055
Metals	Antimony	mg/kg	0.1	-	-	0.490	0.420	0.190	0.760	0.560	0.190	0.490	0.760	0.484	0.208
Metals	Arsenic	mg/kg	0.1	5.9	17	3.77	3.63	1.47	6.23	5.35	1.47	3.77	6.23	4.09	1.83
Metals	Barium	mg/kg	0.5	-	-	127	109	81.2	129	126	81.2	126	129	114	20.2
Metals	Beryllium	mg/kg	0.1	-	-	0.320	0.300	0.120	0.540	0.430	0.120	0.320	0.540	0.342	0.157
Metals	Bismuth	mg/kg	0.2	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-
Metals	Boron	mg/kg	5	-	-	5.50	<5	<5	6.10	5.90	<5	5.50	6.10	5.50	0.310
Metals	Cadmium	mg/kg	0.02	0.6	3.5	0.651	0.571	0.320	0.839	0.791	0.320	0.651	0.839	0.634	0.206
Metals	Calcium	mg/kg	50	-	-	123,000	103,000	149,000	48,000	59,200	48,000	103,000	149,000	96,440	42,557
Metals	Chromium	mg/kg	0.5	37.3	90	8.66	7.11	2.81	11.6	10.9	2.81	8.66	11.6	8.22	3.51
Metals	Cobalt	mg/kg	0.1	-	-	11.0	18.2	28.3	12.8	17.3	11.0	17.3	28.3	17.5	6.74
Metals	Copper	mg/kg	0.5	35.7	197	7.37	7.02	2.67	10.8	10.7	2.67	7.37	10.8	7.71	3.33
Metals	Iron	mg/kg	50	21200	43766	9,180	7,680	3,540	13,000	13,000	3,540	9,180	13,000	9,280	3,975
Metals	Lead	mg/kg	0.5	35	91.3	5.96	5.54	2.03	8.68	7.77	2.03	5.96	8.68	6.00	2.56
Metals	Lithium	mg/kg	2	-	-	6.20	5.20	2.50	8.90	7.50	2.50	6.20	8.90	6.06	2.43
Metals	Magnesium	mg/kg	20	-	-	5,760	4,910	3,600	6,160	7,020	3,600	5,760	7,020	5,490	1,301
Metals	Manganese	mg/kg	1	460	1100	188	401	643	346	399	188	399	643	395	163
Metals	Mercury	mg/kg	0.005	0.17	0.486	0.0191	0.0225	<0.005	0.0412	0.0335	<0.005	0.0225	0.0412	0.0243	0.0102
Metals	Molybdenum	mg/kg	0.1	25	23000	1.35	1.00	0.620	1.72	1.58	0.620	1.35	1.72	1.25	0.447
Metals	Nickel	mg/kg	0.5	16	75	37.0	51.8	52.2	45.8	54.4	37.0	51.8	54.4	48.2	7.05
Metals	Phosphorus	mg/kg	50	-	-	869	782	337	1,030	942	337	869	1,030	792	270
Metals	Potassium	mg/kg	100	-	-	1,160	890	400	1,430	1,300	400	1,160	1,430	1,036	408
Metals	Selenium	mg/kg	0.2	2	-	8.18	1.90	1.58	1.72	1.51	1.51	1.72	8.18	2.98	2.91
Metals	Silver	mg/kg	0.1	0.5	-	<0.1	<0.1	<0.1	0.160	0.140	<0.1	<0.1	0.160	0.120	0.0113
Metals	Sodium	mg/kg	50	-	-	94.0	71.0	72.0	80.0	84.0	71.0	80.0	94.0	80.2	9.44
Metals	Strontium	mg/kg	0.5	-	-	84.1	72.2	86.0	66.5	76.1	66.5	76.1	86.0	77.0	8.15
Metals	Sulphur	mg/kg	1,000	-	-	3,100	1,900	2,900	<1,000	1,000	<1,000	1,900	3,100	1,980	1,036
Metals	Thallium	mg/kg	0.05	-	-	0.162	0.216	0.102	0.252	0.230	0.102	0.216	0.252	0.192	0.0605
Metals	Tin	mg/kg	2	-	-	<2	<2	<2	<2	<2	<2	<2	<2	<2	-
Metals	Titanium	mg/kg	1	-	-	27.3	23.0	8.80	29.2	23.1	8.80	23.1	29.2	22.3	8.00
Metals	Tungsten	mg/kg	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-
Metals	Uranium	mg/kg	0.05	-	-	1.68	1.27	1.20	1.19	1.03	1.03	1.20	1.68	1.27	0.243
Metals	Vanadium	mg/kg	0.2	-	-	21.6	17.3	6.73	29.9	25.4	6.73	21.6	29.9	20.2	8.85
Metals	Zinc	mg/kg	2	123	315	58.4	47.3	23.0	75.0	70.7	23.0	58.4	75.0	54.9	20.9
Metals	Zirconium	mg/kg	1	-	-	<1	1.10	<1	1.20	1.10	<1	1.10	1.20	1.08	0.0490

Indicates values is greater than the lower British Columbia Working Sediment Quality Guidelines.

Indicates values is greater than the upper British Columbia Working Sediment Quality Guidelines.

Notes: "-" indicates data not available. LRL = laboratory reporting limit. BC WSQG = British Columbia Working Sediment Quality Guidelines (BCMOECCS 2021b) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021a). All data and summary statistics are displayed to three significant digits.

Table C.2: Sediment Physical and Chemical Data and Summary Statistics for EVO LAEMP, 2021

	Analyte	Units	LRL	BC Sediment Quality Guidelines		Mine-exposed									
						RG_ERCK									
				Lower WSQG	Upper WSQG	RG_ERCK_1	RG_ERCK_2	RG_ERCK_3	RG_ERCK_4	RG_ERCK_5	Minimum	Median	Maximum	Mean	Standard Deviation
						10-Sep	10-Sep	10-Sep	10-Sep	10-Sep					
Polycyclic Aromatic Hydrocarbons	Acenaphthene	mg/kg	0.005	0.0067	0.0889	0.00640	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.00640	0.00528	-
	Acenaphthylene	mg/kg	0.005	0.0059	0.128	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-
	Acridine	mg/kg	0.01	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
	Anthracene	mg/kg	0.004	0.0469	0.245	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-
	Benzo(a)anthracene	mg/kg	0.01	0.0317	0.385	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
	Benzo(a)pyrene	mg/kg	0.01	0.0319	0.782	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
	Benzo(b&j)fluoranthene	mg/kg	0.01	-	-	0.0230	0.0120	<0.01	0.0170	0.0180	<0.01	0.0170	0.0230	0.0160	0.00477
	Benzo(b+j+k)fluoranthene	mg/kg	0.015	-	-	0.0230	<0.015	<0.015	0.0170	0.0180	<0.015	0.0170	0.0230	0.0176	0.00286
	Benzo(e)pyrene	mg/kg	0.01	-	-	0.0210	0.0130	<0.01	0.0180	0.0180	<0.01	0.0180	0.0210	0.0160	0.00362
	Benzo(g,h,i)perylene	mg/kg	0.01	0.17	3.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
	Benzo(k)fluoranthene	mg/kg	0.01	0.24	13.4	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
	Chrysene	mg/kg	0.01	0.0571	0.862	0.0360	0.0210	<0.01	0.0380	0.0390	<0.01	0.0360	0.0390	0.0288	0.00949
	Dibenz(a,h)anthracene	mg/kg	0.005	0.0062	0.135	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-
	Fluoranthene	mg/kg	0.01	0.111	2.355	0.0170	0.0110	<0.01	0.0130	0.0110	<0.01	0.0110	0.0170	0.0124	0.00269
	Fluorene	mg/kg	0.01	0.021	0.144	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.01	0.2	3.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
	1-Methylnaphthalene	mg/kg	0.01	-	-	<0.05	<0.05	<0.05	0.0520	0.0530	<0.05	<0.05	0.0530	0.0510	0.000566
	2-Methylnaphthalene	mg/kg	0.01	0.0202	0.201	0.0460	0.0500	0.0420	0.0650	0.0710	0.0420	0.0500	0.0710	0.0548	0.0126
	Naphthalene	mg/kg	0.01	0.0346	0.391	0.0280	0.0240	0.0230	0.0300	0.0290	0.0230	0.0280	0.0300	0.0268	0.00311
	Perylene	mg/kg	0.01	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
	Phenanthrene	mg/kg	0.01	0.0419	0.515	0.0980	0.0760	0.0400	0.101	0.100	0.0400	0.0980	0.101	0.0830	0.0262
	Pyrene	mg/kg	0.01	0.053	0.875	0.0160	0.0120	<0.01	0.0160	0.0160	<0.01	0.0160	0.0160	0.0140	0.00226
	Quinoline	mg/kg	0.01	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
	d10-Acenaphthene	%	-	-	-	100	79.4	85.9	84.0	83.0	79.4	84.0	100	86.5	8.10
	d12-Chrysene	%	-	-	-	110	90.3	97.4	94.4	94.5	90.3	94.5	110	97.4	7.61
	d8-Naphthalene	%	-	-	-	94.7	75.5	79.4	78.8	79.4	75.5	79.4	94.7	81.6	7.52
	d10-Phenanthrene	%	-	-	-	108	86.1	92.7	88.6	88.7	86.1	88.7	108	92.7	8.59
	B(a)P Total Potency Equivalent	mg/kg	0.02	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-

Indicates values is greater than the lower British Columbia Working Sediment Quality Guidelines.

Indicates values is greater than the upper British Columbia Working Sediment Quality Guidelines.

Notes: "-" indicates data not available. LRL = laboratory reporting limit. BC WSQG = British Columbia Working Sediment Quality Guidelines (BCMOECCS 2021b) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021a). All data and summary statistics are displayed to three significant digits.

Table C.2: Sediment Physical and Chemical Data and Summary Statistics for EVO LAEMP, 2021

	Analyte	Units	LRL	BC Sediment Quality Guidelines		Mine-exposed																			
						RG_MI3								RG_MIDER											
				Lower WSQG	Upper WSQG	RG_MI3_1	RG_MI3_2	RG_MI3_3	Minimum	Median	Maximum	Mean	Standard Deviation	RG_MIDER_1	RG_MIDER_2	RG_MIDER_3	RG_MIDER_4	RG_MIDER_5	Minimum	Median	Maximum	Mean	Standard Deviation
						14-Sep	14-Sep	14-Sep						9-Sep	9-Sep	9-Sep	9-Sep	9-Sep					
Physical Tests	% Moisture	%	0.25	-	-	31.8	53.3	44.5	31.8	44.5	53.3	43.2	10.8	74.1	64.0	75.9	68.9	73.5	64.0	73.5	75.9	71.3	4.82
Physical Tests	pH (1:2 soil:water)	pH	0.1	-	-	7.56	7.30	7.33	7.30	7.33	7.56	7.40	0.142	7.15	7.21	7.30	7.52	7.53	7.15	7.30	7.53	7.34	0.175
Particle Size	% Gravel (>2mm)	%	1	-	-	6.80	8.40	4.30	4.30	6.80	8.40	6.50	2.07	15.2	<1	3.80	<1	1.20	<1	1.20	15.2	4.44	6.66
Particle Size	% Sand (2.00mm - 1.00mm)	%	1	-	-	4.80	4.00	3.30	3.30	4.00	4.80	4.03	0.751	15.6	1.70	2.90	3.70	5.40	1.70	3.70	15.6	5.86	5.61
Particle Size	% Sand (1.00mm - 0.50mm)	%	1	-	-	20.2	7.50	7.30	7.30	7.50	20.2	11.7	7.39	15.2	3.20	3.90	13.4	12.1	3.20	12.1	15.2	9.56	5.60
Particle Size	% Sand (0.50mm - 0.25mm)	%	1	-	-	37.7	16.0	8.30	8.30	16.0	37.7	20.7	15.2	9.90	9.40	11.4	13.0	9.30	9.30	9.90	13.0	10.6	1.58
Particle Size	% Sand (0.25mm - 0.125mm)	%	1	-	-	17.4	19.1	16.6	16.6	17.4	19.1	17.7	1.28	7.60	6.40	10.0	6.80	5.30	5.30	6.80	10.0	7.22	1.76
Particle Size	% Sand (0.125mm - 0.063mm)	%	1	-	-	4.40	12.5	23.2	4.40	12.5	23.2	13.4	9.43	7.40	8.50	11.7	8.50	6.10	6.10	8.50	11.7	8.44	2.07
Particle Size	% Silt (0.063mm - 0.0312mm)	%	1	-	-	3.70	14.9	18.4	3.70	14.9	18.4	12.3	7.68	12.3	29.1	23.9	22.0	25.5	12.3	23.9	29.1	22.6	6.30
Particle Size	% Silt (0.0312mm - 0.004mm)	%	1	-	-	3.90	15.0	16.2	3.90	15.0	16.2	11.7	6.78	14.0	34.0	27.2	26.5	29.5	14.0	27.2	34.0	26.2	7.44
Particle Size	% Clay (<4um)	%	1	-	-	1.10	2.60	2.40	1.10	2.40	2.60	2.03	0.814	2.90	7.70	5.30	5.50	5.50	2.90	5.50	7.70	5.38	1.70
Organic Carbon	Total Organic Carbon	%	0.05	-	-	-	-	-	1.13	2.56	3.22	2.30	1.07	-	-	-	-	-	3.14	3.94	6.68	4.49	1.39
Metals	Aluminum	mg/kg	50	-	-	7,460	7,230	7,920	7,230	7,460	7,920	7,537	351	6,100	6,350	7,510	7,580	5,650	5,650	6,350	7,580	6,638	865
Metals	Antimony	mg/kg	0.1	-	-	1.05	0.890	0.840	0.840	0.890	1.05	0.927	0.110	0.880	1.07	0.740	0.760	0.810	0.740	0.810	1.07	0.852	0.133
Metals	Arsenic	mg/kg	0.1	5.9	17	9.30	7.86	6.18	6.18	7.86	9.30	7.78	1.56	6.49	8.44	9.64	5.65	5.95	5.65	6.49	9.64	7.23	1.73
Metals	Barium	mg/kg	0.5	-	-	205	220	219	205	219	220	215	8.39	193	207	262	225	183	183	207	262	214	31.1
Metals	Beryllium	mg/kg	0.1	-	-	0.600	0.510	0.580	0.510	0.580	0.600	0.563	0.0473	0.490	0.520	0.560	0.560	0.520	0.490	0.520	0.560	0.530	0.0300
Metals	Bismuth	mg/kg	0.2	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-
Metals	Boron	mg/kg	5	-	-	6.20	6.30	6.50	6.20	6.30	6.50	6.33	0.153	6.30	6.00	8.80	8.60	6.40	6.00	6.40	8.80	7.22	1.36
Metals	Cadmium	mg/kg	0.02	0.6	3.5	1.17	1.10	1.40	1.10	1.17	1.40	1.22	0.157	1.37	1.38	1.64	1.40	1.24	1.24	1.38	1.64	1.41	0.145
Metals	Calcium	mg/kg	50	-	-	38,300	28,500	29,100	28,500	29,100	38,300	31,967	5,493	39,400	38,500	47,200	36,900	41,200	36,900	39,400	47,200	40,640	3,983
Metals	Chromium	mg/kg	0.5	37.3	90	14.6	16.7	15.7	14.6	15.7	16.7	15.7	1.05	13.5	15.7	15.0	14.8	12.4	12.4	14.8	15.7	14.3	1.32
Metals	Cobalt	mg/kg	0.1	-	-	5.83	5.85	6.82	5.83	5.85	6.82	6.17	0.566	6.72	7.18	8.84	7.32	7.11	6.72	7.18	8.84	7.43	0.817
Metals	Copper	mg/kg	0.5	35.7	197	12.8	10.9	12.7	10.9	12.7	12.8	12.1	1.07	12.4	12.9	13.7	12.4	11.6	11.6	12.4	13.7	12.6	0.771
Metals	Iron	mg/kg	50	21200	43766	20,400	14,600	14,300	14,300	14,600	20,400	16,433	3,439	15,500	14,500	14,400	14,300	13,600	13,600	14,400	15,500	14,460	680
Metals	Lead	mg/kg	0.5	35	91.3	9.13	8.82	10.3	8.82	9.13	10.3	9.42	0.781	8.54	8.87	9.36	9.85	8.72	8.54	8.87	9.85	9.07	0.533
Metals	Lithium	mg/kg	2	-	-	8.40	7.50	8.60	7.50	8.40	8.60	8.17	0.586	7.30	7.30	8.70	9.00	8.00	7.30	8.00	9.00	8.06	0.783
Metals	Magnesium	mg/kg	20	-	-	6,810	4,920	5,400	4,920	5,400	6,810	5,710	982.4	5,880	6,440	6,510	5,870	5,410	5,410	5,880	6,510	6,022	456
Metals	Manganese	mg/kg	1	460	1100	280	213	215	213	215	280	236	38.1	258	267	344	272	271	258	271	344	282	34.9
Metals	Mercury	mg/kg	0.005	0.17	0.486	0.0262	0.0458	0.0385	0.0262	0.0385	0.0458	0.0368	0.00991	0.0502	0.0455	0.0525	0.0480	0.0363	0.0363	0.0480	0.0525	0.0465	0.00626
Metals	Molybdenum	mg/kg	0.1	25	23000	2.02	1.73	1.39	1.39	1.73	2.02	1.71	0.315	1.61	2.61	1.44	1.40	1.55	1.40	1.55	2.61	1.72	0.503
Metals	Nickel	mg/kg	0.5	16	75	23.7	25.9	28.0	23.7	25.9	28.0	25.9	2.15	29.2	30.9	35.9	30.9	29.3	29.2	30.9	35.9	31.2	2.73
Metals	Phosphorus	mg/kg	50	-	-	1,360	1,130	1,150	1,130	1,150	1,360	1,213	127	1,230	1,160	1,180	1,210	1,100	1,100	1,180	1,230	1,176	50.3
Metals	Potassium	mg/kg	100	-	-	1,670	1,600	1,670	1,600	1,670	1,670	1,647	40.4	1,220	1,280	1,560	1,660	1,120	1,120	1,280	1,660	1,368	231
Metals	Selenium	mg/kg	0.2	2	-	0.640	1.00	1.08	0.640	1.00	1.08	0.907	0.234	1.43	1.36	1.95	1.70	1.78	1.36	1.70	1.95	1.64	0.246
Metals	Silver	mg/kg	0.1	0.5	-	0.160	0.160	0.180	0.160	0.160	0.180	0.167	0.0115	0.170	0.290	0.210	0.190	0.160	0.160	0.190	0.290	0.204	0.0518
Metals	Sodium	mg/kg	50	-	-	80.0	73.0	88.0	73.0	80.0	88.0	80.3	7.51	82.0	82.0	117	93.0	92.0	82.0	92.0	117	93.2	14.3
Metals	Strontium	mg/kg	0.5	-	-	71.1	62.9	61.7	61.7	62.9	71.1	65.2	5.12	66.5	64.0	76.9	68.3	66.3	64.0	66.5	76.9	68.4	4.99
Metals	Sulphur	mg/kg	1,000	-	-	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	-	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	-
Metals	Thallium	mg/kg	0.05	-	-	0.215	0.231	0.233	0.215	0.231	0.233	0.226	0.00987	0.222	0.212	0.271	0.263	0.216	0.212	0.222	0.271	0.237	0.0279
Metals	Tin	mg/kg	2	-	-	<2	<2	<2	<2	<2	<2	<2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2	-
Metals	Titanium	mg/kg	1	-	-	35.8	38.2	40.3	35.8	38.2	40.3	38.1	2.25	28.8	32.4	31.2	34.8	22.1	22.1	31.2	34.8	29.9	4.85
Metals	Tungsten	mg/kg	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-
Metals	Uranium	mg/kg	0.05	-	-	1.13	1.05	1.11	1.05	1.11	1.13	1.10	0.0416	0.983	1.00	0.997	1.04	1.00	0.983	1.00	1.04	1.00	0.0213
Metals	Vanadium	mg/kg	0.2	-	-	41.3	38.9	41.3	38.9	41.3	41.3	40.5	1.39	31.6	33.6	33.2	34.6	27.9	27.9	33.2	34.6	32.2	2.63
Metals	Zinc	mg/kg	2	123	315	97.5	90.2	96.9	90.2	96.9	97.5	94.9	4.05	94.7	103	109	99.9	93.4	93.4	99.9	109	100	6.36
Metals	Zirconium	mg/kg	1	-	-	1.50	<1	1.10	<1	1.10	1.50	1.20	0.267	<1	<1	<1	<1	<1	<1	<1	<1	<1	-

Indicates values is greater than the lower British Columbia Working Sediment Quality Guidelines.

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Notes: "-" indicates data not available. LRL = laboratory reporting limit. BC WSQG = British Columbia Working Sediment Quality Guidelines (BCMOECCS 2021b) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021a). All data and summary statistics are displayed to three significant digits.

Table C.2: Sediment Physical and Chemical Data and Summary Statistics for EVO LAEMP, 2021

	Analyte	Units	LRL	BC Sediment Quality Guidelines		Mine-exposed																	
						RG_MI3								RG_MIDER									
				Lower WSQG	Upper WSQG	RG_MI3_1	RG_MI3_2	RG_MI3_3	Minimum	Median	Maximum	Mean	Standard Deviation	RG_MIDER_1	RG_MIDER_2	RG_MIDER_3	RG_MIDER_4	RG_MIDER_5	Minimum	Median	Maximum	Mean	Standard Deviation
						14-Sep	14-Sep	14-Sep						9-Sep	9-Sep	9-Sep	9-Sep	9-Sep					
Polycyclic Aromatic Hydrocarbons	Acenaphthene	mg/kg	0.005	0.0067	0.0889	<0.01	<0.005	0.0173	<0.005	<0.01	0.0173	0.00910	-	<0.01	<0.01	0.0110	0.0110	<0.01	<0.01	<0.01	0.0110	0.0104	-
	Acenaphthylene	mg/kg	0.005	0.0059	0.128	0.00510	<0.005	0.00520	<0.005	0.00510	0.00520	0.00510	0.0000667	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
	Acridine	mg/kg	0.01	-	-	<0.01	0.0120	<0.02	<0.01	0.0110	<0.02	0.0110	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-
	Anthracene	mg/kg	0.004	0.0469	0.245	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	-	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	-
	Benzo(a)anthracene	mg/kg	0.01	0.0317	0.385	0.0680	0.0320	0.0290	0.0290	0.0320	0.0680	0.0430	0.0217	0.0220	<0.02	0.0280	<0.02	<0.02	<0.02	<0.02	0.0280	0.0220	0.00339
	Benzo(a)pyrene	mg/kg	0.01	0.0319	0.782	<0.01	<0.01	0.0150	<0.01	<0.01	0.0150	0.0117	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-
	Benzo(b&j)fluoranthene	mg/kg	0.01	-	-	0.0390	0.0260	0.0520	0.0260	0.0390	0.0520	0.0390	0.0130	0.0390	0.0220	0.0490	0.0290	0.0260	0.0220	0.0290	0.0490	0.0330	0.0109
	Benzo(b+j+k)fluoranthene	mg/kg	0.015	-	-	0.0390	0.0260	0.0520	0.0260	0.0390	0.0520	0.0390	0.0130	0.0390	<0.028	0.0490	0.0290	<0.028	<0.028	0.0290	0.0490	0.0346	0.00980
	Benzo(e)pyrene	mg/kg	0.01	-	-	0.0450	0.0290	0.0570	0.0290	0.0450	0.0570	0.0437	0.0140	0.0410	<0.02	0.0430	0.0290	0.0250	<0.02	0.0290	0.0430	0.0316	0.00905
	Benzo(g,h,i)perylene	mg/kg	0.01	0.17	3.2	0.0160	<0.01	0.0170	<0.01	0.0160	0.0170	0.0143	0.000667	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-
	Benzo(k)fluoranthene	mg/kg	0.01	0.24	13.4	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-
	Chrysene	mg/kg	0.01	0.0571	0.862	0.0470	0.0310	0.111	0.0310	0.0470	0.111	0.0630	0.0423	0.0780	0.0380	0.0950	0.0630	0.0450	0.0380	0.0630	0.0950	0.0638	0.0234
	Dibenz(a,h)anthracene	mg/kg	0.005	0.0062	0.135	0.00610	<0.005	<0.005	<0.005	<0.005	0.00610	0.00537	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
	Fluoranthene	mg/kg	0.01	0.111	2.355	0.0240	<0.03	0.0420	0.0240	0.0240	0.0420	0.0300	0.0120	0.0410	0.0220	0.0490	0.0340	0.0300	0.0220	0.0340	0.0490	0.0352	0.0103
	Fluorene	mg/kg	0.01	0.021	0.144	<0.01	0.0100	<0.03	<0.01	0.0100	<0.03	0.0100	-	0.0250	<0.02	0.0220	<0.02	<0.02	<0.02	<0.02	0.0250	0.0214	0.00170
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.01	0.2	3.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-
	1-Methylnaphthalene	mg/kg	0.01	-	-	0.100	0.0760	0.294	0.0760	0.100	0.294	0.157	0.120	0.107	0.0480	0.115	0.0740	0.0520	0.0480	0.0740	0.115	0.0792	0.0308
	2-Methylnaphthalene	mg/kg	0.01	0.0202	0.201	0.122	0.0970	0.372	0.0970	0.122	0.372	0.197	0.152	0.132	0.0650	0.139	0.0980	0.0870	0.0650	0.0980	0.139	0.104	0.0310
	Naphthalene	mg/kg	0.01	0.0346	0.391	0.0760	<0.04	0.159	<0.04	0.0760	0.159	0.0917	0.0553	0.0620	0.0300	0.0540	0.0390	0.0350	0.0300	0.0390	0.0620	0.0440	0.0135
	Perylene	mg/kg	0.01	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-
	Phenanthrene	mg/kg	0.01	0.0419	0.515	0.221	0.145	0.370	0.145	0.221	0.370	0.245	0.114	0.211	0.0960	0.227	0.148	0.125	0.0960	0.148	0.227	0.161	0.0560
	Pyrene	mg/kg	0.01	0.053	0.875	0.0290	<0.03	0.0460	0.0290	0.0290	0.0460	0.0347	0.0113	0.0450	0.0210	0.0510	0.0310	0.0300	0.0210	0.0310	0.0510	0.0356	0.0122
	Quinoline	mg/kg	0.01	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-
	d10-Acenaphthene	%	-	-	-	78.0	87.0	81.7	78.0	81.7	87.0	82.2	4.52	87.4	79.2	81.3	82.2	84.7	79.2	82.2	87.4	83.0	3.17
	d12-Chrysene	%	-	-	-	-	110	103	103	107	110	107	4.74	101	90.4	96.2	95.1	97.9	90.4	96.2	101	96.1	3.80
	d8-Naphthalene	%	-	-	-	120	84.6	83.6	83.6	84.6	120	96.2	21.0	83.3	70.8	78.7	78.1	79.1	70.8	78.7	83.3	78.0	4.52
	d10-Phenanthrene	%	-	-	-	72.0	101	95.0	72.0	95.0	101	89.4	15.3	94.9	88.6	90.0	91.3	91.0	88.6	91.0	94.9	91.2	2.34
	B(a)P Total Potency Equivalent	mg/kg	0.02	-	-	0.0230	<0.02	0.0280	<0.02	0.0230	0.0280	0.0237	0.00333	0.0240	0.0210	0.0260	0.0220	0.0210	0.0210	0.0220	0.0260	0.0228	0.00217

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Table C.2: Sediment Physical and Chemical Data and Summary Statistics for EVO LAEMP, 2021

	Analyte	Units	LRL	BC Sediment Quality Guidelines		Mine-exposed									
						RG_MICOMP									
				Lower WSQG	Upper WSQG	RG_MICOMP_1	RG_MICOMP_2	RG_MICOMP_3	RG_MICOMP_4	RG_MICOMP_5	Minimum	Median	Maximum	Mean	Standard Deviation
						13-Sep	13-Sep	13-Sep	13-Sep	13-Sep					
Physical Tests	% Moisture	%	0.25	-	-	86.2	75.3	95.1	66.7	96.1	66.7	86.2	96.1	83.9	12.7
	pH (1:2 soil:water)	pH	0.1	-	-	8.24	8.17	7.80	8.25	7.88	7.80	8.17	8.25	8.07	0.212
Particle Size	% Gravel (>2mm)	%	1	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	-
	% Sand (2.00mm - 1.00mm)	%	1	-	-	3.50	2.40	<1	<1	4.50	<1	2.40	4.50	2.48	1.04
	% Sand (1.00mm - 0.50mm)	%	1	-	-	8.40	6.50	6.00	<1	5.20	<1	6.00	8.40	5.42	1.36
	% Sand (0.50mm - 0.25mm)	%	1	-	-	11.0	19.0	23.5	3.40	3.70	3.40	11.0	23.5	12.1	9.01
	% Sand (0.25mm - 0.125mm)	%	1	-	-	7.60	15.3	15.2	14.8	3.60	3.60	14.8	15.3	11.3	5.40
	% Sand (0.125mm - 0.063mm)	%	1	-	-	7.10	9.60	7.70	18.5	5.60	5.60	7.70	18.5	9.70	5.12
	% Silt (0.063mm - 0.0312mm)	%	1	-	-	25.7	20.1	19.5	29.6	33.1	19.5	25.7	33.1	25.6	5.91
	% Silt (0.0312mm - 0.004mm)	%	1	-	-	30.1	22.1	22.6	29.9	36.9	22.1	29.9	36.9	28.3	6.14
	% Clay (<4um)	%	1	-	-	6.70	5.00	4.50	3.50	7.30	3.50	5.00	7.30	5.40	1.57
Organic Carbon	Total Organic Carbon	%	0.05	-	-	-	-	-	-	-	4.36	4.98	6.17	5.13	0.807
Metals	Aluminum	mg/kg	50	-	-	5,600	5,780	5,940	6,180	5,020	5,020	5,780	6,180	5,704	438
	Antimony	mg/kg	0.1	-	-	0.640	0.590	0.560	0.640	0.530	0.530	0.590	0.640	0.592	0.0487
	Arsenic	mg/kg	0.1	5.9	17	4.72	4.71	4.17	4.27	3.92	3.92	4.27	4.72	4.36	0.350
	Barium	mg/kg	0.5	-	-	228	216	267	202	170	170	216	267	217	35.5
	Beryllium	mg/kg	0.1	-	-	0.470	0.450	0.420	0.450	0.460	0.420	0.450	0.470	0.450	0.0187
	Bismuth	mg/kg	0.2	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-
	Boron	mg/kg	5	-	-	7.00	6.00	7.20	5.30	5.50	5.30	6.00	7.20	6.20	0.863
	Cadmium	mg/kg	0.02	0.6	3.5	1.35	1.21	1.78	1.15	2.12	1.15	1.35	2.12	1.52	0.415
	Calcium	mg/kg	50	-	-	43,300	39,300	64,800	34,200	52,200	34,200	43,300	64,800	46,760	12,046
	Chromium	mg/kg	0.5	37.3	90	10.4	10.7	11.1	11.8	9.99	9.99	10.7	11.8	10.8	0.692
	Cobalt	mg/kg	0.1	-	-	8.26	7.57	7.86	6.03	9.17	6.03	7.86	9.17	7.78	1.15
	Copper	mg/kg	0.5	35.7	197	12.0	12.0	13.7	11.9	12.5	11.9	12.0	13.7	12.4	0.753
	Iron	mg/kg	50	21200	43766	13,700	12,800	11,100	11,300	12,000	11,100	12,000	13,700	12,180	1,080
	Lead	mg/kg	0.5	35	91.3	8.40	9.41	7.77	8.19	7.08	7.08	8.19	9.41	8.17	0.857
	Lithium	mg/kg	2	-	-	7.50	7.10	7.20	7.50	7.60	7.10	7.50	7.60	7.38	0.217
	Magnesium	mg/kg	20	-	-	5,280	5,190	5,460	5,260	9,570	5,190	5,280	9,570	6,152	1,913
	Manganese	mg/kg	1	460	1100	357	313	324	206	727	206	324	727	385	199
	Mercury	mg/kg	0.005	0.17	0.486	0.0399	0.0417	0.0531	0.0453	0.0406	0.0399	0.0417	0.0531	0.0441	0.00543
	Molybdenum	mg/kg	0.1	25	23000	1.19	1.03	1.20	0.950	1.24	0.950	1.19	1.24	1.12	0.125
	Nickel	mg/kg	0.5	16	75	37.5	33.4	30.7	27.3	61.1	27.3	33.4	61.1	38.0	13.4
	Phosphorus	mg/kg	50	-	-	1,000	981	1,020	946	1,060	946	1,000	1,060	1,001	42.6
	Potassium	mg/kg	100	-	-	1,220	1,260	1,480	1,370	1,320	1,220	1,320	1,480	1,330	101
	Selenium	mg/kg	0.2	2	-	2.28	1.66	4.98	2.00	1.97	1.66	2.00	4.98	2.58	1.36
	Silver	mg/kg	0.1	0.5	-	0.180	0.160	0.160	0.180	0.160	0.160	0.160	0.180	0.168	0.0110
	Sodium	mg/kg	50	-	-	82.0	72.0	103	67.0	67.0	67.0	72.0	103	78.2	15.2
	Strontium	mg/kg	0.5	-	-	74.7	67.6	89.7	58.8	60.2	58.8	67.6	89.7	70.2	12.6
	Sulphur	mg/kg	1,000	-	-	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	-
	Thallium	mg/kg	0.05	-	-	0.195	0.193	0.193	0.204	0.177	0.177	0.193	0.204	0.192	0.00974
	Tin	mg/kg	2	-	-	<2	<2	<2	<2	<2	<2	<2	<2	<2	-
	Titanium	mg/kg	1	-	-	17.5	16.3	14.8	23.5	8.90	8.90	16.3	23.5	16.2	5.25
	Tungsten	mg/kg	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-
	Uranium	mg/kg	0.05	-	-	0.967	0.875	1.34	0.825	0.901	0.825	0.901	1.34	0.982	0.207
	Vanadium	mg/kg	0.2	-	-	25.8	27.2	26.3	29.4	23.8	23.8	26.3	29.4	26.5	2.04
	Zinc	mg/kg	2	123	315	91.9	90.1	99.2	82.5	156	82.5	91.9	156	104	29.7
	Zirconium	mg/kg	1	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	-

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Table C.2: Sediment Physical and Chemical Data and Summary Statistics for EVO LAEMP, 2021

	Analyte	Units	LRL	BC Sediment Quality Guidelines		Mine-exposed RG_MICOMP									
				Lower WSQG	Upper WSQG	RG_MICOMP_1 13-Sep	RG_MICOMP_2 13-Sep	RG_MICOMP_3 13-Sep	RG_MICOMP_4 13-Sep	RG_MICOMP_5 13-Sep	Minimum	Median	Maximum	Mean	Standard Deviation
Polycyclic Aromatic Hydrocarbons	Acenaphthene	mg/kg	0.005	0.0067	0.0889	<0.018	<0.025	<0.05	<0.025	<0.05	<0.018	<0.025	<0.05	<0.018	-
	Acenaphthylene	mg/kg	0.005	0.0059	0.128	<0.018	0.0110	<0.05	<0.015	<0.05	0.0110	0.0110	<0.05	0.0110	-
	Acridine	mg/kg	0.01	-	-	0.0370	<0.03	<0.1	<0.03	<0.1	<0.03	<0.03	<0.1	0.0323	-
	Anthracene	mg/kg	0.004	0.0469	0.245	<0.014	0.0119	<0.04	<0.004	<0.04	<0.004	0.00795	<0.04	0.00795	-
	Benzo(a)anthracene	mg/kg	0.01	0.0317	0.385	0.0410	0.0420	<0.1	0.0520	<0.1	0.0410	0.0420	<0.1	0.0450	0.00785
	Benzo(a)pyrene	mg/kg	0.01	0.0319	0.782	<0.035	0.0360	<0.1	0.0370	<0.1	<0.035	0.0360	<0.1	0.0360	0.000861
	Benzo(b&j)fluoranthene	mg/kg	0.01	-	-	0.0860	0.0900	<0.1	0.102	<0.1	0.0860	0.0900	0.102	0.0908	0.00753
	Benzo(b+j+k)fluoranthene	mg/kg	0.015	-	-	0.0860	0.0900	<0.14	0.121	<0.14	0.0860	0.0900	<0.14	0.0990	0.0247
	Benzo(e)pyrene	mg/kg	0.01	-	-	0.0770	0.0740	<0.1	0.0820	<0.1	0.0740	0.0770	<0.1	0.0777	0.00522
	Benzo(g,h,i)perylene	mg/kg	0.01	0.17	3.2	<0.035	0.0320	<0.1	0.0410	<0.1	0.0320	0.0320	<0.1	0.0350	0.00775
	Benzo(k)fluoranthene	mg/kg	0.01	0.24	13.4	<0.035	<0.02	<0.1	0.0190	<0.1	0.0190	0.0190	<0.1	0.0190	-
	Chrysene	mg/kg	0.01	0.0571	0.862	0.0740	0.0670	0.140	0.111	<0.1	0.0670	0.0740	0.140	0.0925	0.0331
	Dibenz(a,h)anthracene	mg/kg	0.005	0.0062	0.135	<0.018	<0.01	<0.05	0.0128	<0.05	<0.01	0.0114	<0.05	0.0114	-
	Fluoranthene	mg/kg	0.01	0.111	2.355	0.0460	<0.05	<0.1	<0.07	<0.1	0.0460	0.0460	<0.1	0.0460	-
	Fluorene	mg/kg	0.01	0.021	0.144	0.0430	<0.05	<0.1	0.0340	<0.1	0.0340	0.0385	<0.1	0.0385	0.0101
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.01	0.2	3.2	<0.035	<0.02	<0.1	0.0230	<0.1	<0.02	0.0215	<0.1	0.0215	-
	1-Methylnaphthalene	mg/kg	0.01	-	-	0.166	0.166	<0.3	0.208	0.280	0.166	0.187	<0.3	0.205	0.0601
	2-Methylnaphthalene	mg/kg	0.01	0.0202	0.201	0.247	0.234	0.450	0.290	0.340	0.234	0.290	0.450	0.312	0.0875
	Naphthalene	mg/kg	0.01	0.0346	0.391	0.136	0.113	0.170	0.159	<0.1	<0.1	0.136	0.170	0.136	0.0269
	Perylene	mg/kg	0.01	-	-	<0.035	<0.02	<0.1	0.0180	<0.1	0.0180	0.0180	<0.1	0.0180	-
	Phenanthrene	mg/kg	0.01	0.0419	0.515	0.300	0.291	0.390	0.365	0.420	0.291	0.365	0.420	0.353	0.0562
	Pyrene	mg/kg	0.01	0.053	0.875	0.0540	0.0550	<0.1	<0.07	<0.1	0.0540	0.0545	<0.1	0.0545	0.00112
	Quinoline	mg/kg	0.01	-	-	<0.035	<0.02	<0.1	<0.05	<0.1	<0.02	<0.05	<0.1	<0.02	-
	d10-Acenaphthene	%	-	-	-	98.6	99.3	98.1	98.5	104	98.1	98.6	104	99.8	2.66
	d12-Chrysene	%	-	-	-	111	111	108	107	112	107	111	112	110	2.11
	d8-Naphthalene	%	-	-	-	81.3	92.4	87.3	90.7	90.2	81.3	90.2	92.4	88.4	4.36
	d10-Phenanthrene	%	-	-	-	105	108	103	105	107	103	105	108	106	2.07
	B(a)P Total Potency Equivalent	mg/kg	0.02	-	-	0.0430	0.0570	0.0970	0.0710	<0.096	0.0430	0.0570	0.0970	0.0650	0.0230

Indicates values is greater than the lower British Columbia Working Sediment Quality Guidelines.

Indicates values is greater than the upper British Columbia Working Sediment Quality Guidelines.

Notes: "-" indicates data not available. LRL = laboratory reporting limit. BC WSQG = British Columbia Working Sediment Quality Guidelines (BCMOECCS 2021b) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021a). All data and summary statistics are displayed to three significant digits.

Table C.3: Calcite Index Values, EVO LAEMP, September 2015 to 2021

Waterbody	Station	2015			2016			2017			2018			2019			2020			2021					
		Cp	Cc	CI	Cp	Cc	CI	Cp	Cc	CI	Cp	Cc	CI	Cp	Cc	CI	Cp	Cc	CI	Cp	Cc	CI	Cp'[a]	Cc	CI'[a]
Lower Alexander Creek (Reference)	RG_ALUSM	0.690	0.0700	0.760	0.980	0.485	1.46	0.830	0	0.830	0.140	0	0.140	0.110	0	0.110	0.680	0	0.680	0.616	0.0100	0.626	0.285	0.0100	0.295
											0.480	0.0300	0.510	0	0	0	0.560	0	0.560	0.440	0	0.440	0.156	0	0.156
											0.390	0.0100	0.400	0.180	0	0.180	0.490	0	0.490	0.290	0	0.290	0.120	0	0.120
Michel Creek (Reference)	RG_MI25	0.359	0	0.359	0	0	0	0.580	0	0.580	0.350	0	0.350	0	0	0	0.0200	0	0.0200	0	0	0	0	0	0
											0.240	0	0.240	0	0	0	0	0	0	0	0	0	0	0	0
											0.0200	0	0.0200	0	0	0	0.0200	0	0.0200	0	0	0	0	0	0
Erickson Creek	RG_ERCKUT	-	-	-	-	-	-	-	-	-	-	-	-	0.640	0.400	1.04	0.970	0.390	1.36	0.196	0.0495	0.246	0.0588	0.0495	0.108
														0.510	0.450	0.960	0.980	0.580	1.56	0.187	0	0.187	0.0604	0	0.0604
														0.667	0.490	1.16	1.00	0.330	1.33	0.165	0	0.165	0.0571	0	0.0571
	RG_ERCKDT	-	-	-	-	-	-	-	-	-	-	-	-	0.700	0.440	1.14	1.00	0.900	1.90	0.851	0.0319	0.883	0.338	0.0319	0.370
														0.730	0.430	1.16	1.00	0.470	1.47	0.553	0	0.553	0.257	0	0.257
														1.00	0.697	1.70	1.00	0.640	1.64	0.543	0	0.543	0.214	0	0.214
	RG_ERCK	-	-	-	-	-	-	-	-	-	0.970	0.920	1.89	0.910	0.670	1.58	1.00	0.590	1.59	1.00	1.20	2.20	0.927	1.20	2.12
Michel Creek	RG_MI3	0.417	0	0.417	0	0	0	0.760	0	0.760	-	-	-	0.400	0	0.400	0.540	0	0.540	0	0	0	0	0	0
														0.310	0	0.310	0.640	0.0200	0.660	0	0	0	0	0	0
														0.0600	0	0.0600	0.870	0	0.870	0	0	0	0	0	0
	RG_MIDER	-	-	-	-	-	-	-	-	-	0.940	0	0.940	0.0700	0.0200	0.0900	0.910	0	0.910	0	0	0	0	0	0
														0.0500	0	0.0500				0	0	0	0	0	0
														0.190	0.0500	0.240				0	0	0	0	0	0
	RG_MIDGA	-	-	-	-	-	-	-	-	-	0.760	0	0.760	0.170	0	0.170	0.480	0	0.480	0	0	0	0	0	0
																				0	0	0	0	0	0
																				0	0	0	0	0	0
	RG_MIDBO	-	-	-	-	-	-	-	-	-	0.960	0.100	1.06	0.290	0	0.290	0.930	0	0.930	0	0	0	0	0	0
																				0	0	0	0	0	0
																				0	0	0	0	0	0
	RG_MICOMP	-	-	-	-	-	-	-	-	-	0.909	0	0.909	0.480	0	0.480	0.170	0	0.170	0	0	0	0	0	0
											0.875	0	0.875	0.610	0	0.610	0.270	0	0.270	0	0	0	0	0	0
											0.838	0.0101	0.848	0.320	0	0.320	0.140	0	0.140	0	0	0	0	0	0
											0.880	0	0.880	0.570	0	0.570	0.750	0	0.750	0	0	0	0	0	0
											0.950	0	0.950	0.270	0	0.270	0.770	0	0.770	0	0	0	0	0	0

Shaded cells indicate Calcite Index (CI) values at or above the upper limit of the regional normal range (1.0; Minnow 2018a).

Shaded cells indicate Calcite Concretion (Cc) values that are above the future SPO (December 31, 2024: Cc≤ 0.5) as directed by Permit 107517.

Notes: "-" indicates calcite data not recorded. Cp = calcite presence. Cc = concreted status. CI = calcite index.

[a] Calcite index (CI') was calculated using calcite proportion rather than calcite presence and therefore cannot be compared with previous years.

Table C.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations, September 2021

RG_ALUSM-1						RG_ALUSM-2					
12-Sep-21						12-Sep-21					
Pebble	Concreted Status	Calcite Proportion	Calcite Presence	Intermediate Axis (cm)	Embeddedness (%)	Pebble	Concreted Status	Calcite Proportion	Calcite Presence	Intermediate Axis (cm)	Embeddedness (%)
1	0	0.8	1	15.4	-	**1**	0	0.1	1	5.1	-
2	0	0.5	1	7.5	-	**2**	0	0.4	1	7.2	-
3	0	0.5	1	13.4	-	**3**	0	0	0	9.5	-
4	0	0.8	1	15.5	-	**4**	0	0	0	6.8	-
5	0	0	0	4.6	-	**5**	0	0	0	7.1	-
6	0	0.4	1	18.5	-	**6**	0	0	0	11.6	-
7	0	0.4	1	23	-	**7**	0	0	0	9.5	-
8	0	0.2	1	7.2	-	**8**	0	0	0	7.3	-
9	0	0.1	1	5.5	-	**9**	0	0.1	1	14.1	-
10	0	0.2	1	16.5	0.25	**10**	0	0	0	6.4	0.25
11	0	0.1	1	9.3	-	**11**	0	0.2	1	22.4	-
12	0	0.2	1	13.4	-	**12**	0	0	0	9.8	-
13	0	0.3	1	14.4	-	**13**	0	0	0	10.1	-
14	0	0	0	9.1	-	**14**	0	0	0	7.9	-
15	0	0	0	7.6	-	**15**	0	0.1	1	15	-
16	0	0	0	7.6	-	**16**	0	0	0	7.6	-
17	0	0	0	4.4	-	**17**	0	0.1	1	12.4	-
18	0	0	0	4.8	-	**18**	0	0	0	5.1	-
19	0	0	0	9.9	-	**19**	0	0	0	9.3	-
20	0	0	0	11.3	0.5	**20**	0	0	0	6.5	0
21	0	0.1	1	9	-	**21**	0	0.1	1	15.4	-
22	0	0	0	9.2	-	**22**	0	0	0	7.3	-
23	0	0	0	4.3	-	**23**	0	0.2	1	15.4	-
24	0	0	0	4.9	-	**24**	0	0	0	6.3	-
25	0	0	0	4.2	-	**25**	0	0.4	1	19.6	-
26	0	0.2	1	7.7	-	**26**	0	0	0	5	-
27	0	0	0	9.3	-	**27**	0	0.3	1	14	-
28	0	0	0	10.4	-	**28**	0	0.8	1	29	-
29	0	0	0	8.4	-	**29**	0	0.1	1	7.2	-
30	0	0.2	1	10.7	0.5	**30**	0	0	0	8.5	0
31	0	0	0	3.5	-	**31**	0	0	0	14.2	-
32	0	0	0	13.5	-	**32**	0	0	0	7.6	-
33	0	0	0	4.6	-	**33**	0	0	0	6.9	-
34	0	0	0	8.2	-	**34**	0	0	0	14.2	-
35	0	0.7	1	19.8	-	**35**	0	0	0	5.1	-
36	0	0	0	3.9	-	**36**	0	0	0	8.8	-
37	0	0.3	1	10.4	-	**37**	0	0.5	1	21.5	-
38	0	0.2	1	9	-	**38**	0	0	0	6.6	-
39	0	0	0	10.4	-	**39**	0	0	0	9.8	-
40	0	0	0	4	0.25	**40**	0	0	0	6.2	0.25
41	0	0	0	5	-	**41**	0	0.1	1	9.8	-
42	0	0.5	1	11.2	-	**42**	0	0	0	6.1	-
43	0	0	0	15.3	-	**43**	0	0	0	7.1	-
44	0	0.4	1	14	-	**44**	0	0	0	7.5	-
45	0	0.2	1	12.6	-	**45**	0	0.1	1	8.2	-
46	0	0	0	4.3	-	**46**	0	0.1	1	3.4	-
47	0	0.3	1	12.2	-	**47**	0	0	0	9.5	-
48	0	0.6	1	11.7	-	**48**	0	0	0	4.3	-
49	0	0.7	1	46	-	**49**	0	0.1	1	6.5	-
50	0	0.8	1	48	0.75	**50**	0	0	0	4.8	0
51	0	0.4	1	7.5	-	**51**	0	0	0	6.9	-
52	0	0.3	1	12	-	**52**	0	0.2	1	5.4	-
53	0	0.8	1	22.5	-	**53**	0	0.6	1	13.2	-
54	0	-	-	0.2	-	**54**	0	0.9	1	32	-
55	0	1	1	9.4	-	**55**	0	0	0	2.9	-
56	0	1	1	14.5	-	**56**	0	0.5	1	12.6	-
57	0	0.8	1	9.6	-	**57**	0	0.9	1	9.3	-
58	1	1	1	8.3	-	**58**	0	0.7	1	8.1	-
59	0	0.7	1	7.3	-	**59**	0	0	0	5.2	-
60	0	0.6	1	9.2	0.5	**60**	0	0.5	1	16.4	0.75
61	0	0.8	1	6.9	-	**61**	0	1	1	8	-
62	0	0.8	1	16.5	-	**62**	0	1	1	12.4	-
63	0	0.5	1	8.6	-	**63**	0	0.1	1	6.5	-
64	0	0.3	1	18.1	-	**64**	0	0.9	1	10.6	-
65	0	0.8	1	20.6	-	**65**	0	0.6	1	9.5	-
66	0	1	1	40.5	-	**66**	0	0.6	1	7.2	-
67	0	0.6	1	14.9	-	**67**	0	0.5	1	8.4	-
68	0	0.5	1	17.6	-	**68**	0	0.2	1	10.6	-
69	0	0.5	1	8	-	**69**	0	0.5	1	16	-
70	0	0.4	1	10.3	0.5	**70**	0	0	0	9.2	0.5
71	0	0	0	7.7	-	**71**	0	0	0	5.8	-
72	0	0	0	6.7	-	**72**	0	0	0	6.3	-
73	0	0	0	7.9	-	**73**	0	0	0	8.5	-
74	0	0.3	1	20.3	-	**74**	0	0.2	1	15.3	-
75	0	0	0	5.8	-	**75**	0	0.1	1	6.5	-
76	0	0	0	5.8	-	**76**	0	0.4	1	15.2	-
77	0	0.3	1	10	-	**77**	0	0.1	1	9.6	-
78	0	0.1	1	12.5	-	**78**	0	0	0	4.8	-
79	0	0.5	1	13.4	-	**79**	0	0	0	6.3	-
80	0	0	0	7.1	0.25	**80**	0	0	0	7.2	0.25
81	0	0.5	1	10.3	-	**81**	0	0	0	4.2	-
82	0	0.5	1	7.4	-	**82**	0	0.4	1	7.6	-
83	0	0.1	1	7.5	-	**83**	0	0	0	7.5	-
84	0	0	0	6.2	-	**84**	0	0	0	9.7	-
85	0	0	0	8.3	-	**85**	0	0	0	12.6	-
86	0	0.2	1	11.7	-	**86**	0	0.1	1	5.8	-
87	0	0.3	1	11.2	-	**87**	0	0	0	6.2	-
88	0	0	0	13.3	-	**88**	0	0.2	1	14.6	-
89	0	0.1	1	6.2	-	**89**	0	0	0	6.2	-
90	0	0	0	9.8	0.5	**90**	0	0	0	3.9	0.25
91	0	0.4	1	14.1	-	**91**	0	0	0	4.7	-
92	0	0	0	7	-	**92**	0	0.2	1	14.2	-
93	0	0.1	1	8.1	-	**93**	0	0	0	3.7	-
94	0	0.1	1	8.8	-	**94**	0	0	0	5.9	-
95	0	0	0	8.5	-	**95**	0	0.2	1	8.3	-
96	0	0	0	16.5	-	**96**	0	0	0	7.4	-
97	0	0.4	1	13.2	-	**97**	0	0	0	5.6	-
98	0	0.5	1	14.9	-	**98**	0	0	0	8.6	-
99	0	1	1	44.5	-	**99**	0	0.1	1	6.5	-
100	0	0.3	1	12.2	0.25	**100**	0	0.1	1	8.5	0
Average Cc, Cp and Embed. =	**0.01**	**0.28**	**0.62**	**11.6**	**0.43**	**Average Cc, Cp and Embed. =**	**0**	**0.16**	**0.44**	**9.34**	**0.23**
Old Calcite Index (CI) =		**0.63**				**Old Calcite Index (CI) =**		**0.44**			
New Calcite Index (CI') =		**0.29**				**New Calcite Index (CI') =**		**0.16**			

Notes: "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.

Table C.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations, September 2021

RG_ALUSM-3						RG_MI25-1					
12-Sep-21						13-Sep-21					
Pebble	Concreted Status	Calcite Proportion	Calcite Presence	Intermediate Axis (cm)	Embeddedness (%)	Pebble	Concreted Status	Calcite Proportion	Calcite Presence	Intermediate Axis (cm)	Embeddedness (%)
1	0	0	0	5.6	-	**1**	0	0	0	0.2	-
2	0	0	0	5.9	-	**2**	0	0	0	0.2	-
3	0	0	0	8.4	-	**3**	0	0	0	5.4	-
4	0	0	0	8.5	-	**4**	0	0	0	7.4	-
5	0	0	0	8.1	-	**5**	0	0	0	2.2	-
6	0	0	0	14.2	-	**6**	0	0	0	0.2	-
7	0	0	0	16.9	-	**7**	0	0	0	4.7	-
8	0	0	0	9	-	**8**	0	0	0	5.5	-
9	0	0	0	12	-	**9**	0	0	0	7.7	-
10	0	0	0	9.1	0.25	**10**	0	0	0	11.2	0.75
11	0	0.2	1	11.3	-	**11**	0	0	0	0.2	-
12	0	0.4	1	12.3	-	**12**	0	0	0	6	-
13	0	0.2	1	10.1	-	**13**	0	0	0	10.9	-
14	0	0.5	1	10.2	-	**14**	0	0	0	3.6	-
15	0	0.3	1	7.3	-	**15**	0	0	0	6.4	-
16	0	0	0	5.5	-	**16**	0	0	0	4.6	-
17	0	0.7	1	23.5	-	**17**	0	0	0	18.7	-
18	0	0.8	1	16.5	-	**18**	0	0	0	17.1	-
19	0	0.4	1	9.5	-	**19**	0	0	0	5.6	-
20	0	0.3	1	13.8	0.5	**20**	0	0	0	2.4	0.25
21	0	0.5	1	17.2	-	**21**	0	0	0	2.1	-
22	0	0.5	1	14.8	-	**22**	0	0	0	7	-
23	0	0.9	1	12.5	-	**23**	0	0	0	10.2	-
24	0	0.5	1	8.5	-	**24**	0	0	0	2.1	-
25	0	0.8	1	21.5	-	**25**	0	0	0	1	-
26	0	0.1	1	7.5	-	**26**	0	0	0	6.2	-
27	0	0.1	1	5.4	-	**27**	0	0	0	6.9	-
28	0	0	0	4.9	-	**28**	0	0	0	8	-
29	0	0	0	6.6	-	**29**	0	0	0	0.9	-
30	0	0	0	6.8	0	**30**	0	0	0	6.1	0.75
31	0	0	0	11.7	-	**31**	0	0	0	-	-
32	0	0	0	3.7	-	**32**	0	0	0	7.7	-
33	0	0	0	5.9	-	**33**	0	0	0	1.8	-
34	0	0	0	7.5	-	**34**	0	0	0	7.5	-
35	0	0	0	19.9	-	**35**	0	0	0	15.9	-
36	0	0	0	5.3	-	**36**	0	0	0	7.5	-
37	0	0.2	1	13.4	-	**37**	0	0	0	-	-
38	0	0	0	7.6	-	**38**	0	0	0	14.2	-
39	0	0	0	8.9	-	**39**	0	0	0	8.5	-
40	0	0	0	5.9	0.5	**40**	0	0	0	7.5	0.5
41	0	0	0	9	-	**41**	0	0	0	7.1	-
42	0	0	0	6.2	-	**42**	0	0	0	7	-
43	0	0	0	5.8	-	**43**	0	0	0	3.2	-
44	0	0	0	4.2	-	**44**	0	0	0	4.8	-
45	0	0	0	5.3	-	**45**	0	0	0	2.9	-
46	0	0	0	6.6	-	**46**	0	0	0	0.2	-
47	0	0	0	7.5	-	**47**	0	0	0	3	-
48	0	0	0	11.2	-	**48**	0	0	0	5	-
49	0	0	0	8.2	-	**49**	0	0	0	4.3	-
50	0	0	0	11.5	0.5	**50**	0	0	0	11.8	0.25
51	0	0	0	18.6	-	**51**	0	0	0	3.7	-
52	0	0	0	7.7	-	**52**	0	0	0	8.5	-
53	0	0	0	14.4	-	**53**	0	0	0	2.6	-
54	0	0	0	14.2	-	**54**	0	0	0	9.8	-
55	0	0.1	1	21.1	-	**55**	0	0	0	10.1	-
56	0	0.6	1	15.3	-	**56**	0	0	0	16	-
57	0	0	0	8.3	-	**57**	0	0	0	3	-
58	0	0	0	9	-	**58**	0	0	0	3.9	-
59	0	0.5	1	13.6	-	**59**	0	0	0	1.3	-
60	0	0	0	8.2	0.25	**60**	0	0	0	4.9	0.5
61	0	0	0	8.6	-	**61**	0	0	0	5.5	-
62	0	0	0	6.3	-	**62**	0	0	0	0.2	-
63	0	0.4	1	4.7	-	**63**	0	0	0	5.1	-
64	0	0.3	1	13.3	-	**64**	0	0	0	8.7	-
65	0	0	0	9.4	-	**65**	0	0	0	7	-
66	0	0	0	6.7	-	**66**	0	0	0	2.9	-
67	0	0	0	7	-	**67**	0	0	0	6.9	-
68	0	0	0	6.1	-	**68**	0	0	0	5.8	-
69	0	0	0	4.4	-	**69**	0	0	0	11.6	-
70	0	0	0	6.2	0.5	**70**	0	0	0	11.5	0.75
71	0	0.3	1	15.7	-	**71**	0	0	0	0.2	-
72	0	0	0	10.3	-	**72**	0	0	0	11	-
73	0	0.3	1	18.4	-	**73**	0	0	0	2.2	-
74	0	0	0	7.5	-	**74**	0	0	0	5.4	-
75	0	0	0	3.9	-	**75**	0	0	0	10.6	-
76	0	0	0	6	-	**76**	0	0	0	20	-
77	0	0	0	7.2	-	**77**	0	0	0	10.5	-
78	0	0	0	9.1	-	**78**	0	0	0	4.4	-
79	0	0	0	11.8	-	**79**	0	0	0	6.5	-
80	0	0	0	4.2	0.5	**80**	0	0	0	1.9	0
81	0	0	0	11.3	-	**81**	0	0	0	6	-
82	0	0.7	1	19.8	-	**82**	0	0	0	0.2	-
83	0	0.3	1	11.2	-	**83**	0	0	0	6	-
84	0	0.4	1	18.8	-	**84**	0	0	0	1.8	-
85	0	0	0	8.4	-	**85**	0	0	0	8.3	-
86	0	0	0	8.5	-	**86**	0	0	0	12.2	-
87	0	0	0	6.2	-	**87**	0	0	0	4.4	-
88	0	0	0	7.1	-	**88**	0	0	0	4.5	-
89	0	0	0	9.8	-	**89**	0	0	0	6.5	-
90	0	0	0	7.3	0.75	**90**	0	0	0	5.3	0.25
91	0	0	0	2.9	-	**91**	0	0	0	8.6	-
92	0	0	0	11	-	**92**	0	0	0	2	-
93	0	0	0	5.1	-	**93**	0	0	0	13.4	-
94	0	0	0	9.1	-	**94**	0	0	0	5.1	-
95	0	0	0	4.5	-	**95**	0	0	0	2.9	-
96	0	0	0	10.5	-	**96**	0	0	0	0.2	-
97	0	0	0	5.2	-	**97**	0	0	0	2.4	-
98	0	0.6	1	32.5	-	**98**	0	0	0	9.9	-
99	0	0.1	1	10.4	-	**99**	0	0	0	7.6	-
100	0	0	0	7.3	0.5	**100**	0	0	0	6.6	0.25
Average Cc, Cp and Embed. =	**0**	**0.12**	**0.29**	**9.93**	**0.43**	**Average Cc, Cp and Embed. =**	**0**	**0**	**0**	**6.19**	**0.43**
Old Calcite Index (CI) =		**0.29**				**Old Calcite Index (CI) =**		**0**			
New Calcite Index (CI') =		**0.12**				**New Calcite Index (CI') =**		**0**			

Notes: "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.

Table C.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations, September 2021

RG_MI25-2						RG_MI25-3					
13-Sep-21						13-Sep-21					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**	**Pebble**	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	0	1	-	**1**	0	0	0	22.7	-
2	0	0	0	2.9	-	**2**	0	0	0	4.9	-
3	0	0	0	24.1	-	**3**	0	0	0	15.5	-
4	0	0	0	0.9	-	**4**	0	0	0	11.7	-
5	0	0	0	0.7	-	**5**	0	0	0	8	-
6	0	0	0	12.6	-	**6**	0	0	0	6.9	-
7	0	0	0	4	-	**7**	0	0	0	7.5	-
8	0	0	0	16.7	-	**8**	0	0	0	11.4	-
9	0	0	0	6.1	-	**9**	0	0	0	9.2	-
10	0	0	0	7.3	0.25	**10**	0	0	0	7.8	0.25
11	0	0	0	0.2	-	**11**	0	0	0	0.2	-
12	0	0	0	11.5	-	**12**	0	0	0	6.4	-
13	0	0	0	5.1	-	**13**	0	0	0	1.9	-
14	0	0	0	3	-	**14**	0	0	0	10.3	-
15	0	0	0	6	-	**15**	0	0	0	14.7	-
16	0	0	0	12.4	-	**16**	0	0	0	24.6	-
17	0	0	0	9.7	-	**17**	0	0	0	4.8	-
18	0	0	0	7.7	-	**18**	0	0	0	7	-
19	0	0	0	7.3	-	**19**	0	0	0	2.9	-
20	0	0	0	1.8	0	**20**	0	0	0	8.9	0.25
21	0	0	0	10.2	-	**21**	0	0	0	7.4	-
22	0	0	0	3.9	-	**22**	0	0	0	0.2	-
23	0	0	0	1.1	-	**23**	0	0	0	7.1	-
24	0	0	0	9.3	-	**24**	0	0	0	6.5	-
25	0	0	0	4.4	-	**25**	0	0	0	2	-
26	0	0	0	2.2	-	**26**	0	0	0	2.7	-
27	0	0	0	1.4	-	**27**	0	0	0	7.5	-
28	0	0	0	0.2	-	**28**	0	0	0	5.6	-
29	0	0	0	5.1	-	**29**	0	0	0	7.2	-
30	0	0	0	7.2	0.25	**30**	0	0	0	9.8	0.75
31	0	0	0	6.5	-	**31**	0	0	0	14.7	-
32	0	0	0	0.8	-	**32**	0	0	0	14	-
33	0	0	0	17.7	-	**33**	0	0	0	21	-
34	0	0	0	1.9	-	**34**	0	0	0	4.2	-
35	0	0	0	9.2	-	**35**	0	0	0	6.1	-
36	0	0	0	3.8	-	**36**	0	0	0	1.3	-
37	0	0	0	6.7	-	**37**	0	0	0	12.3	-
38	0	0	0	4.5	-	**38**	0	0	0	15.5	-
39	0	0	0	8.6	-	**39**	0	0	0	13.7	-
40	0	0	0	5.4	0.25	**40**	0	0	0	21.5	0.25
41	0	0	0	4.8	-	**41**	0	0	0	4.7	-
42	0	0	0	1.9	-	**42**	0	0	0	5.8	-
43	0	0	0	7.5	-	**43**	0	0	0	9.9	-
44	0	0	0	1.8	-	**44**	0	0	0	5.5	-
45	0	0	0	2.7	-	**45**	0	0	0	14.4	-
46	0	0	0	10.7	-	**46**	0	0	0	8.5	-
47	0	0	0	8.5	-	**47**	0	0	0	7.6	-
48	0	0	0	6	-	**48**	0	0	0	10.2	-
49	0	0	0	6.4	-	**49**	0	0	0	11.6	-
50	0	0	0	3.5	0.25	**50**	0	0	0	11	0.25
51	0	0	0	0.2	-	**51**	0	0	0	10.1	-
52	0	0	0	6.1	-	**52**	0	0	0	6.5	-
53	0	0	0	3.5	-	**53**	0	0	0	4.7	-
54	0	0	0	3.4	-	**54**	0	0	0	0.2	-
55	0	0	0	22.9	-	**55**	0	0	0	3.9	-
56	0	0	0	6.5	-	**56**	0	0	0	13.8	-
57	0	0	0	10	-	**57**	0	0	0	9.1	-
58	0	0	0	10.5	-	**58**	0	0	0	3.8	-
59	0	0	0	0.2	-	**59**	0	0	0	10.2	-
60	0	0	0	1.9	0	**60**	0	0	0	12.1	0.75
61	0	0	0	7.3	-	**61**	0	0	0	8.3	-
62	0	0	0	15.7	-	**62**	0	0	0	0.2	-
63	0	0	0	16.8	-	**63**	0	0	0	12.3	-
64	0	0	0	4.8	-	**64**	0	0	0	10.5	-
65	0	0	0	7.5	-	**65**	0	0	0	15	-
66	0	0	0	2.4	-	**66**	0	0	0	5.8	-
67	0	0	0	2.5	-	**67**	0	0	0	2.1	-
68	0	0	0	17.6	-	**68**	0	0	0	2.5	-
69	0	0	0	3.4	-	**69**	0	0	0	12.5	-
70	0	0	0	10.9	0.25	**70**	0	0	0	6	0.25
71	0	0	0	2.8	-	**71**	0	0	0	9	-
72	0	0	0	8.5	-	**72**	0	0	0	0.8	-
73	0	0	0	7.8	-	**73**	0	0	0	6.7	-
74	0	0	0	2	-	**74**	0	0	0	7.7	-
75	0	0	0	1.1	-	**75**	0	0	0	16.8	-
76	0	0	0	5.9	-	**76**	0	0	0	6.8	-
77	0	0	0	4.2	-	**77**	0	0	0	8.3	-
78	0	0	0	14.4	-	**78**	0	0	0	6	-
79	0	0	0	2.7	-	**79**	0	0	0	9.5	-
80	0	0	0	5.2	0	**80**	0	0	0	4	0.25
81	0	0	0	18.8	-	**81**	0	0	0	24.8	-
82	0	0	0	9.4	-	**82**	0	0	0	7.2	-
83	0	0	0	2.7	-	**83**	0	0	0	7	-
84	0	0	0	5.9	-	**84**	0	0	0	9.2	-
85	0	0	0	6.9	-	**85**	0	0	0	4.2	-
86	0	0	0	2.7	-	**86**	0	0	0	7.7	-
87	0	0	0	4.9	-	**87**	0	0	0	3.2	-
88	0	0	0	9.9	-	**88**	0	0	0	0.2	-
89	0	0	0	4.6	-	**89**	0	0	0	4.3	-
90	0	0	0	6.2	0.75	**90**	0	0	0	4.7	0.5
91	0	0	0	0.2	-	**91**	0	0	0	18	-
92	0	0	0	4.9	-	**92**	0	0	0	7.1	-
93	0	0	0	4.5	-	**93**	0	0	0	9.1	-
94	0	0	0	3	-	**94**	0	0	0	9.8	-
95	0	0	0	9.7	-	**95**	0	0	0	10	-
96	0	0	0	9	-	**96**	0	0	0	6	-
97	0	0	0	10.2	-	**97**	0	0	0	18.9	-
98	0	0	0	0.2	-	**98**	0	0	0	0.2	-
99	0	0	0	7.6	-	**99**	0	0	0	2.6	-
100	0	0	0	2.5	0	**100**	0	0	0	20	0.75
Average Cc, Cp and Embed. =	**0**	**0**	**0**	**6.37**	**0.20**	**Average Cc, Cp and Embed. =**	**0**	**0**	**0**	**8.56**	**0.43**
Old Calcite Index (CI) =				**0**		**Old Calcite Index (CI) =**				**0**	
New Calcite Index (CI') =				**0**		**New Calcite Index (CI') =**				**0**	

Notes: "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.

Table C.4: **Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations, September 2021**

RG_ERCKUT-1						RG_ERCKUT-2					
15-Sep-21						15-Sep-21					
Pebble	Concreted Status	Calcite Proportion	Calcite Presence	Intermediate Axis (cm)	Embeddedness (%)	Pebble	Concreted Status	Calcite Proportion	Calcite Presence	Intermediate Axis (cm)	Embeddedness (%)
1	0	0.4	1	13.5	-	**1**	0	1	1	2.5	-
2	0	0	0	4.1	-	**2**	0	0.8	1	7.6	-
3	0	0	0	8.3	-	**3**	0	0.1	1	7.2	-
4	0	1	1	6.2	-	**4**	0	0	0	3.1	-
5	0	0	0	5.6	-	**5**	0	0	0	9.6	-
6	0	0	0	8.9	-	**6**	0	0	0	1.9	-
7	0	0	0	3.5	-	**7**	0	0	0	1.8	-
8	0	0	0	10.6	-	**8**	0	0	0	15.2	-
9	0	0	0	13.4	-	**9**	0	0	0	10.3	-
10	0	0	0	4.8	0	**10**	0	0	0	5.5	0.25
11	0	0	0	8.2	-	**11**	0	0.5	1	10.6	-
12	0	0	0	6.9	-	**12**	0	0	0	8.3	-
13	0	0	0	8.6	-	**13**	0	0	0	21.5	-
14	0	0.2	1	12.4	-	**14**	0	0	0	16.2	-
15	0	1	1	5.5	-	**15**	-	-	-	0.2	-
16	0	0.1	1	13.6	-	**16**	0	0	0	4	-
17	0	0	0	18.5	-	**17**	-	-	-	0.2	-
18	0	0	0	3.8	-	**18**	0	0	0	8	-
19	0	0	0	4.5	-	**19**	0	0.1	1	6.9	-
20	0	0.1	1	4.6	0.25	**20**	0	0	0	10.3	0.25
21	0	0.2	1	4.8	-	**21**	0	0	0	6.4	-
22	0	0	0	17.9	-	**22**	0	0	0	14.8	-
23	0	0	0	18.5	-	**23**	0	0	0	21.5	-
24	0	0	0	12.3	-	**24**	0	0.1	1	11.6	-
25	0	0	0	7.2	-	**25**	0	0.1	1	5.8	-
26	0	0.1	1	10.5	-	**26**	0	0.1	1	3.7	-
27	0	0.2	1	13	-	**27**	0	0.2	1	9.6	-
28	0	0	0	9.5	-	**28**	0	0	0	17.7	-
29	0	0.2	1	9	-	**29**	0	0.8	1	9.1	-
30	0	0	0	8.2	0.5	**30**	0	0	0	22.4	0.25
31	0	0	0	6	-	**31**	-	-	-	0.2	-
32	0	0	0	12	-	**32**	0	0	0	9.1	-
33	0	0	0	7	-	**33**	0	0	0	7.5	-
34	0	0	0	4	-	**34**	0	0	0	12.4	-
35	0	0.3	1	6.5	-	**35**	0	0	0	9.2	-
36	0	0	0	12	-	**36**	0	0	0	5.1	-
37	0	0	0	3.3	-	**37**	0	0	0	14.5	-
38	0	0	0	4	-	**38**	0	0	0	11.3	-
39	0	0	0	5	-	**39**	0	0	0	4.1	-
40	0	0	0	1.5	0.25	**40**	0	0	0	12.3	0.25
41	0	0	0	2	-	**41**	0	0	0	21.5	-
42	0	0	0	0.2	-	**42**	0	0	0	8.4	-
43	0	0	0	14	-	**43**	0	0	0	21.2	-
44	2	0.7	1	17	-	**44**	0	0.5	1	18.3	-
45	0	0.3	1	9	-	**45**	0	0	0	16.6	-
46	0	0	0	1.5	-	**46**	0	0	0	4.1	-
47	0	0.2	1	11.5	-	**47**	0	0	0	8.5	-
48	0	0	0	2.6	-	**48**	0	0	0	6.7	-
49	0	0	0	2	-	**49**	0	0	0	5.7	-
50	0	0.3	1	12	0.75	**50**	0	0	0	15.8	0.5
51	0	0	0	4	-	**51**	-	-	-	0.2	-
52	0	0	0	6	-	**52**	0	0	0	20.8	-
53	0	0.2	1	14	-	**53**	0	0	0	5.6	-
54	0	0	0	6	-	**54**	0	0	0	5.6	-
55	0	0	0	5	-	**55**	0	0	0	5.2	-
56	0	0	0	3	-	**56**	0	0	0	3.6	-
57	0	0	0	6	-	**57**	0	0	0	10.1	-
58	0	0	0	7.5	-	**58**	0	0	0	17.7	-
59	0	0	0	4.5	-	**59**	0	0	0	7.6	-
60	0	0	0	6.3	0.5	**60**	0	0	0	9.8	0.5
61	0	0	0	5	-	**61**	0	0.5	1	17.8	-
62	0	0	0	3.5	-	**62**	0	0	0	10.1	-
63	0	0	0	4.5	-	**63**	0	0.2	1	20	-
64	0	0	0	5.5	-	**64**	0	0.2	1	9.3	-
65	0	0	0	3	-	**65**	0	0	0	22.5	-
66	0	0	0	9	-	**66**	0	0	0	7.1	-
67	0	0	0	10	-	**67**	0	0.1	1	5.2	-
68	0	0	0	8	-	**68**	0	0.1	1	7.4	-
69	0	0.1	1	11	-	**69**	0	0.1	1	12.4	-
70	0	0	0	7.5	0.5	**70**	0	0	0	18.5	0.25
71	0	0	0	2.5	-	**71**	0	0	0	10.4	-
72	0	0	0	4	-	**72**	-	-	-	0.2	-
73	0	0	0	3.5	-	**73**	-	-	-	0.2	-
74	0	0	0	6	-	**74**	0	0	0	2.8	-
75	0	0	0	17	-	**75**	0	0	0	8.6	-
76	0	0	0	7	-	**76**	0	0	0	1.6	-
77	0	0	0	6.7	-	**77**	0	0	0	6.5	-
78	0	0	0	6.5	-	**78**	0	0	0	2.1	-
79	0	0	0	10	-	**79**	0	0	0	13.9	-
80	0	0	0	7.3	0.5	**80**	0	0	0	3.1	0.5
81	0	0	0	5.2	-	**81**	0	0	0	10.9	-
82	0	0	0	6.5	-	**82**	0	0	0	19	-
83	0	0	0	13	-	**83**	-	-	-	0.2	-
84	0	0	0	11	-	**84**	0	0	0	6.4	-
85	0	0	0	7	-	**85**	0	0	0	14.3	-
86	0	0	0	5.5	-	**86**	0	0	0	5.2	-
87	0	0	0	18	-	**87**	0	0	0	2	-
88	0	0	0	19	-	**88**	0	0	0	4.1	-
89	0	0	0	6.5	-	**89**	0	0	0	10.9	-
90	0	0	0	5.3	0.25	**90**	0	0	0	14	0.75
91	0	0	0	3	-	**91**	-	-	-	0.2	-
92	0	0	0	4	-	**92**	0	0	0	3.1	-
93	0	0	0	17.5	-	**93**	0	0	0	2.9	-
94	-	0	0	0.2	-	**94**	0	0	0	7.7	-
95	0	0	0	13	-	**95**	0	0	0	11.5	-
96	0	0	0	4.6	-	**96**	0	0	0	6.3	-
97	0	0	0	7.2	-	**97**	0	0	0	8.4	-
98	0	0	0	5.4	-	**98**	-	-	-	0.2	-
99	0	0.1	1	15	-	**99**	0	0	0	15.2	-
100	0	0	0	8	0.5	**100**	0	0	0	18.5	0.75
Average Cc, Cp and Embed. =	**0.02**	**0.06**	**0.18**	**7.84**	**0.40**	**Average Cc, Cp and Embed. =**	**0**	**0.06**	**0.19**	**9.13**	**0.43**
Old Calcite Index (CI) =			**0.20**			**Old Calcite Index (CI) =**			**0.19**		
New Calcite Index (CI') =			**0.08**			**New Calcite Index (CI') =**			**0.06**		

Notes: "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.

Table C.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations, September 2021

RG_ERCKUT-3						RG_ERCKDT-1					
15-Sep-21						14-Sep-21					
Pebble	Concreted Status	Calcite Proportion	Calcite Presence	Intermediate Axis (cm)	Embeddedness (%)	Pebble	Concreted Status	Calcite Proportion	Calcite Presence	Intermediate Axis (cm)	Embeddedness (%)
1	0	0.5	1	10	-	**1**	0	0	0	1.5	-
2	-	-	-	0.2	-	**2**	0	0	0	2.2	-
3	0	0.2	1	3.5	-	**3**	-	-	-	101	-
4	0	0	0	4.3	-	**4**	-	-	-	101	-
5	0	0	0	16.2	-	**5**	0	0	0	3.8	-
6	-	-	-	0.2	-	**6**	0	0	0	6.5	-
7	0	0.2	1	5.4	-	**7**	0	0.2	1	3.8	-
8	-	-	-	0.2	-	**8**	-	-	-	101	-
9	0	0	0	2.9	-	**9**	1	0.8	1	6.1	-
10	0	0.2	1	6.2	0.25	**10**	0	0	0	3.2	0
11	0	0.1	1	4	-	**11**	0	0.1	1	22.5	-
12	0	0	0	5.7	-	**12**	0	0.1	1	8.5	-
13	0	0	0	3.5	-	**13**	-	-	-	101	-
14	0	0	0	3	-	**14**	0	0.7	1	14	-
15	0	0.1	1	12	-	**15**	-	-	-	0.2	-
16	0	0	0	11	-	**16**	0	0.1	1	14.2	-
17	0	0	0	8.5	-	**17**	0	0	0	25.5	-
18	0	0.1	1	14	-	**18**	0	0.5	1	9.5	-
19	0	0	0	8.9	-	**19**	0	0.1	1	3.3	-
20	0	0	0	2.5	0.25	**20**	0	0.5	1	13.5	0.5
21	0	0	0	3.2	-	**21**	0	0.3	1	3.9	-
22	-	-	-	0.2	-	**22**	0	0.4	1	5.1	-
23	0	0	0	6	-	**23**	0	0.2	1	8.5	-
24	0	0	0	2	-	**24**	0	1	1	22.5	-
25	0	0	0	28.5	-	**25**	0	0.2	1	15.3	-
26	0	0	0	13.5	-	**26**	0	0.2	1	6.6	-
27	0	0	0	2	-	**27**	0	0.1	1	4.8	-
28	0	1	1	30	-	**28**	0	0.3	1	2.2	-
29	0	0	0	6.5	-	**29**	0	0.5	1	8.1	-
30	0	0	0	17	0.5	**30**	0	0.3	1	9.7	0.25
31	0	0	0	7.5	-	**31**	0	0.4	1	4.5	-
32	0	0.1	1	1.5	-	**32**	0	0	0	4.9	-
33	0	0	0	5.5	-	**33**	0	0.2	1	5.7	-
34	0	0	0	7	-	**34**	0	0.5	1	2.3	-
35	0	0	0	7.3	-	**35**	0	0.2	1	13.2	-
36	0	0	0	3.7	-	**36**	0	0.3	1	12.2	-
37	0	0	0	10.9	-	**37**	0	0.2	1	8.5	-
38	-	-	-	0.2	-	**38**	0	0.3	1	11.4	-
39	0	0	0	8.7	-	**39**	0	0.4	1	13.9	-
40	0	0	0	16.5	0.25	**40**	0	0.2	1	10.3	0.25
41	0	0	0	8.6	-	**41**	0	0	0	11.2	-
42	0	0	0	3.4	-	**42**	0	0.4	1	10.9	-
43	0	0	0	13.2	-	**43**	0	0.2	1	7.4	-
44	0	0	0	14	-	**44**	0	0.3	1	8.8	-
45	-	-	-	0.2	-	**45**	0	0.6	1	2.9	-
46	0	0	0	1.5	-	**46**	0	0.2	1	3.2	-
47	0	0	0	11.4	-	**47**	0	0.2	1	24.5	-
48	0	0	0	16	-	**48**	0	0.4	1	9.6	-
49	0	0	0	2	-	**49**	0	0	0	3.2	-
50	0	0.1	1	7	0.5	**50**	0	0.4	1	8.2	0.75
51	0	0	0	2.9	-	**51**	-	-	-	0.2	-
52	0	0	0	10.1	-	**52**	0	0.2	1	18.9	-
53	0	0	0	3.6	-	**53**	0	0.3	1	10.7	-
54	0	0	0	4.2	-	**54**	0	0.8	1	8.3	-
55	0	0	0	15.1	-	**55**	0	0.3	1	14.6	-
56	0	0.1	1	13.4	-	**56**	0	0.5	1	23	-
57	0	0	0	4.6	-	**57**	0	0.1	1	3.4	-
58	0	0	0	8.5	-	**58**	0	0.6	1	16.2	-
59	0	0	0	7.6	-	**59**	0	0.3	1	10.2	-
60	0	0	0	23.5	0.75	**60**	0	0	0	2.5	0
61	0	0	0	4.1	-	**61**	0	0	0	4.6	-
62	0	0	0	7.6	-	**62**	0	0.2	1	14.9	-
63	0	0	0	9.5	-	**63**	0	0.4	1	19.3	-
64	0	0	0	20	-	**64**	0	0.6	1	4.5	-
65	0	0	0	13.1	-	**65**	0	0.3	1	12.3	-
66	0	0	0	17.3	-	**66**	0	0.2	1	3.4	-
67	0	0.5	1	11.8	-	**67**	0	0.4	1	4.3	-
68	0	1	1	15.2	-	**68**	0	0	0	6.4	-
69	0	0	0	10.2	-	**69**	0	0.2	1	7.6	-
70	0	0	0	27	0.75	**70**	0	0.8	1	6.3	0.25
71	0	0	0	14.6	-	**71**	0	0.8	1	5.9	-
72	0	0	0	17.8	-	**72**	0	0	0	2.9	-
73	0	0	0	19.5	-	**73**	0	5	1	12	-
74	0	0.5	1	18.2	-	**74**	0	0	0	3.5	-
75	-	-	-	0.2	-	**75**	0	0.2	1	7.3	-
76	0	0	0	12.8	-	**76**	0	0.5	1	11.1	-
77	0	0	0	2.5	-	**77**	0	0.2	1	10.4	-
78	0	0	0	3.8	-	**78**	-	-	-	101	-
79	0	0	0	14.2	-	**79**	0	0.8	1	16.4	-
80	0	0	0	11.5	0.5	**80**	0	0.4	1	11.6	0.25
81	-	-	-	0.2	-	**81**	0	0.2	1	9.3	-
82	-	-	-	0.2	-	**82**	0	0.5	1	22.4	-
83	0	0	0	9.8	-	**83**	0	0.7	1	8.4	-
84	0	0	0	18.2	-	**84**	0	0.5	1	19.6	-
85	0	0	0	11.5	-	**85**	0	0.3	1	3.5	-
86	0	0	0	7.6	-	**86**	0	0.8	1	6.1	-
87	0	0	0	5.8	-	**87**	0	0.1	1	5.1	-
88	0	0	0	2.9	-	**88**	0	0.6	1	12.2	-
89	0	0	0	17.1	-	**89**	0	0.3	1	7.2	-
90	0	0	0	7.5	0.5	**90**	2	0.6	1	14.5	0.25
91	0	0	0	8.4	-	**91**	0	0.5	1	5.6	-
92	0	0	0	4.4	-	**92**	0	1	1	6.3	-
93	0	0	0	2.9	-	**93**	0	0.4	1	7.4	-
94	0	0	0	8.7	-	**94**	0	0.2	1	2.4	-
95	0	0	0	4.5	-	**95**	0	0.5	1	24.2	-
96	0	0	0	5.6	-	**96**	0	0.6	1	21.5	-
97	0	0	0	3.8	-	**97**	-	-	-	0.2	-
98	0	0.5	1	8.2	-	**98**	0	0.4	1	8.3	-
99	0	0	0	3.7	-	**99**	0	0.6	1	7.6	-
100	0	0	0	2.9	0.25	**100**	-	-	-	0.2	0
Average Cc, Cp and Embed. =	**0**	**0.06**	**0.16**	**8.56**	**0.45**	**Average Cc, Cp and Embed. =**	**0.03**	**0.38**	**0.85**	**13.7**	**0.25**
Old Calcite Index (CI) =				**0.16**		**Old Calcite Index (CI) =**				**0.88**	
New Calcite Index (CI') =				**0.06**		**New Calcite Index (CI') =**				**0.42**	

Notes: "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.

Table C.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations, September 2021

RG_ERCKDT-2						RG_ERCKDT-3					
14-Sep-21						15-Sep-21					
Pebble	Concreted Status	Calcite Proportion	Calcite Presence	Intermediate Axis (cm)	Embeddedness (%)	Pebble	Concreted Status	Calcite Proportion	Calcite Presence	Intermediate Axis (cm)	Embeddedness (%)
1	0	0.3	1	16.5	-	**1**	0	0.1	1	3.5	-
2	0	0.8	1	9.2	-	**2**	0	0.3	1	5.5	-
3	0	0.4	1	13.6	-	**3**	-	-	-	0.2	-
4	0	0.6	1	11	-	**4**	0	0	0	1.5	-
5	0	0.2	1	16.2	-	**5**	0	0	0	4.3	-
6	0	0.2	1	5.2	-	**6**	0	0.2	1	9	-
7	0	0.2	1	11.1	-	**7**	0	0.6	1	4	-
8	0	0.2	1	7.3	-	**8**	0	0	0	3	-
9	0	0.2	1	7.1	-	**9**	0	0	0	2	-
10	0	0.3	1	5.2	0.5	**10**	0	0.1	1	10.8	0.75
11	-	-	-	0.2	-	**11**	0	0.3	1	5.5	-
12	-	-	-	0.2	-	**12**	0	0.5	1	5	-
13	-	-	-	0.2	-	**13**	0	0	0	8	-
14	-	-	-	0.2	-	**14**	0	0	0	4.3	-
15	0	0.8	1	3.8	-	**15**	0	0.7	1	9.5	-
16	0	0.4	1	15.5	-	**16**	0	0.5	1	5	-
17	0	0	0	17	-	**17**	0	-	-	0.2	-
18	0	0	0	2.7	-	**18**	0	0.1	1	1.5	-
19	0	0	0	2.1	-	**19**	0	0	0	0.7	-
20	0	0.3	1	3.5	0.5	**20**	0	0	0	1.5	0.5
21	0	0.4	1	10.3	-	**21**	0	0	0	1.3	-
22	0	1	1	17.5	-	**22**	0	0.2	1	4	-
23	0	0	0	2.6	-	**23**	0	0.3	1	7	-
24	0	0	0	2.8	-	**24**	0	0.4	1	5.5	-
25	-	-	-	101	-	**25**	0	0	0	4.5	-
26	0	0.2	1	15.2	-	**26**	-	-	-	0.2	-
27	0	0.3	1	9.2	-	**27**	0	0	0	1.5	-
28	0	0.2	1	10.8	-	**28**	0	0.6	1	8.6	-
29	0	0	0	3.8	-	**29**	0	0.3	1	9.5	-
30	0	0.2	1	7.2	0.5	**30**	0	0.6	1	10	0.75
31	-	-	-	0.2	-	**31**	0	0.5	1	13	-
32	-	-	-	0.2	-	**32**	0	0.1	1	9.5	-
33	0	0.1	1	3.3	-	**33**	0	0.4	1	10	-
34	-	-	-	0.2	-	**34**	0	0.6	1	13	-
35	0	0	0	4.8	-	**35**	0	0.3	1	6	-
36	0	0.3	1	4.2	-	**36**	0	0	0	2	-
37	0	0	0	21.5	-	**37**	0	-	-	0.2	-
38	0	0	0	3.6	-	**38**	0	0	0	2.3	-
39	0	0.2	1	10.6	-	**39**	0	0.2	1	11	-
40	0	0.7	1	22.5	0.25	**40**	0	-	-	8	0.75
41	0	0.4	1	5.6	-	**41**	0	0	0	1	-
42	0	0	0	2.2	-	**42**	0	0	0	10	-
43	0	0.3	1	11.1	-	**43**	0	0.1	1	6	-
44	0	0	0	5.4	-	**44**	0	0	0	5	-
45	0	0	0	13.6	-	**45**	0	0.3	1	8	-
46	-	-	-	0.2	-	**46**	0	0.1	1	4.5	-
47	0	0	0	3.2	-	**47**	0	0	0	3	-
48	0	0	0	2.6	-	**48**	0	0	0	3.5	-
49	0	0	0	4.5	-	**49**	0	0.4	1	8.5	-
50	0	0	0	2.6	0.25	**50**	0	0.1	1	6	0.5
51	0	0	0	3	-	**51**	0	0	0	5	-
52	0	0	0	19.1	-	**52**	0	0	0	2	-
53	0	1	1	22	-	**53**	0	0	0	8	-
54	0	0	0	5.1	-	**54**	0	0	0	4	-
55	0	0	0	9.2	-	**55**	0	0	0	6.3	-
56	0	0	0	2.2	-	**56**	0	0	0	1.5	-
57	0	0	0	2.3	-	**57**	0	0	0	1.5	-
58	-	-	-	0.2	-	**58**	0	0	0	4.3	-
59	-	-	-	0.2	-	**59**	0	0.4	1	5	-
60	0	0.5	1	19.5	0.5	**60**	0	0	0	8	0.5
61	-	-	-	0.2	-	**61**	0	0	0	5	-
62	0	0	0	4.1	-	**62**	0	0	0	10	-
63	0	0.1	1	10.8	-	**63**	0	0	0	10	-
64	-	-	-	0.2	-	**64**	0	0.3	1	8	-
65	0	0.5	1	15.2	-	**65**	0	0	0	1	-
66	0	0.8	1	20.3	-	**66**	0	0	0	3.5	-
67	-	-	-	0.2	-	**67**	0	0.5	1	6.5	-
68	0	0.5	1	6.4	-	**68**	0	0.3	1	6.5	-
69	-	-	-	0.2	-	**69**	0	0	0	3	-
70	0	0	0	3.8	0.25	**70**	0	0.6	1	7	0.5
71	-	-	-	0.2	-	**71**	0	0.5	1	7	-
72	-	-	-	0.2	-	**72**	0	0.3	1	4.2	-
73	-	-	-	0.2	-	**73**	0	0	0	6.5	-
74	-	-	-	0.2	-	**74**	0	0.3	1	21.5	-
75	-	-	-	0.2	-	**75**	0	0.3	1	11.8	-
76	-	-	-	0.2	-	**76**	0	0.5	1	10.5	-
77	0	1	1	15.1	-	**77**	0	0	0	9.2	-
78	0	0	0	7.2	-	**78**	0	0.3	1	9.8	-
79	0	0.4	1	10.1	-	**79**	0	0	0	2.7	0
80	0	0.3	1	11.2	0.5	**80**	0	0	0	15.4	-
81	0	0	0	4.2	-	**81**	0	0	0	8.1	-
82	0	0	0	16.7	-	**82**	0	0	0	3.8	-
83	0	0	0	15	-	**83**	0	0.5	1	5.7	-
84	0	1	1	15.8	-	**84**	0	0.8	1	8.2	-
85	0	0	0	2.8	-	**85**	-	-	-	0.2	-
86	0	0.4	1	10.1	-	**86**	0	0.8	1	7.4	-
87	-	0	0	0.2	-	**87**	0	0	0	3.4	-
88	0	0.4	1	21.3	-	**88**	0	0.5	1	5.6	-
89	0	0	0	3	-	**89**	0	0.3	1	5.8	-
90	0	0.5	1	17.2	0.25	**90**	0	0.5	1	7.6	0.25
91	0	1	1	17	-	**91**	0	0.8	1	14.5	-
92	-	-	-	0.2	-	**92**	0	0.5	1	3	-
93	0	0	0	5.5	-	**93**	0	0.5	1	10.3	-
94	0	0.5	1	16.4	-	**94**	0	0.5	1	5.8	-
95	-	-	-	0.2	-	**95**	-	-	-	0.2	-
96	-	-	-	0.2	-	**96**	0	0.5	1	14.5	-
97	0	0	0	3.4	-	**97**	-	-	-	0.2	-
98	0	0.4	1	15.5	-	**98**	0	0.3	1	30.8	-
99	0	0	0	3.5	-	**99**	0	0	0	13.4	-
100	0	1	1	14.7	0.5	**100**	0	0	0	11.4	0.25
Average Cc, Cp and Embed. =	**0**	**0.26**	**0.55**	**8.22**	**0.40**	**Average Cc, Cp and Embed. =**	**0**	**0.21**	**0.54**	**6.32**	**0.48**
Old Calcite Index (CI) =			**0.55**			**Old Calcite Index (CI) =**			**0.54**		
New Calcite Index (CI') =			**0.26**			**New Calcite Index (CI') =**			**0.21**		

Notes: "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.

Table C.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations, September 2021

RG_ERCK-1						RG_MI3-1					
10-Sep-21						10-Sep-21					
Pebble	Concreted Status	Calcite Proportion	Calcite Presence	Intermediate Axis (cm)	Embeddedness (%)	Pebble	Concreted Status	Calcite Proportion	Calcite Presence	Intermediate Axis (cm)	Embeddedness (%)
1	1	0.9	1	13.5	-	1	0	0	0	7.5	-
2	1	0.8	1	14.2	-	2	0	0	0	4.5	-
3	2	1	1	10.1	-	3	0	0	0	15.5	-
4	0	1	1	14.6	-	4	0	0	0	10.8	-
5	1	1	1	15.2	-	5	0	0	0	21.2	-
6	1	1	1	9.5	-	6	0	0	0	14.6	-
7	2	1	1	8.5	-	7	0	0	0	26.3	-
8	1	1	1	12.4	-	8	0	0	0	5.9	-
9	2	1	1	10.1	-	9	0	0	0	16.5	-
10	1	0.8	1	5.5	0.25	10	0	0	0	11.3	0.25
11	0	0.5	1	4.6	-	11	0	0	0	14.2	-
12	2	1	1	11	-	12	0	0	0	16.1	-
13	1	1	1	7.1	-	13	0	0	0	3.1	-
14	2	1	1	5.5	-	14	0	0	0	7.8	-
15	2	1	1	6.6	-	15	0	0	0	3.5	-
16	2	1	1	20.5	-	16	0	0	0	14.5	-
17	2	1	1	17.6	-	17	0	0	0	8.5	-
18	0	0.5	1	4.3	-	18	0	0	0	20.2	-
19	2	1	1	10.9	-	19	0	0	0	6.9	-
20	2	1	1	13.4	0.5	20	0	0	0	8.4	0.5
21	0	0.4	1	10.3	-	21	0	0	0	9.8	-
22	1	1	1	7.6	-	22	0	0	0	25.3	-
23	1	0.9	1	13.2	-	23	0	0	0	18.6	-
24	2	1	1	25	-	24	0	0	0	6.8	-
25	2	1	1	16	-	25	0	0	0	8.8	-
26	2	1	1	23.5	-	26	0	0	0	19.4	-
27	2	1	1	20.4	-	27	0	0	0	9.3	-
28	2	1	1	29.5	-	28	0	0	0	14.6	-
29	1	1	1	7.7	-	29	0	0	0	6.4	-
30	2	1	1	11.3	0.5	30	0	0	0	18.7	0.5
31	1	1	1	7.2	-	31	0	0	0	6.5	-
32	0	1	1	7.2	-	32	0	0	0	19.3	-
33	2	1	1	10.5	-	33	0	0	0	2.3	-
34	2	1	1	12.4	-	34	0	0	0	8.6	-
35	0	1	1	7.4	-	35	0	0	0	8.6	-
36	2	1	1	10.2	-	36	0	0	0	15.4	-
37	1	0.8	1	14.4	-	37	0	0	0	12.2	-
38	0	0.8	1	14.4	-	38	0	0	0	12	-
39	2	1	1	5.9	-	39	0	0	0	13.6	-
40	2	1	1	7	0.25	40	0	0	0	7.8	0
41	0	0.8	1	6.2	-	41	0	0	0	11.6	-
42	0	0.8	1	8.2	-	42	0	0	0	4.1	-
43	2	1	1	9.7	-	43	0	0	0	17.4	-
44	0	0.7	1	9.4	-	44	0	0	0	4.7	-
45	2	1	1	9.4	-	45	0	0	0	16.8	-
46	0	0.7	1	7.1	-	46	0	0	0	3.9	-
47	1	0.6	1	13.2	-	47	0	0	0	10.6	-
48	0	0.9	1	6.6	-	48	0	0	0	6.3	-
49	0	0.4	1	14.4	-	49	0	0	0	6.3	-
50	0	1	1	10.2	0.25	50	0	0	0	8.9	0
51	2	1	1	13	-	51	0	0	0	27.2	-
52	2	1	1	8.3	-	52	0	0	0	10.5	-
53	0	1	1	8.2	-	53	0	0	0	4.8	-
54	2	1	1	4.6	-	54	0	0	0	17.9	-
55	0	1	1	13.4	-	55	0	0	0	12.2	-
56	0	0.8	1	11.2	-	56	0	0	0	9.5	-
57	0	0.7	1	6.7	-	57	0	0	0	5.5	-
58	2	1	1	10	-	58	0	0	0	5.6	-
59	2	1	1	15.8	-	59	0	0	0	4.5	-
60	2	1	1	8.9	0.25	60	0	0	0	21.5	0.5
61	2	1	1	7.1	-	61	0	0	0	11.2	-
62	2	1	1	20.4	-	62	0	0	0	13.2	-
63	-	-	-	101	-	63	0	0	0	7.9	-
64	2	1	1	10.5	-	64	0	0	0	23.4	-
65	2	1	1	11.6	-	65	0	0	0	19.8	-
66	2	1	1	16.5	-	66	0	0	0	10.9	-
67	2	1	1	15	-	67	0	0	0	3	-
68	2	1	1	21.6	-	68	0	0	0	22.2	-
69	-	-	-	101	-	69	0	0	0	15.5	-
70	2	1	1	7.6	0.25	70	0	0	0	8.4	0
71	-	-	-	101	-	71	0	0	0	9.6	-
72	2	1	1	17.1	-	72	0	0	0	11.7	-
73	2	1	1	8.5	-	73	0	0	0	6.4	-
74	2	1	1	12.5	-	74	0	0	0	18.7	-
75	2	1	1	12.2	-	75	0	0	0	7.7	-
76	-	-	-	101	-	76	0	0	0	8.3	-
77	-	-	-	101	-	77	0	0	0	15.2	-
78	1	1	1	10.2	-	78	0	0	0	6.1	-
79	2	1	1	16.5	-	79	0	0	0	7.8	-
80	0	1	1	7.4	0.25	80	0	0	0	15.2	0.5
81	1	1	1	12.6	-	81	0	0	0	8.5	-
82	1	1	1	16.6	-	82	0	0	0	30	-
83	1	1	1	12	-	83	0	0	0	3.6	-
84	2	1	1	15.5	-	84	0	0	0	5.1	-
85	1	1	1	8.6	-	85	0	0	0	16.3	-
86	1	1	1	7.2	-	86	0	0	0	25.2	-
87	0	1	1	13.4	-	87	0	0	0	6.3	-
88	2	1	1	11.5	-	88	0	0	0	8.5	-
89	0	1	1	12.6	-	89	0	0	0	7.4	-
90	0	0.8	1	5.8	0.25	90	0	0	0	35	0.75
91	2	1	1	13.3	-	91	0	0	0	17	-
92	0	0.5	1	8.4	-	92	0	0	0	3.6	-
93	1	0.9	1	11.2	-	93	0	0	0	10.8	-
94	0	1	1	8.4	-	94	0	0	0	18.2	-
95	1	1	1	12.9	-	95	0	0	0	4	-
96	0	0.5	1	-	-	96	0	0	0	13.3	-
97	0	1	1	9	-	97	0	0	0	5.1	-
98	-	-	-	101	-	98	0	0	0	10.9	-
99	2	1	1	42	-	99	0	0	0	9.3	-
100	0	1	1	10.1	0.25	100	0	0	0	16.2	0.5
Average Cc, Cp and Embed. =	**1.20**	**0.93**	**1.00**	**17.2**	**0.30**	**Average Cc, Cp and Embed. =**	**0**	**0**	**0**	**11.9**	**0.35**
Old Calcite Index (CI) =			**2.20**			**Old Calcite Index (CI) =**			**0**		
New Calcite Index (CI') =			**2.13**			**New Calcite Index (CI') =**			**0**		

Notes: "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.

Table C.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations, September 2021

RG_MI3-2						RG_MI3-3					
10-Sep-21						10-Sep-21					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**	**Pebble**	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	0	12.3	-	**1**	0	0	0	11.2	-
2	0	0	0	14.4	-	**2**	0	0	0	10.1	-
3	0	0	0	10.3	-	**3**	0	0	0	9.7	-
4	0	0	0	14.5	-	**4**	0	0	0	12.5	-
5	0	0	0	2.2	-	**5**	0	0	0	11.1	-
6	0	0	0	12.4	-	**6**	0	0	0	20.4	-
7	0	0	0	14.6	-	**7**	0	0	0	10.3	-
8	0	0	0	18.1	-	**8**	0	0	0	30	-
9	0	0	0	9	-	**9**	0	0	0	12.88	-
10	0	0	0	10.2	0.75	**10**	0	0	0	12.2	0.5
11	0	0	0	5.3	-	**11**	0	0	0	7.1	-
12	0	0	0	15.9	-	**12**	0	0	0	14	-
13	0	0	0	11.1	-	**13**	0	0	0	52	-
14	0	0	0	7.5	-	**14**	0	0	0	16.1	-
15	0	0	0	6.5	-	**15**	-	-	-	0.2	-
16	0	0	0	26	-	**16**	0	0	0	10.2	-
17	0	0	0	8.4	-	**17**	0	0	0	16.2	-
18	0	0	0	4.8	-	**18**	0	0	0	3.9	-
19	0	0	0	15.1	-	**19**	0	0	0	22.5	-
20	0	0	0	4.3	0.5	**20**	0	0	0	8.3	0.5
21	0	0	0	10.1	-	**21**	0	0	0	4.3	-
22	0	0	0	5.1	-	**22**	0	0	0	10.6	-
23	0	0	0	13.2	-	**23**	0	0	0	7.1	-
24	0	0	0	7.4	-	**24**	0	0	0	7.1	-
25	0	0	0	13.6	-	**25**	0	0	0	6.2	-
26	0	0	0	13.6	-	**26**	0	0	0	10.8	-
27	0	0	0	12.2	-	**27**	0	0	0	3.2	-
28	0	0	0	10.4	-	**28**	0	0	0	4.1	-
29	0	0	0	17.9	-	**29**	0	0	0	16.6	-
30	0	0	0	12.5	0	**30**	0	0	0	30	0.25
31	0	0	0	12.5	-	**31**	0	0	0	15.5	-
32	-	-	-	-	-	**32**	0	0	0	5.8	-
33	0	0	0	9.6	-	**33**	0	0	0	8	-
34	0	0	0	5.5	-	**34**	0	0	0	6.2	-
35	0	0	0	8.2	-	**35**	0	0	0	5.4	-
36	0	0	0	24.7	-	**36**	0	0	0	18.3	-
37	0	0	0	2.8	-	**37**	0	0	0	101	-
38	0	0	0	13.6	-	**38**	0	0	0	15.2	-
39	0	0	0	15	-	**39**	0	0	0	18.3	-
40	0	0	0	7.1	0.5	**40**	0	0	0	11	0.5
41	0	0	0	9.3	-	**41**	0	0	0	6.4	-
42	0	0	0	10.9	-	**42**	0	0	0	22.5	-
43	0	0	0	6.5	-	**43**	0	0	0	8.3	-
44	0	0	0	12.6	-	**44**	0	0	0	11.3	-
45	0	0	0	8.6	-	**45**	0	0	0	25.6	-
46	0	0	0	7	-	**46**	0	0	0	21	-
47	0	0	0	21.5	-	**47**	0	0	0	9.9	-
48	0	0	0	14.5	-	**48**	0	0	0	9	-
49	0	0	0	9	-	**49**	0	0	0	6.2	-
50	0	0	0	15.5	0.25	**50**	0	0	0	11.5	0.25
51	0	0	0	4.5	-	**51**	-	-	-	0.2	-
52	0	0	0	5.5	-	**52**	0	0	0	8.6	-
53	0	0	0	9.8	-	**53**	0	0	0	7.2	-
54	0	0	0	8.4	-	**54**	0	0	0	14.1	-
55	0	0	0	7.9	-	**55**	0	0	0	5.3	-
56	0	0	0	5.6	-	**56**	0	0	0	7.2	-
57	0	0	0	22.5	-	**57**	0	0	0	10.8	-
58	0	0	0	5.8	-	**58**	0	0	0	7	-
59	0	0	0	17.9	-	**59**	0	0	0	10.3	-
60	0	0	0	7.8	0.5	**60**	0	0	0	14.5	0.25
61	0	0	0	15.9	-	**61**	0	0	0	9.4	-
62	0	0	0	18.2	-	**62**	0	0	0	4.8	-
63	0	0	0	13.6	-	**63**	0	0	0	3.7	-
64	0	0	0	14.7	-	**64**	0	0	0	10	-
65	0	0	0	21.2	-	**65**	0	0	0	10	-
66	0	0	0	13.1	-	**66**	0	0	0	7.2	-
67	0	0	0	12.9	-	**67**	0	0	0	45	-
68	0	0	0	12.9	-	**68**	0	0	0	10.6	-
69	0	0	0	3.8	-	**69**	0	0	0	4.9	-
70	0	0	0	18.5	0.5	**70**	0	0	0	7.2	0.25
71	0	0	0	5.9	-	**71**	0	0	0	3.9	-
72	0	0	0	20.9	-	**72**	0	0	0	14.8	-
73	0	0	0	3	-	**73**	0	0	0	27.6	-
74	0	0	0	3.8	-	**74**	0	0	0	12.1	-
75	0	0	0	8.6	-	**75**	0	0	0	30	-
76	0	0	0	6.9	-	**76**	0	0	0	22.6	-
77	0	0	0	11.7	-	**77**	0	0	0	22.5	-
78	0	0	0	12.2	-	**78**	0	0	0	3.9	-
79	0	0	0	8.6	-	**79**	0	0	0	8.2	-
80	0	0	0	22.5	0.75	**80**	0	0	0	35	0.25
81	0	0	0	6.4	-	**81**	0	0	0	8	-
82	0	0	0	19.5	-	**82**	-	-	-	0.2	-
83	0	0	0	14.2	-	**83**	0	0	0	5.2	-
84	0	0	0	13.1	-	**84**	0	0	0	18.5	-
85	0	0	0	7.1	-	**85**	0	0	0	8	-
86	0	0	0	5.3	-	**86**	0	0	0	8	-
87	0	0	0	6.7	-	**87**	0	0	0	24.5	-
88	0	0	0	3.8	-	**88**	0	0	0	38	-
89	0	0	0	6.8	-	**89**	0	0	0	9.1	-
90	0	0	0	9	0.5	**90**	0	0	0	22.5	0
91	0	0	0	15.2	-	**91**	0	0	0	6.4	-
92	0	0	0	12.9	-	**92**	0	0	0	5.5	-
93	0	0	0	22	-	**93**	0	0	0	10.3	-
94	0	0	0	45	-	**94**	0	0	0	4.2	-
95	0	0	0	13.5	-	**95**	0	0	0	10.5	-
96	0	0	0	20.2	-	**96**	0	0	0	9.5	-
97	0	0	0	14.1	-	**97**	0	0	0	14.4	-
98	0	0	0	15.3	-	**98**	0	0	0	16	-
99	0	0	0	6.2	-	**99**	0	0	0	9	-
100	0	0	0	18.3	0.75	**100**	0	0	0	28	0.5
Average Cc, Cp and Embed. =	**0**	**0**	**0**	**11.8**	**0.50**	**Average Cc, Cp and Embed. =**	**0**	**0**	**0**	**13.6**	**0.33**
Old Calcite Index (CI) =		**0**				**Old Calcite Index (CI) =**		**0**			
New Calcite Index (CI') =		**0**				**New Calcite Index (CI') =**		**0**			

Notes: "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.

Table C.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations, September 2021

RG_MIDER-1						RG_MIDER-2					
09-Sep-21						09-Sep-21					
Pebble	Concreted Status	Calcite Proportion	Calcite Presence	Intermediate Axis (cm)	Embeddedness (%)	Pebble	Concreted Status	Calcite Proportion	Calcite Presence	Intermediate Axis (cm)	Embeddedness (%)
1	0	0	0	2.8	-	**1**	0	0	0	10.5	-
2	0	0	0	12.3	-	**2**	0	0	0	12.2	-
3	0	0	0	12.5	-	**3**	0	0	0	12.4	-
4	0	0	0	7.2	-	**4**	0	0	0	9.8	-
5	0	0	0	11.1	-	**5**	0	0	0	13.2	-
6	0	0	0	13.8	-	**6**	0	0	0	3.8	-
7	0	0	0	10.2	-	**7**	0	0	0	6.5	-
8	0	0	0	17.6	-	**8**	0	0	0	17.8	-
9	0	0	0	5.7	-	**9**	0	0	0	12.3	-
10	0	0	0	7.2	0.25	**10**	0	0	0	23.5	0.5
11	0	0	0	3.4	-	**11**	0	0	0	7.6	-
12	0	0	0	19.4	-	**12**	0	0	0	19.4	-
13	0	0	0	13.2	-	**13**	0	0	0	13.8	-
14	0	0	0	7.5	-	**14**	0	0	0	24.5	-
15	0	0	0	5.3	-	**15**	0	0	0	7.3	-
16	0	0	0	8.1	-	**16**	0	0	0	11.4	-
17	0	0	0	12.2	-	**17**	-	-	-	15	-
18	0	0	0	9.6	-	**18**	0	0	0	12.4	-
19	0	0	0	9.1	-	**19**	0	0	0	15.8	-
20	0	0	0	20.5	0.25	**20**	0	0	0	16.8	0.5
21	0	0	0	4.3	-	**21**	0	0	0	16.2	-
22	0	0	0	6.8	-	**22**	0	0	0	7.1	-
23	0	0	0	16.4	-	**23**	0	0	0	14.3	-
24	0	0	0	11.5	-	**24**	0	0	0	6.2	-
25	0	0	0	11.8	-	**25**	0	0	0	13.5	-
26	0	0	0	7.3	-	**26**	0	0	0	10	-
27	0	0	0	13.4	-	**27**	0	0	0	17	-
28	0	0	0	20.2	-	**28**	0	0	0	3.3	-
29	0	0	0	4.4	-	**29**	0	0	0	9.6	-
30	0	0	0	9.3	0.5	**30**	0	0	0	12.4	0.25
31	0	0	0	25.2	-	**31**	0	0	0	8.5	-
32	0	0	0	16.5	-	**32**	0	0	0	9.9	-
33	0	0	0	18.4	-	**33**	0	0	0	11.6	-
34	0	0	0	6.6	-	**34**	0	0	0	5.1	-
35	0	0	0	14.2	-	**35**	0	0	0	8.2	-
36	0	0	0	10.4	-	**36**	0	0	0	12.3	-
37	0	0	0	8.3	-	**37**	0	0	0	15.5	-
38	0	0	0	27.2	-	**38**	0	0	0	8.5	-
39	0	0	0	5.3	-	**39**	0	0	0	10.2	-
40	0	0	0	14.3	0.5	**40**	0	0	0	8.1	0.5
41	0	0	0	21.7	-	**41**	0	0	0	12.4	-
42	0	0	0	26.5	-	**42**	0	0	0	11	-
43	0	0	0	9.3	-	**43**	0	0	0	19.3	-
44	0	0	0	26.3	-	**44**	0	0	0	4.6	-
45	0	0	0	17.4	-	**45**	0	0	0	8	-
46	0	0	0	5.1	-	**46**	0	0	0	14.5	-
47	0	0	0	18.2	-	**47**	0	0	0	25.5	-
48	0	0	0	23.4	-	**48**	0	0	0	9.1	-
49	0	0	0	8.6	-	**49**	0	0	0	11.6	-
50	0	0	0	20.4	0.5	**50**	0	0	0	13.8	0.5
51	0	0	0	13.5	-	**51**	0	0	0	5.9	-
52	0	0	0	7.6	-	**52**	0	0	0	43	-
53	0	0	0	13.8	-	**53**	0	0	0	10.2	-
54	0	0	0	16.4	-	**54**	0	0	0	11.9	-
55	0	0	0	6.9	-	**55**	0	0	0	14.3	-
56	0	0	0	24.2	-	**56**	0	0	0	15.5	-
57	0	0	0	14	-	**57**	0	0	0	11.6	-
58	0	0	0	8.3	-	**58**	0	0	0	12.1	-
59	0	0	0	4.6	-	**59**	0	0	0	10.8	-
60	0	0	0	16.1	0.25	**60**	0	0	0	17.5	0.25
61	0	0	0	6.5	-	**61**	0	0	0	11	-
62	0	0	0	7.8	-	**62**	0	0	0	15.5	-
63	0	0	0	7.2	-	**63**	0	0	0	37	-
64	0	0	0	23.4	-	**64**	0	0	0	5.8	-
65	0	0	0	9.3	-	**65**	0	0	0	7.5	-
66	0	0	0	11	-	**66**	0	0	0	10.9	-
67	0	0	0	21.4	-	**67**	0	0	0	23.5	-
68	0	0	0	8.3	-	**68**	0	0	0	5.4	-
69	0	0	0	7.2	-	**69**	0	0	0	4.4	-
70	0	0	0	15.7	0.5	**70**	0	0	0	11.6	0.5
71	0	0	0	19.2	-	**71**	0	0	0	7.8	-
72	0	0	0	24.8	-	**72**	0	0	0	7.5	-
73	0	0	0	9.7	-	**73**	0	0	0	12.9	-
74	0	0	0	7.3	-	**74**	0	0	0	6.2	-
75	0	0	0	7.4	-	**75**	0	0	0	10.8	-
76	0	0	0	26.3	-	**76**	0	0	0	11.3	-
77	0	0	0	6.8	-	**77**	0	0	0	8	-
78	0	0	0	9.9	-	**78**	0	0	0	19.5	-
79	0	0	0	40.5	-	**79**	0	0	0	13.2	-
80	0	0	0	16.3	0.25	**80**	0	0	0	20.1	0.25
81	0	0	0	14.5	-	**81**	0	0	0	12.8	-
82	0	0	0	18.3	-	**82**	0	0	0	19.3	-
83	0	0	0	9.6	-	**83**	0	0	0	11.2	-
84	0	0	0	24.5	-	**84**	0	0	0	5.5	-
85	0	0	0	30.4	-	**85**	0	0	0	19	-
86	0	0	0	14.7	-	**86**	0	0	0	6.8	-
87	0	0	0	2.8	-	**87**	0	0	0	6.8	-
88	0	0	0	15.3	-	**88**	0	0	0	12.3	-
89	0	0	0	13.1	-	**89**	0	0	0	17.1	-
90	0	0	0	17.2	0.25	**90**	0	0	0	12.2	0
91	0	0	0	8.6	-	**91**	0	0	0	8.1	-
92	0	0	0	21.6	-	**92**	0	0	0	10.1	-
93	0	0	0	5.8	-	**93**	0	0	0	22.5	-
94	0	0	0	5.8	-	**94**	0	0	0	9.5	-
95	0	0	0	10.3	-	**95**	0	0	0	3.8	-
96	0	0	0	22	-	**96**	0	0	0	11.7	-
97	0	0	0	8.4	-	**97**	0	0	0	12.9	-
98	0	0	0	10	-	**98**	0	0	0	17.4	-
99	0	0	0	17.8	-	**99**	0	0	0	10.2	-
100	0	0	0	11.5	0.25	**100**	0	0	0	4.8	0.5
Average Cc, Cp and Embed. =	**0**	**0**	**0**	**13.3**	**0.35**	**Average Cc, Cp and Embed. =**	**0**	**0**	**0**	**12.4**	**0.38**
Old Calcite Index (CI) =		**0**				**Old Calcite Index (CI) =**		**0**			
New Calcite Index (CI') =		**0**				**New Calcite Index (CI') =**		**0**			

Notes: "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.

Table C.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations, September 2021

RG_MIDER-3						RG_MIDGA-1					
09-Sep-21						11-Sep-21					
Pebble	Concreted Status	Calcite Proportion	Calcite Presence	Intermediate Axis (cm)	Embeddedness (%)	Pebble	Concreted Status	Calcite Proportion	Calcite Presence	Intermediate Axis (cm)	Embeddedness (%)
1	0	0	0	5.8	-	**1**	0	0	0	11.6	-
2	0	0	0	7.2	-	**2**	0	0	0	7	-
3	0	0	0	15.5	-	**3**	0	0	0	8.2	-
4	0	0	0	21.2	-	**4**	0	0	0	20.4	-
5	0	0	0	9.4	-	**5**	0	0	0	10.2	-
6	0	0	0	12.7	-	**6**	0	0	0	13.4	-
7	0	0	0	10.8	-	**7**	0	0	0	5	-
8	0	0	0	6.8	-	**8**	0	0	0	2.8	-
9	0	0	0	7.3	-	**9**	0	0	0	6.4	-
10	0	0	0	6.4	0.25	**10**	0	0	0	14.5	0.5
11	0	0	0	13.2	-	**11**	0	0	0	5.5	-
12	0	0	0	5.8	-	**12**	0	0	0	7.8	-
13	0	0	0	18.2	-	**13**	0	0	0	2.8	-
14	0	0	0	12.4	-	**14**	0	0	0	3.2	-
15	0	0	0	3	-	**15**	0	0	0	10.4	-
16	0	0	0	8.5	-	**16**	0	0	0	10	-
17	0	0	0	13.9	-	**17**	0	0	0	5.5	-
18	0	0	0	8.7	-	**18**	0	0	0	21.5	-
19	0	0	0	11.3	-	**19**	0	0	0	4.8	-
20	0	0	0	11.6	0	**20**	0	0	0	6.4	0.25
21	0	0	0	8.7	-	**21**	0	0	0	3.1	-
22	0	0	0	9.2	-	**22**	0	0	0	11.6	-
23	0	0	0	16.5	-	**23**	0	0	0	8.1	-
24	-	-	-	14.8	-	**24**	0	0	0	5.2	-
25	0	0	0	8.4	-	**25**	0	0	0	12.3	-
26	0	0	0	11.3	-	**26**	0	0	0	6.4	-
27	0	0	0	19.6	-	**27**	0	0	0	6.3	-
28	0	0	0	12.8	-	**28**	0	0	0	3.6	-
29	0	0	0	12.5	-	**29**	0	0	0	6.5	-
30	0	0	0	6	0	**30**	0	0	0	14.1	0.5
31	0	0	0	9.1	-	**31**	0	0	0	5.3	-
32	0	0	0	14.5	-	**32**	0	0	0	3.4	-
33	0	0	0	14.5	-	**33**	0	0	0	18.6	-
34	0	0	0	5.8	-	**34**	0	0	0	5.9	-
35	0	0	0	12.3	-	**35**	0	0	0	6.8	-
36	0	0	0	10.6	-	**36**	0	0	0	4.2	-
37	0	0	0	14.1	-	**37**	0	0	0	12	-
38	0	0	0	13.2	-	**38**	0	0	0	13.1	-
39	0	0	0	15	-	**39**	0	0	0	5.2	-
40	0	0	0	20.5	0.5	**40**	0	0	0	6.4	0.25
41	0	0	0	12.2	-	**41**	0	0	0	5.6	-
42	0	0	0	7.6	-	**42**	0	0	0	5.5	-
43	0	0	0	7.9	-	**43**	0	0	0	11.5	-
44	0	0	0	14.2	-	**44**	0	0	0	21.5	-
45	0	0	0	9.9	-	**45**	0	0	0	10	-
46	0	0	0	7.5	-	**46**	0	0	0	2.8	-
47	0	0	0	24.2	-	**47**	0	0	0	7.1	-
48	0	0	0	6.5	-	**48**	0	0	0	13.1	-
49	0	0	0	11.2	-	**49**	0	0	0	3.6	-
50	0	0	0	3.5	0.25	**50**	0	0	0	13.2	0.25
51	0	0	0	9.5	-	**51**	0	0	0	9.1	-
52	0	0	0	5	-	**52**	0	0	0	4.8	-
53	0	0	0	10.2	-	**53**	0	0	0	6.9	-
54	0	0	0	26.1	-	**54**	0	0	0	10.5	-
55	0	0	0	24.3	-	**55**	0	0	0	11.2	-
56	0	0	0	17.4	-	**56**	0	0	0	7.1	-
57	0	0	0	7.5	-	**57**	0	0	0	15.5	-
58	0	0	0	12.2	-	**58**	0	0	0	7.4	-
59	0	0	0	10.6	-	**59**	0	0	0	20.1	-
60	0	0	0	5.8	0	**60**	0	0	0	16.5	0.5
61	0	0	0	8.7	-	**61**	0	0	0	4.1	-
62	0	0	0	7.9	-	**62**	0	0	0	10.3	-
63	0	0	0	14.1	-	**63**	0	0	0	7.3	-
64	0	0	0	9.6	-	**64**	0	0	0	10.8	-
65	0	0	0	11.4	-	**65**	0	0	0	7.4	-
66	0	0	0	4.8	-	**66**	0	0	0	12.5	-
67	0	0	0	14.8	-	**67**	0	0	0	4.1	-
68	0	0	0	14.9	-	**68**	0	0	0	3.6	-
69	0	0	0	15.7	-	**69**	0	0	0	5.1	-
70	0	0	0	9.7	0	**70**	0	0	0	17.6	0.5
71	0	0	0	22.9	-	**71**	0	0	0	7.8	-
72	0	0	0	6.4	-	**72**	0	0	0	5.4	-
73	0	0	0	18.7	-	**73**	0	0	0	8.9	-
74	0	0	0	7.4	-	**74**	0	0	0	13.2	-
75	0	0	0	8	-	**75**	0	0	0	5.1	-
76	0	0	0	7.5	-	**76**	0	0	0	5.1	-
77	0	0	0	15	-	**77**	0	0	0	6.8	-
78	0	0	0	20.3	-	**78**	0	0	0	21.3	-
79	0	0	0	6.3	-	**79**	0	0	0	7.5	-
80	0	0	0	19.1	0.25	**80**	0	0	0	8.3	0.25
81	0	0	0	8.3	-	**81**	0	0	0	4.9	-
82	0	0	0	18.4	-	**82**	0	0	0	6.8	-
83	0	0	0	13.6	-	**83**	0	0	0	10.3	-
84	0	0	0	4	-	**84**	0	0	0	8.7	-
85	0	0	0	12.7	-	**85**	0	0	0	8	-
86	0	0	0	13.7	-	**86**	0	0	0	14.2	-
87	0	0	0	5.5	-	**87**	0	0	0	3.1	-
88	0	0	0	16.8	-	**88**	0	0	0	5.2	-
89	0	0	0	4.5	-	**89**	0	0	0	16.4	-
90	0	0	0	6.7	0.5	**90**	0	0	0	13.8	0.5
91	0	0	0	10.1	-	**91**	0	0	0	7.5	-
92	0	0	0	7.5	-	**92**	0	0	0	6.5	-
93	0	0	0	6.3	-	**93**	0	0	0	6.5	-
94	0	0	0	18.5	-	**94**	0	0	0	5.9	-
95	0	0	0	14.7	-	**95**	0	0	0	8.2	-
96	0	0	0	13.5	-	**96**	0	0	0	19.7	-
97	0	0	0	11.2	-	**97**	0	0	0	6.5	-
98	0	0	0	8.6	-	**98**	0	0	0	12.4	-
99	0	0	0	16.4	-	**99**	0	0	0	6.5	-
100	0	0	0	7.3	0	**100**	0	0	0	16.2	0.75
Average Cc, Cp and Embed. =	**0**	**0**	**0**	**11.5**	**0.18**	**Average Cc, Cp and Embed. =**	**0**	**0**	**0**	**8.98**	**0.43**
Old Calcite Index (CI) =		**0**				**Old Calcite Index (CI) =**		**0**			
New Calcite Index (CI') =		**0**				**New Calcite Index (CI') =**		**0**			

Notes: "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.

Table C.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations, September 2021

RG_MIDGA-2					
11-Sep-21					
Pebble	Concreted Status	Calcite Proportion	Calcite Presence	Intermediate Axis (cm)	Embeddedness (%)
1	0	0	0	9.1	-
2	0	0	0	18.2	-
3	0	0	0	4.5	-
4	0	0	0	8.7	-
5	0	0	0	6.2	-
6	0	0	0	21.6	-
7	0	0	0	12.4	-
8	0	0	0	8.9	-
9	0	0	0	10.9	-
10	0	0	0	18.2	0.25
11	0	0	0	5.6	-
12	0	0	0	22.5	-
13	0	0	0	28.5	-
14	0	0	0	22.6	-
15	0	0	0	5.9	-
16	0	0	0	16.3	-
17	0	0	0	9.6	-
18	0	0	0	14.3	-
19	0	0	0	6.2	-
20	0	0	0	6.5	0.25
21	0	0	0	23.5	-
22	0	0	0	19	-
23	0	0	0	7.6	-
24	0	0	0	21.2	-
25	0	0	0	9.3	-
26	0	0	0	5.5	-
27	0	0	0	6.9	-
28	0	0	0	14.5	-
29	0	0	0	4.1	-
30	0	0	0	18.2	0.25
31	0	0	0	5.1	-
32	0	0	0	6.5	-
33	0	0	0	11.1	-
34	0	0	0	25.8	-
35	0	0	0	13.3	-
36	0	0	0	22.9	-
37	0	0	0	4.4	-
38	0	0	0	19.6	-
39	0	0	0	7.2	-
40	0	0	0	13.6	0.25
41	0	0	0	12.4	-
42	0	0	0	6.3	-
43	0	0	0	5.4	-
44	0	0	0	12.6	-
45	0	0	0	23.1	-
46	0	0	0	11	-
47	0	0	0	19.5	-
48	0	0	0	10.5	-
49	0	0	0	8.4	-
50	0	0	0	6.9	0
51	0	0	0	17.3	-
52	0	0	0	21.6	-
53	0	0	0	4.6	-
54	0	0	0	7.7	-
55	0	0	0	16.3	-
56	0	0	0	7.4	-
57	0	0	0	12.2	-
58	0	0	0	28.4	-
59	0	0	0	6.8	-
60	0	0	0	6.6	0.25
61	0	0	0	13.5	-
62	0	0	0	5.3	-
63	0	0	0	4.6	-
64	0	0	0	6.3	-
65	0	0	0	5.8	-
66	0	0	0	13.9	-
67	0	0	0	22.4	-
68	0	0	0	14.6	-
69	0	0	0	15.8	-
70	0	0	0	16.2	0.5
71	0	0	0	22.8	-
72	0	0	0	8.9	-
73	0	0	0	13.1	-
74	0	0	0	4.9	-
75	0	0	0	5.4	-
76	0	0	0	12.6	-
77	0	0	0	9.1	-
78	0	0	0	6.8	-
79	0	0	0	20.2	-
80	0	0	0	6.3	0.5
81	0	0	0	8.9	-
82	0	0	0	6.3	-
83	0	0	0	11.6	-
84	0	0	0	5.1	-
85	0	0	0	4.7	-
86	0	0	0	22.4	-
87	0	0	0	16.3	-
88	0	0	0	6.5	-
89	0	0	0	7.6	-
90	0	0	0	9.8	0.75
91	0	0	0	14.5	-
92	0	0	0	5.7	-
93	0	0	0	10.1	-
94	0	0	0	13.1	-
95	0	0	0	8.8	-
96	0	0	0	6.2	-
97	0	0	0	21.3	-
98	0	0	0	11.4	-
99	0	0	0	9.4	-
100	0	0	0	26.5	0.5
Average Cc, Cp and Embed. =	**0**	**0**	**0**	**12.2**	**0.35**
Old Calcite Index (CI) =		**0**			
New Calcite Index (CI') =		**0**			

RG_MIDGA-3					
11-Sep-21					
Pebble	Concreted Status	Calcite Proportion	Calcite Presence	Intermediate Axis (cm)	Embeddedness (%)
1	0	0	0	9.5	-
2	0	0	0	6.1	-
3	0	0	0	10.4	-
4	0	0	0	8.2	-
5	0	0	0	8.4	-
6	0	0	0	5	-
7	0	0	0	3.5	-
8	0	0	0	15.2	-
9	0	0	0	9.6	-
10	0	0	0	24.5	0.25
11	0	0	0	9.2	-
12	0	0	0	7.3	-
13	0	0	0	4.8	-
14	0	0	0	4.7	-
15	0	0	0	7.2	-
16	0	0	0	20.3	-
17	0	0	0	5.1	-
18	0	0	0	14.3	-
19	0	0	0	5	-
20	0	0	0	13.6	0.5
21	0	0	0	11.8	-
22	0	0	0	18	-
23	0	0	0	11.1	-
24	-	-	-	4.6	-
25	0	0	0	13.8	-
26	0	0	0	18.2	-
27	0	0	0	13.4	-
28	0	0	0	9.3	-
29	0	0	0	4.4	-
30	0	0	0	5	0.25
31	0	0	0	4.9	-
32	0	0	0	15.5	-
33	0	0	0	4.6	-
34	0	0	0	4.9	-
35	0	0	0	6.8	-
36	0	0	0	11.2	-
37	0	0	0	7.6	-
38	0	0	0	6.6	-
39	0	0	0	18.2	-
40	0	0	0	13.5	0.75
41	0	0	0	9.4	-
42	0	0	0	8.2	-
43	0	0	0	5.6	-
44	0	0	0	15.6	-
45	0	0	0	4.2	-
46	0	0	0	4.8	-
47	0	0	0	16.6	-
48	0	0	0	16.6	-
49	0	0	0	12.4	-
50	0	0	0	4.9	0.5
51	0	0	0	5.8	-
52	0	0	0	5	-
53	0	0	0	10.2	-
54	0	0	0	5.1	-
55	0	0	0	3.6	-
56	0	0	0	3.6	-
57	0	0	0	10.5	-
58	0	0	0	11.2	-
59	0	0	0	5.2	-
60	0	0	0	6.9	0.5
61	0	0	0	4.4	-
62	0	0	0	3.6	-
63	0	0	0	3.3	-
64	0	0	0	5.9	-
65	0	0	0	4.1	-
66	0	0	0	6.5	-
67	0	0	0	10.5	-
68	0	0	0	5.9	-
69	0	0	0	5.1	-
70	0	0	0	9.1	0.5
71	0	0	0	7.3	-
72	0	0	0	15.2	-
73	0	0	0	3.6	-
74	0	0	0	9.1	-
75	0	0	0	11.6	-
76	0	0	0	2.5	-
77	0	0	0	7.3	-
78	0	0	0	4.9	-
79	0	0	0	5.8	-
80	0	0	0	5.8	0.5
81	0	0	0	5.5	-
82	0	0	0	4.5	-
83	0	0	0	4.3	-
84	0	0	0	5.6	-
85	0	0	0	21.5	-
86	0	0	0	4.6	-
87	0	0	0	5	-
88	0	0	0	5.5	-
89	0	0	0	5.1	-
90	0	0	0	18.6	0.75
91	0	0	0	8.7	-
92	0	0	0	13.8	-
93	0	0	0	4.2	-
94	0	0	0	3.8	-
95	0	0	0	9.7	-
96	0	0	0	6	-
97	0	0	0	3.5	-
98	0	0	0	5.5	-
99	0	0	0	3.6	-
100	0	0	0	7.2	0.25
Average Cc, Cp and Embed. =	**0**	**0**	**0**	**8.38**	**0.48**
Old Calcite Index (CI) =		**0**			
New Calcite Index (CI') =		**0**			

Notes: "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.

Table C.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations, September 2021

RG_MIDBO-1						RG_MIDBO-2					
13-Sep-21						13-Sep-21					
Pebble	Concreted Status	Calcite Proportion	Calcite Presence	Intermediate Axis (cm)	Embeddedness (%)	Pebble	Concreted Status	Calcite Proportion	Calcite Presence	Intermediate Axis (cm)	Embeddedness (%)
1	0	0	0	6.7	-	**1**	0	0	0	10.6	-
2	0	0	0	14.5	-	**2**	0	0	0	11.1	-
3	0	0	0	24.5	-	**3**	0	0	0	5.8	-
4	0	0	0	7.6	-	**4**	0	0	0	11.6	-
5	0	0	0	18.9	-	**5**	0	0	0	9.2	-
6	0	0	0	14.2	-	**6**	0	0	0	12.1	-
7	0	0	0	11.1	-	**7**	0	0	0	9.3	-
8	0	0	0	5.6	-	**8**	0	0	0	3.3	-
9	0	0	0	3.4	-	**9**	0	0	0	6.1	-
10	0	0	0	12.5	0.5	**10**	0	0	0	3.8	0.25
11	0	0	0	28.2	-	**11**	0	0	0	11.2	-
12	0	0	0	15.2	-	**12**	0	0	0	7.5	-
13	0	0	0	7.8	-	**13**	0	0	0	19.1	-
14	0	0	0	9.1	-	**14**	0	0	0	8.5	-
15	0	0	0	6	-	**15**	0	0	0	10.2	-
16	0	0	0	17.1	-	**16**	0	0	0	22.5	-
17	0	0	0	5	-	**17**	-	-	-	0.2	-
18	0	0	0	14.6	-	**18**	0	0	0	7	-
19	0	0	0	8.9	-	**19**	0	0	0	7.4	-
20	0	0	0	19.5	0.25	**20**	0	0	0	10.4	0.25
21	0	0	0	32.5	-	**21**	0	0	0	14.2	-
22	0	0	0	12.6	-	**22**	0	0	0	16.5	-
23	0	0	0	15.4	-	**23**	0	0	0	17.5	-
24	0	0	0	24.3	-	**24**	0	0	0	25	-
25	0	0	0	6.8	-	**25**	0	0	0	17.2	-
26	0	0	0	15.2	-	**26**	0	0	0	6.8	-
27	0	0	0	9.3	-	**27**	0	0	0	8.6	-
28	0	0	0	20.6	-	**28**	0	0	0	6	-
29	0	0	0	13.4	-	**29**	0	0	0	7.5	-
30	0	0	0	4	0	**30**	0	0	0	7.3	0.25
31	0	0	0	7.9	-	**31**	0	0	0	9.2	-
32	0	0	0	9.8	-	**32**	0	0	0	13.3	-
33	0	0	0	11.3	-	**33**	0	0	0	19.8	-
34	0	0	0	5.2	-	**34**	0	0	0	21.1	-
35	0	0	0	24.5	-	**35**	0	0	0	17.4	-
36	0	0	0	8.9	-	**36**	0	0	0	7.5	-
37	0	0	0	6.8	-	**37**	0	0	0	11.3	-
38	0	0	0	7.2	-	**38**	0	0	0	4.4	-
39	0	0	0	18.3	-	**39**	0	0	0	17	-
40	0	0	0	10.2	0.25	**40**	0	0	0	9.1	0
41	0	0	0	18.6	-	**41**	0	0	0	10.3	-
42	0	0	0	7.2	-	**42**	0	0	0	7.5	-
43	0	0	0	5.8	-	**43**	0	0	0	14.2	-
44	0	0	0	17.6	-	**44**	0	0	0	7.1	-
45	0	0	0	6.8	-	**45**	0	0	0	11.3	-
46	0	0	0	24.3	-	**46**	0	0	0	10.1	-
47	0	0	0	7.9	-	**47**	0	0	0	11.7	-
48	0	0	0	12.1	-	**48**	0	0	0	22.1	-
49	0	0	0	6.4	-	**49**	0	0	0	6	-
50	0	0	0	10.2	0	**50**	0	0	0	9.5	0.75
51	0	0	0	7.9	-	**51**	0	0	0	11.5	-
52	0	0	0	7.8	-	**52**	0	0	0	12.8	-
53	0	0	0	21.6	-	**53**	0	0	0	4.9	-
54	0	0	0	6.4	-	**54**	0	0	0	3.8	-
55	0	0	0	17.5	-	**55**	0	0	0	14.2	-
56	0	0	0	9.2	-	**56**	0	0	0	4.7	-
57	-	-	-	101	-	**57**	0	0	0	4.3	-
58	0	0	0	26.2	-	**58**	0	0	0	2.9	-
59	0	0	0	5.8	-	**59**	0	0	0	10.3	-
60	0	0	0	35	0.75	**60**	0	0	0	6.4	0.25
61	0	0	0	7.3	-	**61**	0	0	0	13.9	-
62	0	0	0	3.6	-	**62**	0	0	0	6	-
63	0	0	0	5.2	-	**63**	0	0	0	9.3	-
64	0	0	0	9.8	-	**64**	0	0	0	7.4	-
65	0	0	0	17.2	-	**65**	0	0	0	8.2	-
66	0	0	0	6.1	-	**66**	0	0	0	10.5	-
67	0	0	0	32.6	-	**67**	0	0	0	10.1	-
68	0	0	0	13.4	-	**68**	0	0	0	9.1	-
69	0	0	0	10.2	-	**69**	0	0	0	3.5	-
70	0	0	0	7.5	0.5	**70**	0	0	0	10.1	0.5
71	0	0	0	15.6	-	**71**	0	0	0	8.2	-
72	0	0	0	7.6	-	**72**	0	0	0	6.6	-
73	0	0	0	6.5	-	**73**	0	0	0	17.9	-
74	0	0	0	8.1	-	**74**	0	0	0	5.4	-
75	0	0	0	25.5	-	**75**	0	0	0	8.3	-
76	0	0	0	10.3	-	**76**	0	0	0	8.3	-
77	0	0	0	27.5	-	**77**	0	0	0	18.6	-
78	0	0	0	11.4	-	**78**	0	0	0	11.4	-
79	0	0	0	9.3	-	**79**	0	0	0	5.9	-
80	0	0	0	10.4	0.25	**80**	0	0	0	18	0.75
81	0	0	0	3.6	-	**81**	0	0	0	5.2	-
82	0	0	0	9.8	-	**82**	0	0	0	15.4	-
83	0	0	0	9.6	-	**83**	0	0	0	6.5	-
84	0	0	0	20.1	-	**84**	0	0	0	16.1	-
85	0	0	0	31	-	**85**	0	0	0	9.4	-
86	0	0	0	5.2	-	**86**	0	0	0	16.6	-
87	0	0	0	13.6	-	**87**	0	0	0	10.8	-
88	0	0	0	7.9	-	**88**	0	0	0	7.1	-
89	0	0	0	3.8	-	**89**	0	0	0	14.2	-
90	0	0	0	7.6	0	**90**	0	0	0	12.4	0.25
91	0	0	0	8.3	-	**91**	0	0	0	25.5	-
92	0	0	0	4.5	-	**92**	0	0	0	6.4	-
93	0	0	0	25.6	-	**93**	0	0	0	12.5	-
94	0	0	0	9.8	-	**94**	0	0	0	8.3	-
95	0	0	0	8.7	-	**95**	0	0	0	4.3	-
96	0	0	0	7.2	-	**96**	0	0	0	6.9	-
97	0	0	0	21.6	-	**97**	0	0	0	6.3	-
98	0	0	0	15.4	-	**98**	0	0	0	7.4	-
99	0	0	0	8.9	-	**99**	0	0	0	38	-
100	0	0	0	29.1	0.25	**100**	0	0	0	20.5	0.5
Average Cc, Cp and Embed. =	**0**	**0**	**0**	**13.7**	**0.28**	**Average Cc, Cp and Embed. =**	**0**	**0**	**0**	**10.8**	**0.38**
Old Calcite Index (CI) =		**0**				**Old Calcite Index (CI) =**		**0**			
New Calcite Index (CI') =		**0**				**New Calcite Index (CI') =**		**0**			

Notes: "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.

Table C.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations, September 2021

RG_MIDBO-3						RG_MICOMP-1					
13-Sep-21						13-Sep-21					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**	**Pebble**	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	0	9.1	-	**1**	0	0	0	9	-
2	0	0	0	13.2	-	**2**	0	0	0	8.9	-
3	0	0	0	6.5	-	**3**	0	0	0	8.3	-
4	0	0	0	14.9	-	**4**	0	0	0	11.6	-
5	0	0	0	17.8	-	**5**	0	0	0	15.2	-
6	0	0	0	16.2	-	**6**	0	0	0	10.1	-
7	0	0	0	32	-	**7**	0	0	0	8.1	-
8	0	0	0	4.9	-	**8**	0	0	0	18.5	-
9	0	0	0	7.6	-	**9**	0	0	0	6.8	-
10	0	0	0	19.3	0.25	**10**	0	0	0	30	0.25
11	0	0	0	11.6	-	**11**	0	0	0	6.6	-
12	0	0	0	5.9	-	**12**	0	0	0	6.1	-
13	0	0	0	7.8	-	**13**	0	0	0	8.4	-
14	0	0	0	8.2	-	**14**	0	0	0	16.6	-
15	0	0	0	12.6	-	**15**	0	0	0	6.3	-
16	0	0	0	12.1	-	**16**	0	0	0	8	-
17	0	0	0	4.3	-	**17**	0	0	0	8.3	-
18	0	0	0	18.2	-	**18**	0	0	0	7.2	-
19	0	0	0	6.5	-	**19**	0	0	0	4.2	-
20	0	0	0	16.2	0.5	**20**	0	0	0	10.6	0.5
21	0	0	0	14.6	-	**21**	0	0	0	5.8	-
22	0	0	0	6.5	-	**22**	0	0	0	6	-
23	0	0	0	4.5	-	**23**	0	0	0	3.3	-
24	-	-	-	101	-	**24**	0	0	0	7.4	-
25	0	0	0	7.6	-	**25**	0	0	0	4.9	-
26	0	0	0	10.2	-	**26**	0	0	0	6.2	-
27	0	0	0	5.1	-	**27**	0	0	0	10	-
28	0	0	0	7.6	-	**28**	0	0	0	19.1	-
29	0	0	0	13.2	-	**29**	0	0	0	6.6	-
30	0	0	0	8.5	0.75	**30**	0	0	0	11.4	0.5
31	0	0	0	21.4	-	**31**	0	0	0	35.5	-
32	0	0	0	33	-	**32**	0	0	0	6.4	-
33	0	0	0	4	-	**33**	0	0	0	13.6	-
34	0	0	0	5.1	-	**34**	0	0	0	10.4	-
35	0	0	0	17.2	-	**35**	0	0	0	7.1	-
36	0	0	0	6.2	-	**36**	0	0	0	5.9	-
37	0	0	0	8.1	-	**37**	0	0	0	17.2	-
38	0	0	0	12.2	-	**38**	0	0	0	5.5	-
39	0	0	0	11.6	-	**39**	0	0	0	7.8	-
40	0	0	0	21.2	0.5	**40**	0	0	0	38.5	0.25
41	0	0	0	15.6	-	**41**	0	0	0	2.9	-
42	0	0	0	5.6	-	**42**	0	0	0	9.5	-
43	0	0	0	8.9	-	**43**	0	0	0	9.4	-
44	0	0	0	7.6	-	**44**	0	0	0	19.2	-
45	0	0	0	14.3	-	**45**	0	0	0	16.8	-
46	0	0	0	10.8	-	**46**	0	0	0	7.7	-
47	0	0	0	10.6	-	**47**	0	0	0	9	-
48	0	0	0	5.6	-	**48**	0	0	0	8.9	-
49	0	0	0	12.3	-	**49**	0	0	0	8.3	-
50	0	0	0	19.2	0.5	**50**	0	0	0	12.6	0.5
51	0	0	0	16.4	-	**51**	0	0	0	10.9	-
52	0	0	0	22.6	-	**52**	0	0	0	10.3	-
53	0	0	0	5.9	-	**53**	0	0	0	9.2	-
54	0	0	0	7.3	-	**54**	0	0	0	7.6	-
55	0	0	0	24.6	-	**55**	0	0	0	12.5	-
56	0	0	0	13.4	-	**56**	0	0	0	7.3	-
57	0	0	0	4.6	-	**57**	0	0	0	7.9	-
58	0	0	0	9.5	-	**58**	0	0	0	13.6	-
59	0	0	0	7.2	-	**59**	0	0	0	5.8	-
60	0	0	0	25.6	0.75	**60**	0	0	0	17.4	0.25
61	0	0	0	14.2	-	**61**	0	0	0	15.5	-
62	0	0	0	4.8	-	**62**	0	0	0	9.1	-
63	0	0	0	26.1	-	**63**	0	0	0	7.5	-
64	0	0	0	6.5	-	**64**	0	0	0	13.2	-
65	0	0	0	23.2	-	**65**	0	0	0	7.4	-
66	0	0	0	18.6	-	**66**	0	0	0	15.8	-
67	0	0	0	21.6	-	**67**	0	0	0	4.3	-
68	0	0	0	8.9	-	**68**	0	0	0	12.6	-
69	0	0	0	7.4	-	**69**	0	0	0	21.2	-
70	0	0	0	18.2	0.5	**70**	0	0	0	6.8	0.25
71	0	0	0	9.1	-	**71**	0	0	0	9.7	-
72	0	0	0	17.3	-	**72**	0	0	0	9.2	-
73	0	0	0	6.5	-	**73**	0	0	0	12.6	-
74	0	0	0	7.6	-	**74**	0	0	0	13.1	-
75	0	0	0	10.5	-	**75**	0	0	0	15.2	-
76	0	0	0	12.7	-	**76**	0	0	0	9	-
77	0	0	0	4.6	-	**77**	0	0	0	4.3	-
78	0	0	0	5.2	-	**78**	0	0	0	11.2	-
79	0	0	0	22.1	-	**79**	0	0	0	8.7	-
80	0	0	0	11.3	0.25	**80**	0	0	0	6.1	0.5
81	0	0	0	18.2	-	**81**	0	0	0	5.4	-
82	0	0	0	19.4	-	**82**	0	0	0	21.6	-
83	0	0	0	8.6	-	**83**	0	0	0	12.3	-
84	0	0	0	13.6	-	**84**	0	0	0	5.8	-
85	0	0	0	3.9	-	**85**	0	0	0	8.8	-
86	0	0	0	8.7	-	**86**	0	0	0	11.5	-
87	0	0	0	11.3	-	**87**	0	0	0	11.8	-
88	0	0	0	10.5	-	**88**	0	0	0	5.7	-
89	0	0	0	8.7	-	**89**	0	0	0	4.5	-
90	0	0	0	5.5	0	**90**	0	0	0	6.4	0.25
91	0	0	0	12.6	-	**91**	0	0	0	8.7	-
92	0	0	0	13.4	-	**92**	0	0	0	7.1	-
93	0	0	0	7.1	-	**93**	0	0	0	4.2	-
94	0	0	0	26.5	-	**94**	0	0	0	15.6	-
95	0	0	0	11.2	-	**95**	0	0	0	13.7	-
96	0	0	0	5.8	-	**96**	0	0	0	14.6	-
97	0	0	0	10.1	-	**97**	0	0	0	6.4	-
98	0	0	0	13.6	-	**98**	0	0	0	19.3	-
99	0	0	0	4.7	-	**99**	0	0	0	10.1	-
100	0	0	0	7.9	0.5	**100**	0	0	0	27.2	0.25
Average Cc, Cp and Embed. =	**0**	**0**	**0**	**12.9**	**0.45**	**Average Cc, Cp and Embed. =**	**0**	**0**	**0**	**10.8**	**0.35**
Old Calcite Index (CI) =		**0**				**Old Calcite Index (CI) =**		**0**			
New Calcite Index (CI') =		**0**				**New Calcite Index (CI') =**		**0**			

Notes: "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.

Table C.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations, September 2021

RG_MICOMP-2						RG_MICOMP-3					
13-Sep-21						13-Sep-21					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**	**Pebble**	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	0	4.5	-	**1**	0	0	0	14.6	-
2	0	0	0	8.7	-	**2**	0	0	0	4.2	-
3	0	0	0	21.4	-	**3**	0	0	0	13.5	-
4	0	0	0	12.2	-	**4**	0	0	0	12.2	-
5	0	0	0	25.3	-	**5**	0	0	0	8	-
6	0	0	0	10.6	-	**6**	0	0	0	10.1	-
7	0	0	0	5.6	-	**7**	0	0	0	9.1	-
8	0	0	0	6.5	-	**8**	0	0	0	3.8	-
9	0	0	0	4.7	-	**9**	0	0	0	4.2	-
10	0	0	0	13.2	0.5	**10**	0	0	0	6.7	0.25
11	0	0	0	15.6	-	**11**	0	0	0	18.2	-
12	0	0	0	10.9	-	**12**	0	0	0	15	-
13	0	0	0	3.8	-	**13**	0	0	0	21.5	-
14	0	0	0	6.4	-	**14**	0	0	0	12.2	-
15	0	0	0	10.8	-	**15**	0	0	0	6.3	-
16	0	0	0	19.5	-	**16**	0	0	0	4.2	-
17	0	0	0	12.6	-	**17**	0	0	0	8.7	-
18	0	0	0	8.3	-	**18**	0	0	0	9.1	-
19	0	0	0	10.1	-	**19**	0	0	0	6.3	-
20	0	0	0	4.3	0	**20**	0	0	0	7.7	0.25
21	0	0	0	7.2	-	**21**	0	0	0	10.8	-
22	0	0	0	18.6	-	**22**	0	0	0	9.3	-
23	0	0	0	7.9	-	**23**	0	0	0	9.2	-
24	0	0	0	15.4	-	**24**	0	0	0	17.3	-
25	0	0	0	13.6	-	**25**	0	0	0	11	-
26	0	0	0	19.4	-	**26**	0	0	0	7.4	-
27	0	0	0	6.9	-	**27**	0	0	0	5.2	-
28	0	0	0	12.2	-	**28**	0	0	0	6.6	-
29	0	0	0	21.6	-	**29**	0	0	0	12.9	-
30	0	0	0	21.9	0.25	**30**	0	0	0	17	0.5
31	0	0	0	11.4	-	**31**	0	0	0	13.1	-
32	0	0	0	8.3	-	**32**	0	0	0	12.6	-
33	0	0	0	33	-	**33**	0	0	0	8.4	-
34	0	0	0	5.7	-	**34**	0	0	0	7.9	-
35	0	0	0	9.6	-	**35**	0	0	0	10	-
36	0	0	0	12.2	-	**36**	0	0	0	6.5	-
37	0	0	0	11.4	-	**37**	0	0	0	2.2	-
38	0	0	0	6.3	-	**38**	0	0	0	3.6	-
39	0	0	0	26.4	-	**39**	0	0	0	9.9	-
40	0	0	0	16.3	0.5	**40**	0	0	0	10.9	0.25
41	0	0	0	5.5	-	**41**	0	0	0	6.5	-
42	0	0	0	17.2	-	**42**	0	0	0	-	-
43	0	0	0	7.6	-	**43**	0	0	0	-	-
44	0	0	0	12.2	-	**44**	0	0	0	-	-
45	0	0	0	17.9	-	**45**	0	0	0	-	-
46	0	0	0	12.6	-	**46**	0	0	0	-	-
47	0	0	0	21.3	-	**47**	0	0	0	-	-
48	0	0	0	18.3	-	**48**	0	0	0	-	-
49	0	0	0	6.4	-	**49**	0	0	0	-	-
50	0	0	0	7.6	0.25	**50**	0	0	0	-	-
51	0	0	0	14.5	-	**51**	0	0	0	4.3	-
52	0	0	0	23.1	-	**52**	0	0	0	6.3	-
53	0	0	0	15.4	-	**53**	0	0	0	14.5	-
54	0	0	0	8.2	-	**54**	0	0	0	2.9	-
55	0	0	0	13.7	-	**55**	0	0	0	17.8	-
56	0	0	0	25.4	-	**56**	0	0	0	3.8	-
57	0	0	0	6.3	-	**57**	0	0	0	4.8	-
58	0	0	0	5.5	-	**58**	0	0	0	30.3	-
59	0	0	0	8.2	-	**59**	0	0	0	16.4	-
60	0	0	0	16.2	0.5	**60**	0	0	0	8.2	0.25
61	0	0	0	9.1	-	**61**	0	0	0	8.1	-
62	0	0	0	19.2	-	**62**	0	0	0	19.3	-
63	0	0	0	8.5	-	**63**	0	0	0	12.2	-
64	0	0	0	3.5	-	**64**	0	0	0	5.6	-
65	0	0	0	26.5	-	**65**	0	0	0	6.8	-
66	0	0	0	11.6	-	**66**	0	0	0	10.8	-
67	0	0	0	15.3	-	**67**	0	0	0	5.5	-
68	0	0	0	12.9	-	**68**	0	0	0	5.9	-
69	0	0	0	15.3	-	**69**	0	0	0	14.4	-
70	0	0	0	11.2	0.25	**70**	0	0	0	18.5	0
71	0	0	0	6.8	-	**71**	0	0	0	35	-
72	0	0	0	10.1	-	**72**	0	0	0	18.5	-
73	0	0	0	20	-	**73**	0	0	0	5.7	-
74	0	0	0	9.4	-	**74**	0	0	0	6.2	-
75	0	0	0	5.1	-	**75**	0	0	0	22	-
76	0	0	0	13.6	-	**76**	0	0	0	16.7	-
77	0	0	0	11.3	-	**77**	0	0	0	6.1	-
78	0	0	0	2.2	-	**78**	0	0	0	19.4	-
79	0	0	0	15.4	-	**79**	0	0	0	8.3	-
80	0	0	0	5	0.25	**80**	0	0	0	2.2	0.5
81	0	0	0	9.2	-	**81**	0	0	0	6.8	-
82	0	0	0	3.6	-	**82**	0	0	0	6.9	-
83	0	0	0	15.2	-	**83**	0	0	0	5.9	-
84	0	0	0	10.4	-	**84**	0	0	0	13.4	-
85	0	0	0	12.6	-	**85**	0	0	0	5.5	-
86	0	0	0	15.9	-	**86**	0	0	0	8.2	-
87	0	0	0	11.4	-	**87**	0	0	0	7.3	-
88	0	0	0	17.6	-	**88**	0	0	0	19.5	-
89	0	0	0	16.3	-	**89**	0	0	0	23.5	-
90	0	0	0	6.3	0	**90**	0	0	0	12.5	0.25
91	0	0	0	17.5	-	**91**	0	0	0	6.2	-
92	0	0	0	7.9	-	**92**	0	0	0	7.4	-
93	0	0	0	24.9	-	**93**	0	0	0	10.4	-
94	0	0	0	4.7	-	**94**	0	0	0	8.3	-
95	0	0	0	8.3	-	**95**	0	0	0	12	-
96	0	0	0	6.4	-	**96**	0	0	0	19.1	-
97	0	0	0	18.2	-	**97**	0	0	0	9.5	-
98	0	0	0	21.3	-	**98**	0	0	0	9.9	-
99	0	0	0	6.6	-	**99**	0	0	0	9.3	-
100	0	0	0	6.7	0	**100**	0	0	0	7.2	0.25
Average Cc, Cp and Embed. =	**0**	**0**	**0**	**12.4**	**0.25**	**Average Cc, Cp and Embed. =**	**0**	**0**	**0**	**10.5**	**0.28**
Old Calcite Index (CI) =			**0**			**Old Calcite Index (CI) =**			**0**		
New Calcite Index (CI') =			**0**			**New Calcite Index (CI') =**			**0**		

Notes: "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.

Table C.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations, September 2021

RG_MICOMP-4						RG_MICOMP-5					
13-Sep-21						13-Sep-21					
Pebble	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**	**Pebble**	**Concreted Status**	**Calcite Proportion**	**Calcite Presence**	**Intermediate Axis (cm)**	**Embeddedness (%)**
1	0	0	0	11.5	-	**1**	0	0	0	10.2	-
2	0	0	0	13.2	-	**2**	0	0	0	2.5	-
3	0	0	0	18.9	-	**3**	0	0	0	8.6	-
4	0	0	0	14.6	-	**4**	0	0	0	8.4	-
5	0	0	0	24.5	-	**5**	0	0	0	7.3	-
6	0	0	0	26.2	-	**6**	0	0	0	4.6	-
7	0	0	0	7.1	-	**7**	0	0	0	21.6	-
8	0	0	0	13.4	-	**8**	0	0	0	6.3	-
9	0	0	0	26.7	-	**9**	0	0	0	17.4	-
10	0	0	0	16.9	0.5	**10**	0	0	0	5.9	0.25
11	0	0	0	7.3	-	**11**	0	0	0	12.3	-
12	0	0	0	16.9	-	**12**	0	0	0	5.5	-
13	0	0	0	4.6	-	**13**	0	0	0	7.2	-
14	0	0	0	17.3	-	**14**	0	0	0	4.8	-
15	0	0	0	8.7	-	**15**	0	0	0	10.4	-
16	0	0	0	22.2	-	**16**	0	0	0	3.5	-
17	0	0	0	15.5	-	**17**	0	0	0	6.9	-
18	0	0	0	7.8	-	**18**	0	0	0	9.7	-
19	0	0	0	17.9	-	**19**	0	0	0	2.5	-
20	0	0	0	19.3	0.25	**20**	0	0	0	4.3	0.25
21	0	0	0	6.3	-	**21**	0	0	0	18.5	-
22	0	0	0	6.6	-	**22**	0	0	0	22.3	-
23	0	0	0	7.5	-	**23**	0	0	0	5.1	-
24	0	0	0	18.2	-	**24**	0	0	0	9.2	-
25	0	0	0	5.8	-	**25**	0	0	0	14.2	-
26	0	0	0	26.3	-	**26**	0	0	0	6.1	-
27	0	0	0	13.4	-	**27**	0	0	0	4.3	-
28	0	0	0	27.2	-	**28**	0	0	0	4.6	-
29	0	0	0	13.5	-	**29**	0	0	0	4	-
30	0	0	0	4.6	0	**30**	0	0	0	3.5	0.25
31	0	0	0	24	-	**31**	0	0	0	5	-
32	0	0	0	7.5	-	**32**	0	0	0	3.1	-
33	0	0	0	16.3	-	**33**	0	0	0	10.6	-
34	0	0	0	18.2	-	**34**	0	0	0	16	-
35	0	0	0	21.4	-	**35**	0	0	0	7	-
36	0	0	0	11.3	-	**36**	0	0	0	19.9	-
37	0	0	0	6.9	-	**37**	0	0	0	7.3	-
38	0	0	0	23.2	-	**38**	0	0	0	10	-
39	0	0	0	10.8	-	**39**	0	0	0	18.2	-
40	0	0	0	24.5	0.75	**40**	0	0	0	7	0.5
41	0	0	0	7.9	-	**41**	0	0	0	7.3	-
42	0	0	0	21.6	-	**42**	0	0	0	4.1	-
43	0	0	0	5.1	-	**43**	0	0	0	5.4	-
44	0	0	0	13.4	-	**44**	0	0	0	5.2	-
45	0	0	0	14.2	-	**45**	0	0	0	5.5	-
46	0	0	0	12.9	-	**46**	0	0	0	16.4	-
47	0	0	0	9	-	**47**	0	0	0	4.1	-
48	0	0	0	9.5	-	**48**	0	0	0	9.2	-
49	0	0	0	4.6	-	**49**	0	0	0	4.6	-
50	0	0	0	23.2	0.5	**50**	0	0	0	20.5	0.5
51	0	0	0	9.1	-	**51**	0	0	0	7.2	-
52	0	0	0	15.2	-	**52**	0	0	0	8.4	-
53	0	0	0	10.9	-	**53**	0	0	0	17.6	-
54	0	0	0	10.1	-	**54**	0	0	0	6.3	-
55	0	0	0	24.5	-	**55**	0	0	0	3.9	-
56	0	0	0	15.5	-	**56**	0	0	0	5.4	-
57	0	0	0	7.8	-	**57**	0	0	0	15.2	-
58	0	0	0	9	-	**58**	0	0	0	5.6	-
59	0	0	0	45.5	-	**59**	0	0	0	17.4	-
60	0	0	0	7.6	0.25	**60**	0	0	0	6.3	0.25
61	0	0	0	7.2	-	**61**	0	0	0	7.1	-
62	0	0	0	23.8	-	**62**	0	0	0	12.2	-
63	0	0	0	4.6	-	**63**	0	0	0	21.3	-
64	0	0	0	36	-	**64**	0	0	0	10.1	-
65	0	0	0	12.5	-	**65**	0	0	0	6.5	-
66	0	0	0	12.5	-	**66**	0	0	0	11.6	-
67	0	0	0	19.9	-	**67**	0	0	0	20.5	-
68	0	0	0	10.7	-	**68**	0	0	0	17.6	-
69	0	0	0	8.8	-	**69**	0	0	0	4.7	-
70	0	0	0	9.7	0.5	**70**	0	0	0	21.2	0.75
71	0	0	0	10	-	**71**	0	0	0	5.3	-
72	0	0	0	15.6	-	**72**	0	0	0	3.3	-
73	0	0	0	4.8	-	**73**	0	0	0	6.1	-
74	0	0	0	10.4	-	**74**	0	0	0	17.2	-
75	0	0	0	2.3	-	**75**	0	0	0	4.3	-
76	0	0	0	12.6	-	**76**	0	0	0	5.6	-
77	0	0	0	6.7	-	**77**	0	0	0	13.5	-
78	0	0	0	10.7	-	**78**	0	0	0	4.4	-
79	0	0	0	19.3	-	**79**	0	0	0	23.4	-
80	0	0	0	18.2	0.25	**80**	0	0	0	4.4	0
81	0	0	0	7.5	-	**81**	0	0	0	4.4	-
82	0	0	0	24.8	-	**82**	0	0	0	3.7	-
83	0	0	0	14.1	-	**83**	0	0	0	9.6	-
84	0	0	0	8.2	-	**84**	0	0	0	5.2	-
85	0	0	0	23	-	**85**	0	0	0	18.6	-
86	0	0	0	5.5	-	**86**	0	0	0	7.1	-
87	0	0	0	5.5	-	**87**	0	0	0	19.4	-
88	0	0	0	10.1	-	**88**	0	0	0	6.2	-
89	0	0	0	10.2	-	**89**	0	0	0	3.1	-
90	0	0	0	12.8	0	**90**	0	0	0	4.9	0.25
91	0	0	0	11.4	-	**91**	0	0	0	7.5	-
92	0	0	0	3.6	-	**92**	0	0	0	6.2	-
93	0	0	0	12.2	-	**93**	0	0	0	6.5	-
94	0	0	0	12.5	-	**94**	0	0	0	15.6	-
95	0	0	0	13.3	-	**95**	0	0	0	9.3	-
96	0	0	0	4.4	-	**96**	0	0	0	3.4	-
97	0	0	0	13.6	-	**97**	0	0	0	4.7	-
98	0	0	0	12	-	**98**	0	0	0	13.2	-
99	0	0	0	22.5	-	**99**	0	0	0	4.8	-
100	0	0	0	4.9	0.25	**100**	0	0	0	19.4	0.5
Average Cc, Cp and Embed. =	**0**	**0**	**0**	**13.7**	**0.33**	**Average Cc, Cp and Embed. =**	**0**	**0**	**0**	**9.25**	**0.35**
Old Calcite Index (CI) =		**0**				**Old Calcite Index (CI) =**		**0**			
New Calcite Index (CI') =		**0**				**New Calcite Index (CI') =**		**0**			

Notes: "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.

Table C.5: Habitat Information Associated with Mine-Exposed and Reference Areas Sampled during the Benthic Invertebrate Survey, EVO LAEMP, September 2021

Station ID		Reference		Mine-Exposed										
		RG_ALUSM	RG_MI25	RG_ERCKUT	RG_ERCKDT	RG_ERCK	RG_GATE	RG_GATEDP	RG_BOCK	RG_MI3	RG_MIDER	RG_MIDGA	RG_MIDBO	RG_MICOMP
Waterbody		Alexander Creek	Alexander Creek	Erickson Creek	Erickson Creek	Erickson Creek	Gate Creek	Gate Creek	Bodie Creek	Michel Creek	Michel Creek	Michel Creek	Michel Creek	Michel Creek
Date Sampled		12-Sep-21	12-Sep-21	15-Sep-21	14-Sep-21	10-Sep-21	16-Sep-21	16-Sep-21	12-Sep-21	10-Sep-21	9-Sep-21	11-Sep-21	11-Sep-21	13-Sep-21
Weather		Overcast	Clear, partially cloudy	Partially cloudy	Sun and cloud	Sunny	Windy and sunny	Sunny	Sunny	Cloudy	Sunny and local smoke	Cloudy	Overcast	Overcast
Air Temperature (°C)		15	15	18	15	15	15	8	0	15	15	18	15	15
Habitat Characteristics														
Surrounding Land Use		Other	Other	Mining	Mining	Mining, Other	Mining, Other	Mining	Mining, Other	Mining, Other	Mining, Other	Mining, Other	Mining	Mining
Length of Reach Assessed (m)		100	100	100	100	50	30	10	-	100	100	100	100	100
Substrate	% Bedrock	0	0	0	0	0	0	0	0	0	0	0	0	0
	% Boulder	10	5	0	5	40	5	5	0	5	5	5	5	10
	% Cobble	80	80	65	70	55	5	80	10	80	85	90	85	85
	% Gravel	10	5	15	10	5	5	10	5	10	10	5	10	5
	% Sand	0	5	15	10	0	10	0	5	5	0	0	0	0
	% Fines	0	5	5	5	0	5	5	80	0	0	0	0	0
Water Clarity		Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
Water Colour		Colourless	Brown	Colourless	Colourless	Colourless	Colourless	Colourless	Colourless	Colourless	Colourless	Colourless	Colourless	Colourless
Vegetation														
Canopy Coverage (%)		1-25	1-25	76-100	76-100	0	0	0	0	1-25	1-25	1-25	1-25	1-25
Streamside Vegetation		Ferns/Grasses, Shrubs, Deciduous trees, Coniferous trees	Coniferous trees, Ferns/Grasses, Shrubs	Coniferous trees, Deciduous trees, Ferns/Grasses, Shrubs	-	Ferns/Grasses, Shrubs	Ferns/Grasses	Ferns/Grasses	Ferns/Grasses	Coniferous trees, Deciduous trees, Ferns/Grasses, Shrubs	Coniferous trees, Deciduous trees, Ferns/Grasses, Shrubs	Coniferous trees, Deciduous trees, Ferns/Grasses, Shrubs	Coniferous trees, Deciduous trees, Ferns/Grasses, Shrubs	Deciduous trees, Ferns/Grasses, Shrubs
Dominant Vegetation		Ferns/grasses	Ferns/grasses	Coniferous trees	-	Shrubs	Ferns/grasses	Ferns/grasses	Ferns/grasses	Shrubs	Deciduous trees	Deciduous trees	Deciduous trees	Ferns/grasses
Periphyton Cover (1-5)		4, 4, 2, 2, 3	2, 2, 2, 2, 3	4, 3, 3, 4, 2 (76-100% bryophytes)	1, 1, 1, 1, 4 (76-100% bryophytes)	5 (76-100% bryophytes)	3	3	2	3, 2, 3, 2, 2	3, 2, 3, 1, 2	2, 2, 2, 2, 2	3, 2, 2, 2, 2	2, 4, 3, 3, 4

Notes: "-" = not sampled. Periphyton Coverage Scores (Environment Canada, 2012b):

1 = Rocks not slippery, no obvious colour (<0.5mm thick)

2 = Rocks slightly slippery, yellow-brown to light green colour (0.5-1mm thick)

3 = Rocks have noticeable slippery feel, patches of thicker green to brown algae (1-5mm thick)

4 = Rocks are very slippery, numerous clumps (5-20mm thick)

5 = Rocks mostly obscured by algae mat, may have long strands (>20mm thick)

Table C.6: Supporting Measures Associated with 3-Minute Kick and Sweep Benthic Invertebrate Community Sampling at Areas, EVO LAEMP, September 2021

Station Parameters		Reference		Mine-Exposed							
		RG_ALUSM	RG_MI25	RG_ERCKUT	RG_ERCKDT	RG_ERCK	RG_MI3	RG_MIDER	RG_MIDGA	RG_MIDBO	RG_MICOMP
Station 1	Easting	663503	668195	660809	660806	659850	659917	659503	655483	655175	653958
	Northing	5502787	5482814	5506542	5506260	5505118	5505061	5505215	5509418	5509859	5511038
	Date	12-Sep-21	13-Sep-21	15-Sep-21	14-Sep-21	10-Sep-21	10-Sep-21	09-Sep-21	11-Sep-21	13-Sep-21	13-Sep-21
	Number of Jars	1	1	3	2	2	1	1	1	1	1
	Total Kick Distance (m)	13	20	24	40	9	15.5	7	10	18	15
	Full Transect (Yes / No)	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No
	Number of Transects	1.5	1.5	8	10	2	1	0.5	0.5	0.9	0.5
Station 2	Easting	663493	668187	660800	660833	-	660014	659534	655553	655205	653962
	Northing	5502739	5482834	5506564	5506316	-	5505028	5505192	5509358	5509815	5511050
	Date	12-Sep-21	13-Sep-21	15-Sep-21	14-Sep-21	-	10-Sep-21	09-Sep-21	11-Sep-21	13-Sep-21	13-Sep-21
	Number of Jars	1	1	5	2	-	1	1	1	1	1
	Total Kick Distance (m)	16	22	25	25	-	16	10	16	19	20
	Full Transect (Yes / No)	Yes	Yes	Yes	Yes	-	No	No	No	Yes	Yes
	Number of Transects	1.5	4	5.5	6	-	0.75	0.75	0.33	1.7	1
Station 3	Easting	663516	668173	660791	660820	-	660022	659591	655594	655225	654074
	Northing	5502707	5482859	5506595	5506358	-	5505024	5505157	5509311	5509758	5511023
	Date	12-Sep-21	13-Sep-21	15-Sep-21	15-Sep-21	-	10-Sep-21	09-Sep-21	11-Sep-21	13-Sep-21	13-Sep-21
	Number of Jars	1	1	3	4	-	1	1	1	1	1
	Total Kick Distance (m)	15	20	22	24	-	11	12	22	17	10
	Full Transect (Yes / No)	Yes	Yes	Yes	Yes	-	No	No	No	Yes	No
	Number of Transects	1.75	4	7	6	-	-	0.75	0.8	1	0.5
Station 4	Easting	-	-	-	-	-	-	-	-	-	654150
	Northing	-	-	-	-	-	-	-	-	-	5511018
	Date	-	-	-	-	-	-	-	-	-	13-Sep-21
	Number of Jars	-	-	-	-	-	-	-	-	-	1
	Total Kick Distance (m)	-	-	-	-	-	-	-	-	-	15
	Full Transect (Yes / No)	-	-	-	-	-	-	-	-	-	No
	Number of Transects	-	-	-	-	-	-	-	-	-	0.5
Station 5	Easting	-	-	-	-	-	-	-	-	-	654356
	Northing	-	-	-	-	-	-	-	-	-	5510884
	Date	-	-	-	-	-	-	-	-	-	13-Sep-21
	Number of Jars	-	-	-	-	-	-	-	-	-	1
	Total Kick Distance (m)	-	-	-	-	-	-	-	-	-	25
	Full Transect (Yes / No)	-	-	-	-	-	-	-	-	-	Yes
	Number of Transects	-	-	-	-	-	-	-	-	-	1

Notes: "-" = not sampled. 3-minute kick and sweep sampling was not conducted at RG_BOCK, RG_GATE, or RG_GATEDP.

Table C.7: Depth and Velocity Associated with 3-Minute Kick and Sweep Benthic Invertebrate Community Sampling Areas, EVO LAEMP, September 2021

		Replicate	1	2	3	4	5	Mean
Reference		**RG_ALUSM**						
	1	Depth (cm)	32.5	37	29.5	26.5	24	29.9
		Velocity (m/s)	0.914	0.86	0.817	0.623	0.724	0.788
		Bankfull Width (m)			11.8			-
		Wetted Width (m)			8.6			-
		Bankfull-Wetted Depth (cm)			70			-
	2	Depth (cm)	25	46.5	42.5	44	31	37.8
		Velocity (m/s)	0.694	1.032	0.838	0.945	1.277	0.957
		Bankfull Width (m)			11.9			-
		Wetted Width (m)			10			-
		Bankfull-Wetted Depth (cm)			-			-
	3	Depth (cm)	23	33	40.5	32	28	31.3
		Velocity (m/s)	0.733	0.712	0.788	0.684	0.71	0.725
		Bankfull Width (m)			11.2			-
		Wetted Width (m)			9.6			-
		Bankfull-Wetted Depth (cm)			-			-
		RG_MI25						
	1	Depth (cm)	11.5	3	7.5	8	10.5	8.1
		Velocity (m/s)	0.815	0.148	0.09	0.156	0.126	0.267
		Bankfull Width (m)			6.2			-
		Wetted Width (m)			5.8			-
		Bankfull-Wetted Depth (cm)			-			-
	2	Depth (cm)	7	11.5	10	4	4.5	7.4
		Velocity (m/s)	0.294	0.314	0.413	0.437	0.222	0.336
		Bankfull Width (m)			5			-
		Wetted Width (m)			3.9			-
		Bankfull-Wetted Depth (cm)			-			-
	3	Depth (cm)	8.5	10	7.5	10	5	8.2
		Velocity (m/s)	0.224	0.17	0.221	0.453	0.154	0.244
		Bankfull Width (m)			5.5			-
		Wetted Width (m)			3.9			-
		Bankfull-Wetted Depth (cm)			15			-
Mine-Exposed		**RG_ERCKUT**						
	1	Depth (cm)	18.5	25.5	24	23.5	27	23.7
		Velocity (m/s)	0.9	0.763	0.956	0.617	0.839	0.815
		Bankfull Width (m)			4.4			-
		Wetted Width (m)			3.2			-
		Bankfull-Wetted Depth (cm)			8			-
	2	Depth (cm)	21.5	21	18	17.5	16.5	18.9
		Velocity (m/s)	0.287	0.841	0.124	0.855	0.712	0.564
		Bankfull Width (m)			5.6			-
		Wetted Width (m)			4.7			-
		Bankfull-Wetted Depth (cm)			-			-
	3	Depth (cm)	19.5	27	25.5	26.5	28.5	25.4
		Velocity (m/s)	0.274	0.644	0.193	0.616	0.41	0.427
		Bankfull Width (m)			4.5			-
		Wetted Width (m)			3.2			-
		Bankfull-Wetted Depth (cm)			-			-
		RG_ERCKDT						
	1	Depth (cm)	27.5	31	34.5	26	24.5	28.7
		Velocity (m/s)	0.518	0.286	0.49	0.445	0.265	0.401
		Bankfull Width (m)			5.5			-
		Wetted Width (m)			5			-
		Bankfull-Wetted Depth (cm)			30			-
	2	Depth (cm)	25.5	23.5	28	31	33.5	28.3
		Velocity (m/s)	0.719	1.314	0.881	0.654	0.116	0.737
		Bankfull Width (m)			4.2			-
		Wetted Width (m)			3.8			-
		Bankfull-Wetted Depth (cm)			-			-
	3	Depth (cm)	25.5	23	21.5	19	31.5	24.1
		Velocity (m/s)	0.625	0.684	0.834	0.448	0.816	0.681
		Bankfull Width (m)			5.5			-
		Wetted Width (m)			4			-
		Bankfull-Wetted Depth (cm)			-			-
		RG_ERCK						
	1	Depth (cm)	23	22	24.5	24	23.5	23.4
		Velocity (m/s)	0.219	0.946	0.599	0.736	0.436	0.587
		Bankfull Width (m)			8.4			-
		Wetted Width (m)			4			-
		Bankfull-Wetted Depth (cm)			90			-
		RG_MI3						
	1	Depth (cm)	49.5	48.5	44.5	46	52.5	48.2
		Velocity (m/s)	0.428	0.686	0.482	0.57	0.469	0.527
		Bankfull Width (m)			23			-
		Wetted Width (m)			15.5			-
		Bankfull-Wetted Depth (cm)			-			-
	2	Depth (cm)	22.5	24	19	32	34	26.3
		Velocity (m/s)	0.209	0.336	0.216	0.584	0.521	0.373
		Bankfull Width (m)			18.6			-
		Wetted Width (m)			18.3			-
		Bankfull-Wetted Depth (cm)			-			-
	3	Depth (cm)	24.5	24.5	29	38.5	33	29.9
		Velocity (m/s)	0.679	0.7	0.509	0.514	0.497	0.580
		Bankfull Width (m)			32.5			-
		Wetted Width (m)			56.6			-
		Bankfull-Wetted Depth (cm)			-			-

Notes: "-" = data not available / not collected. Parameters were not assessed at RG_GATE, RG_GATEDP, RG_BOCK, as areas were not suitable for CABIN sampling.

Table C.7: Depth and Velocity Associated with 3-Minute Kick and Sweep Benthic Invertebrate Community Sampling Areas, EVO LAEMP, September 2021

		Replicate	1	2	3	4	5	Mean
Mine-Exposed		**RG_MIDER**						
	1	Depth (cm)	30.5	42	46.5	47	65.5	46.3
		Velocity (m/s)	0.399	0.363	0.333	0.306	0.341	0.348
		Bankfull Width (m)			20.9			-
		Wetted Width (m)			13.6			-
		Bankfull-Wetted Depth (cm)			70			-
	2	Depth (cm)	22.5	29	24.5	29.5	41	29.3
		Velocity (m/s)	0.271	0.506	0.336	0.36	0.371	0.369
		Bankfull Width (m)			27			-
		Wetted Width (m)			13.9			-
		Bankfull-Wetted Depth (cm)			-			-
	3	Depth (cm)	31.5	29.5	34	33.5	36.5	33
		Velocity (m/s)	0.721	0.539	0.483	0.66	0.415	0.564
		Bankfull Width (m)			29.7			-
		Wetted Width (m)			47.2			-
		Bankfull-Wetted Depth (cm)			-			-
	4	Depth (cm)	-	-	-	-	-	-
		Velocity (m/s)	0.690	-	-	-	-	0.690
		Bankfull Width (m)			-			-
		Wetted Width (m)			-			-
		Bankfull-Wetted Depth (cm)			-			-
		RG_MIDGA						
	1	Depth (cm)	35	28.5	22	23.5	23	26.4
		Velocity (m/s)	0.812	0.592	0.525	0.332	0.615	0.575
		Bankfull Width (m)			36.8			-
		Wetted Width (m)			24.6			-
		Bankfull-Wetted Depth (cm)			40			-
	2	Depth (cm)	56.5	46.5	51	42.5	32	45.7
		Velocity (m/s)	0.644	0.83	0.87	0.8	0.567	0.742
		Bankfull Width (m)			30.9			-
		Wetted Width (m)			29.9			-
		Bankfull-Wetted Depth (cm)			-			-
	3	Depth (cm)	45.5	38	33	34.5	28	35.8
		Velocity (m/s)	0.423	0.523	0.394	0.348	0.526	0.443
		Bankfull Width (m)			30.8			-
		Wetted Width (m)			28.2			-
		Bankfull-Wetted Depth (cm)			-			-
		RG_MIDBO						
	1	Depth (cm)	31	43.5	44	47	32.5	39.6
		Velocity (m/s)	0.742	0.723	0.713	0.574	0.561	0.663
		Bankfull Width (m)			25.6			-
		Wetted Width (m)			20.4			-
		Bankfull-Wetted Depth (cm)			100			-
	2	Depth (cm)	31	40.5	45	46.5	49	42.4
		Velocity (m/s)	0.443	0.715	0.634	0.670	0.738	0.640
		Bankfull Width (m)			18.7			-
		Wetted Width (m)			16.8			-
		Bankfull-Wetted Depth (cm)			-			-
	3	Depth (cm)	31	39.5	46.5	39	31.5	37.5
		Velocity (m/s)	0.636	0.617	0.785	0.885	0.7	0.725
		Bankfull Width (m)			23.9			-
		Wetted Width (m)			18.8			-
		Bankfull-Wetted Depth (cm)			-			-
		RG_MICOMP						
	1	Depth (cm)	22	38.5	36	25	41	32.5
		Velocity (m/s)	0.834	0.736	0.51	0.963	0.739	0.756
		Bankfull Width (m)			34.7			-
		Wetted Width (m)			32			-
		Bankfull-Wetted Depth (cm)			100			-
	2	Depth (cm)	36.5	39	36.5	44	46.5	40.5
		Velocity (m/s)	0.587	0.353	0.585	0.471	0.789	0.557
		Bankfull Width (m)			21.4			-
		Wetted Width (m)			20.9			-
		Bankfull-Wetted Depth (cm)			-			-
	3	Depth (cm)	22.5	23	32.5	29	33	28
		Velocity (m/s)	0.589	1.091	0.848	0.364	0.716	0.722
		Bankfull Width (m)			22.9			-
		Wetted Width (m)			19.3			-
		Bankfull-Wetted Depth (cm)			-			-
	4	Depth (cm)	33.5	32	45	39	45	38.9
		Velocity (m/s)	0.9	1.029	1.044	0.923	0.678	0.915
		Bankfull Width (m)			32.5			-
		Wetted Width (m)			29.5			-
		Bankfull-Wetted Depth (cm)			-			-
	5	Depth (cm)	32	36.5	42	35	38.5	36.8
		Velocity (m/s)	0.754	1.135	1.16	1.17	0.934	1.031
		Bankfull Width (m)			39.5			-
		Wetted Width (m)			31.9			-
		Bankfull-Wetted Depth (cm)			-			-

Notes: "-" = data not available / not collected. Parameters were not assessed at RG_GATE, RG_GATEDP, RG_BOCK, as areas were not suitable for CABIN sampling.

Table C.8: **Hess Sample Depth and Flow Information, EVO LAEMP, September 2021**

Area	Replicate	Date	Associated K&S Sample	Easting	Northing	Depth (cm)	Flow (m/s)
RG_ERCKUT	1	15-Sep-21	1	660804	5506553	31.0	0.678
	2	15-Sep-21	1	660802	5506547	22.0	0.646
	3	15-Sep-21	1	660804	5506564	19.5	0.653
	4	15-Sep-21	2	660799	5506569	25.0	0.607
	5	15-Sep-21	2	660796	5506566	21.5	0.479
	6	15-Sep-21	2	660795	5506575	22.0	0.757
	7	15-Sep-21	2	660788	5506568	23.5	0.911
	8	15-Sep-21	3	660795	5506597	23.0	0.513
	9	15-Sep-21	3	660798	5506601	16.0	0.442
	10	15-Sep-21	3	660786	5506607	30.0	0.121
RG_ERCKDT	1	14-Sep-21	1	660801	5506258	34.5	0.290
	2	14-Sep-21	1	660806	5506261	27.0	0.167
	3	14-Sep-21	1	660806	5506270	32.0	0.810
	4	14-Sep-21	2	660840	5506327	24.0	0.257
	5	14-Sep-21	2	660835	5506330	40.0	0.682
	6	14-Sep-21	2	668838	5506335	36.5	0.385
	7	15-Sep-21	3	660809	5506379	14.5	0.578
	8	15-Sep-21	3	660812	5506376	21.0	0.926
	9	15-Sep-21	3	660817	5506365	25.5	0.289
	10	15-Sep-21	3	660820	5506370	28.5	0.490

Note: K&S = kick and sweep.

Table C.9: ***In Situ*** **Water Quality Taken at Biological Monitoring Areas, EVO LAEMP, September 2021**

Field Parameters			Reference		Mine-Exposed											
			RG_ALUSM	RG_MI25	RG_ERCKUT	RG_ERCKDT	RG_ERCKMD	RG_ERCK	RG_GATE	RG_GATEDP	RG_BOCK	RG_MI3	RG_MIDER	RG_MIDGA	RG_MIDBO	RG_MICOMP
September 2021 Sampling Event	Station 1	Date	12-Sep-21	13-Sep-21	15-Sep-21	14-Sep-21	-	10-Sep-21	16-Sep-21	16-Sep-21	16-Sep-21	10-Sep-21	09-Sep-21	11-Sep-21	13-Sep-21	13-Sep-21
		Temperature (°C)	7.4	9	5.3	5	-	6.4	8.7	9.3	8.7	9.9	9.1	10.9	10.1	8.7
		Dissolved Oxygen (mg/L)	10.37	11.66	10.81	10.81	-	10.68	10.21	10.2	8.56	9.94	9.56	9.69	9.36	10.19
		Dissolved Oxygen (%)	100.7	121.1	101.4	99.2	-	100.3	101.2	102.8	84.6	101.7	95.6	100.5	95.4	99.5
		Conductivity (µS/cm)	198.3	225.6	1175	1104	-	1160	1172	1284	1258	241.6	274.8	430.6	363.2	361.4
		Specific Conductivity (µS/cm)	298.2	325.3	1881	1786	-	1801	1701	1834	1830	339.3	393.9	589.2	507.8	527.9
		pH	8.13	8.74	7.65	7.78	-	8.29	8.46	8.37	8.22	8.4	7.47	8.37	8.16	8.18
	Station 2	Date	12-Sep-21	13-Sep-21	15-Sep-21	14-Sep-21	-	-	-	-	-	10-Sep-21	09-Sep-21	11-Sep-21	13-Sep-21	13-Sep-21
		Temperature (°C)	7.6	7.7	5.4	6.1	-	-	-	-	-	10	12.3	11.7	10.1	9.1
		Dissolved Oxygen (mg/L)	10.4	15.46	11.31	11.17	-	-	-	-	-	9.91	9.1	9.66	9.5	10.27
		Dissolved Oxygen (%)	101.2	155.9	106.7	105.8	-	-	-	-	-	101.6	98.4	102.2	96.7	101.8
		Conductivity (µS/cm)	198	217.4	1177	1198	-	-	-	-	-	239.6	291	476.5	372.9	367
		Specific Conductivity (µS/cm)	297	324.8	1882	1872	-	-	-	-	-	336	384.4	633.9	521.6	527
		pH	8.16	8.13	7.66	7.74	-	-	-	-	-	8.26	8	8.38	8.27	8.25
	Station 3	Date	12-Sep-21	13-Sep-21	15-Sep-21	15-Sep-21	-	-	-	-	-	10-Sep-21	09-Sep-21	11-Sep-21	13-Sep-21	13-Sep-21
		Temperature (°C)	8.2	7.1	5.3	5.3	-	-	-	-	-	9.9	13	12.4	10.1	9.8
		Dissolved Oxygen (mg/L)	10.61	12.66	10.54	11.03	-	-	-	-	-	9.63	8.96	9.06	9.45	10.14
		Dissolved Oxygen (%)	105.1	127.9	99	103.3	-	-	-	-	-	98.5	98.7	97.4	96.1	102.3
		Conductivity (µS/cm)	200.4	325.4	1173	1172	-	-	-	-	-	241.2	296	446	372.4	372.9
		Specific Conductivity (µS/cm)	295.1	214.3	1882	1877	-	-	-	-	-	338.6	383.8	586.2	520.9	525
		pH	8.18	8.05	7.58	7.76	-	-	-	-	-	8.22	8.32	8.44	8.36	8.29
	Station 4	Date	-	-	-	-	-	-	-	-	-	-	-	-	-	13-Sep-21
		Temperature (°C)	-	-	-	-	-	-	-	-	-	-	-	-	-	12
		Dissolved Oxygen (mg/L)	-	-	-	-	-	-	-	-	-	-	-	-	-	9.27
		Dissolved Oxygen (%)	-	-	-	-	-	-	-	-	-	-	-	-	-	98.6
		Conductivity (µS/cm)	-	-	-	-	-	-	-	-	-	-	-	-	-	395.4
		Specific Conductivity (µS/cm)	-	-	-	-	-	-	-	-	-	-	-	-	-	525.5
		pH	-	-	-	-	-	-	-	-	-	-	-	-	-	8.24
	Station 5	Date	-	-	-	-	-	-	-	-	-	-	-	-	-	13-Sep-21
		Temperature (°C)	-	-	-	-	-	-	-	-	-	-	-	-	-	12.3
		Dissolved Oxygen (mg/L)	-	-	-	-	-	-	-	-	-	-	-	-	-	9.28
		Dissolved Oxygen (%)	-	-	-	-	-	-	-	-	-	-	-	-	-	99.3
		Conductivity (µS/cm)	-	-	-	-	-	-	-	-	-	-	-	-	-	381.9
		Specific Conductivity (µS/cm)	-	-	-	-	-	-	-	-	-	-	-	-	-	504.3
		pH	-	-	-	-	-	-	-	-	-	-	-	-	-	8.29
August or December 2021 Sampling Event	Station 1	Date	-	-	15-Dec-21	15-Dec-21	15-Dec-21	14-Dec-21	27-Aug-21	-	27-Aug-21	-	-	-	-	-
		Temperature (°C)	-	-	5.2	4.9	4.2	3.4	9.3	-	13.6	-	-	-	-	-
		Dissolved Oxygen (mg/L)	-	-	10.3	10.97	11.15	11.43	10.12	-	8.84	-	-	-	-	-
		Dissolved Oxygen (%)	-	-	81.8	86.4	87	86.4	88.9	-	84.8	-	-	-	-	-
		Conductivity (µS/cm)	-	-	1427	1397	1364	1270	1489	-	1694	-	-	-	-	-
		Specific Conductivity (µS/cm)	-	-	2296	2266	2245	2165	2124	-	2190	-	-	-	-	-
		pH	-	-	7.43	7.64	8.05	8.05	8.24	-	7.87	-	-	-	-	-

Note: "-" = data not collected.

APPENDIX D

WATER QUALITY

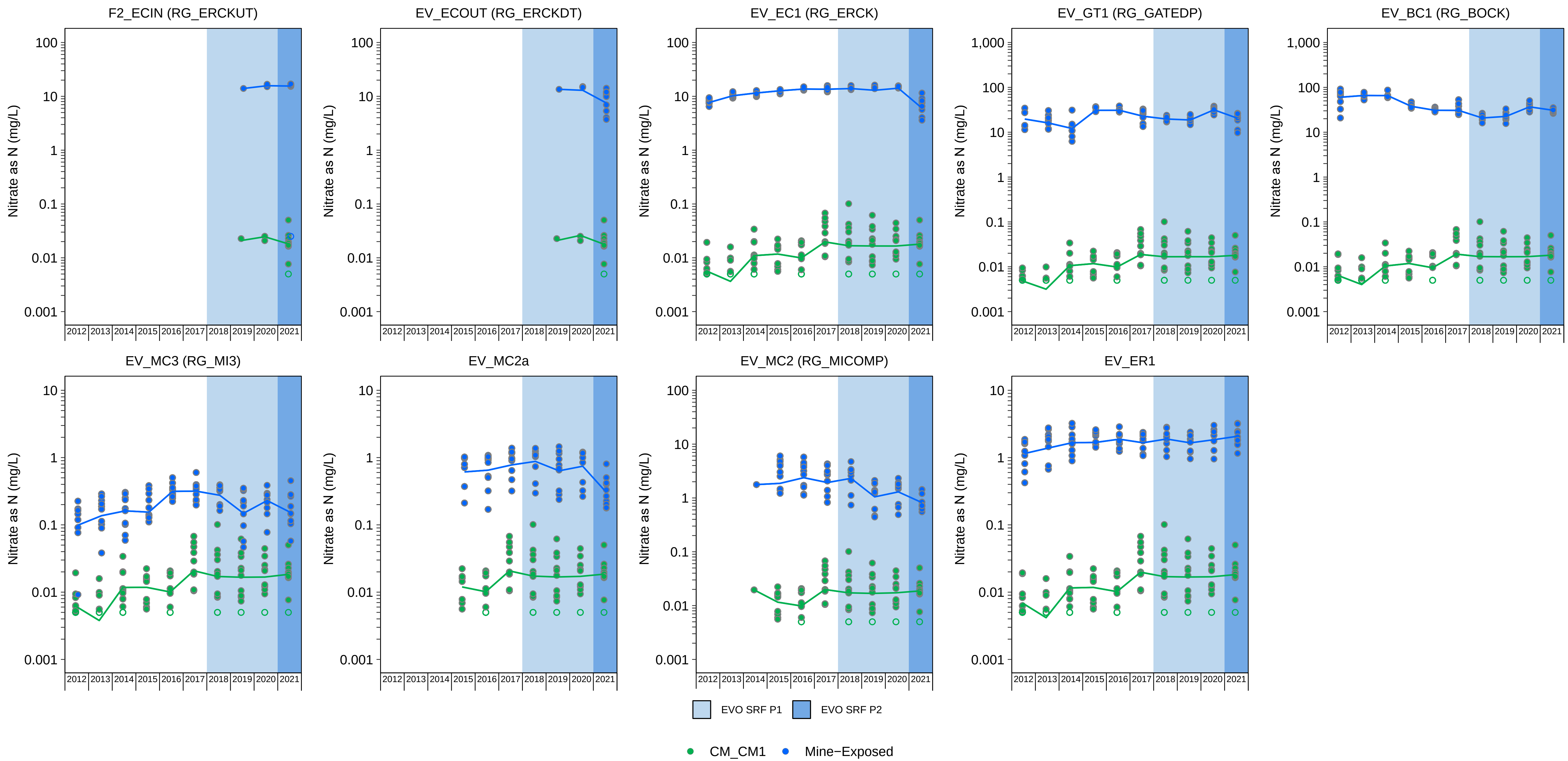

Figure D.1: Monthly Means of Key Constituents from EVO LAEMP Areas, 2012 to 2021

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Solid lines connect annual means of each area. Annual mean of each year was calculated where the percentage of data below the laboratory reporting limit was less than 80%.

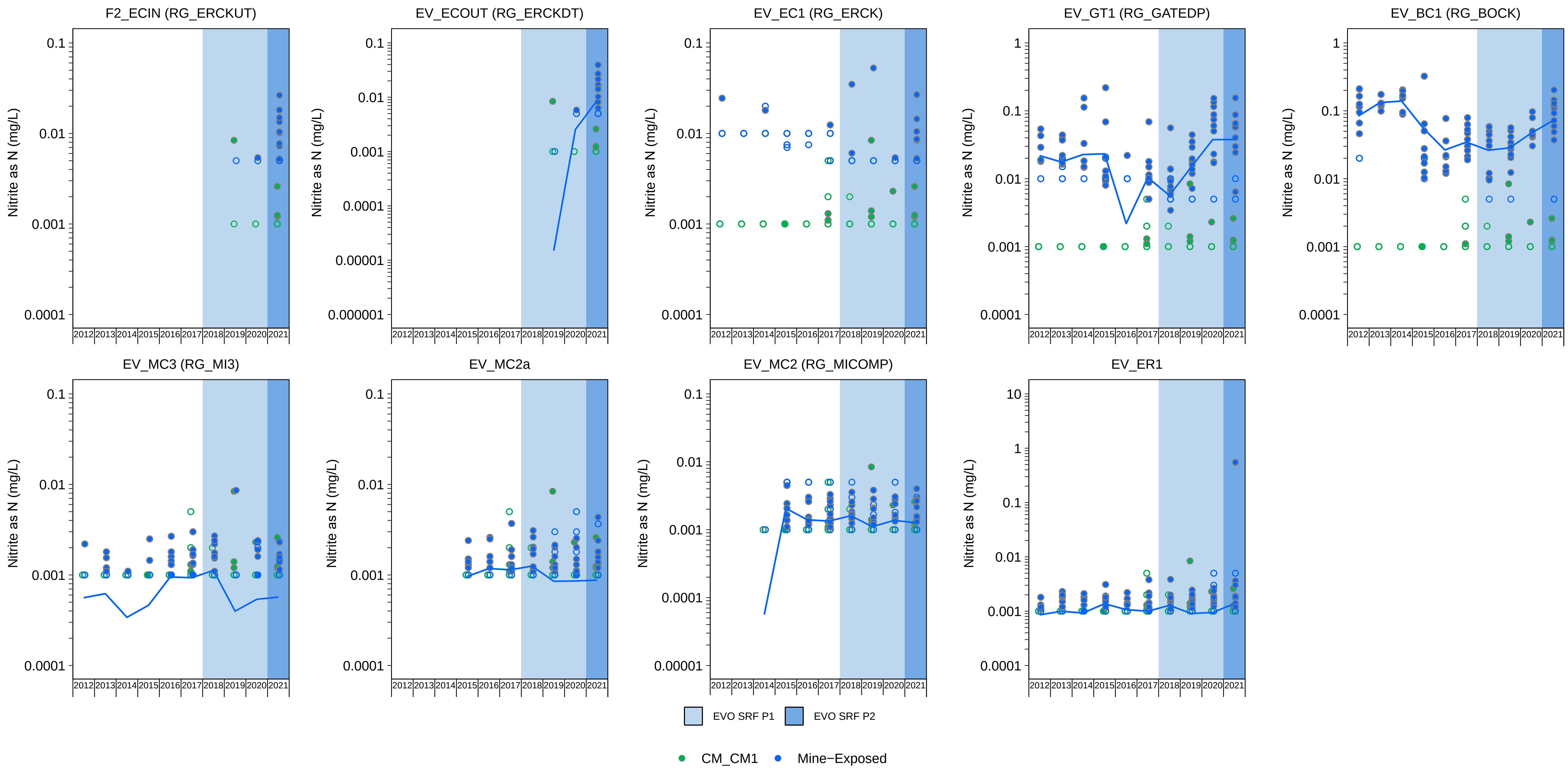

Figure D.1: **Monthly Means of Key Constituents from EVO LAEMP Areas, 2012 to 2021**

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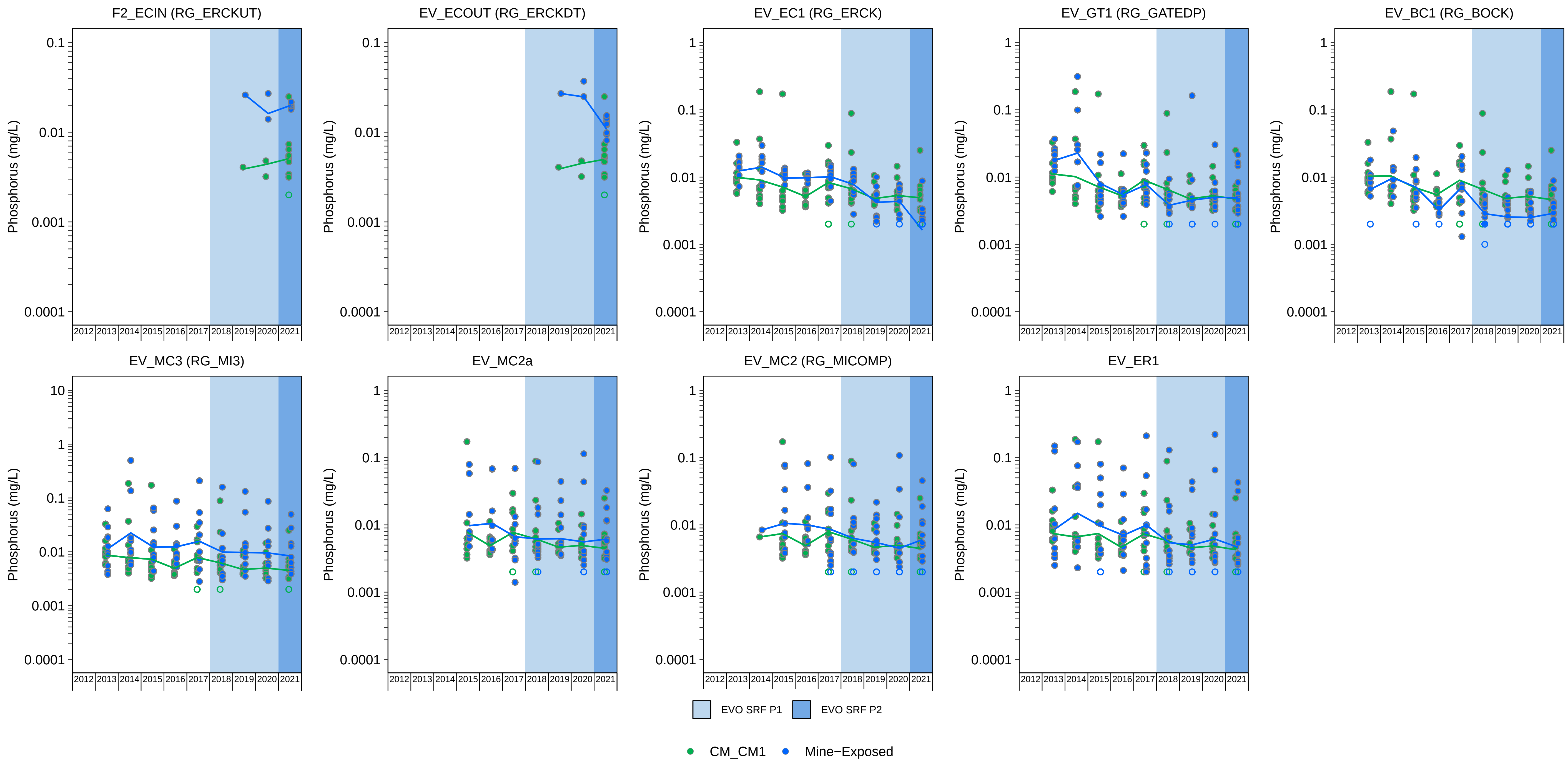

Figure D.1: Monthly Means of Key Constituents from EVO LAEMP Areas, 2012 to 2021

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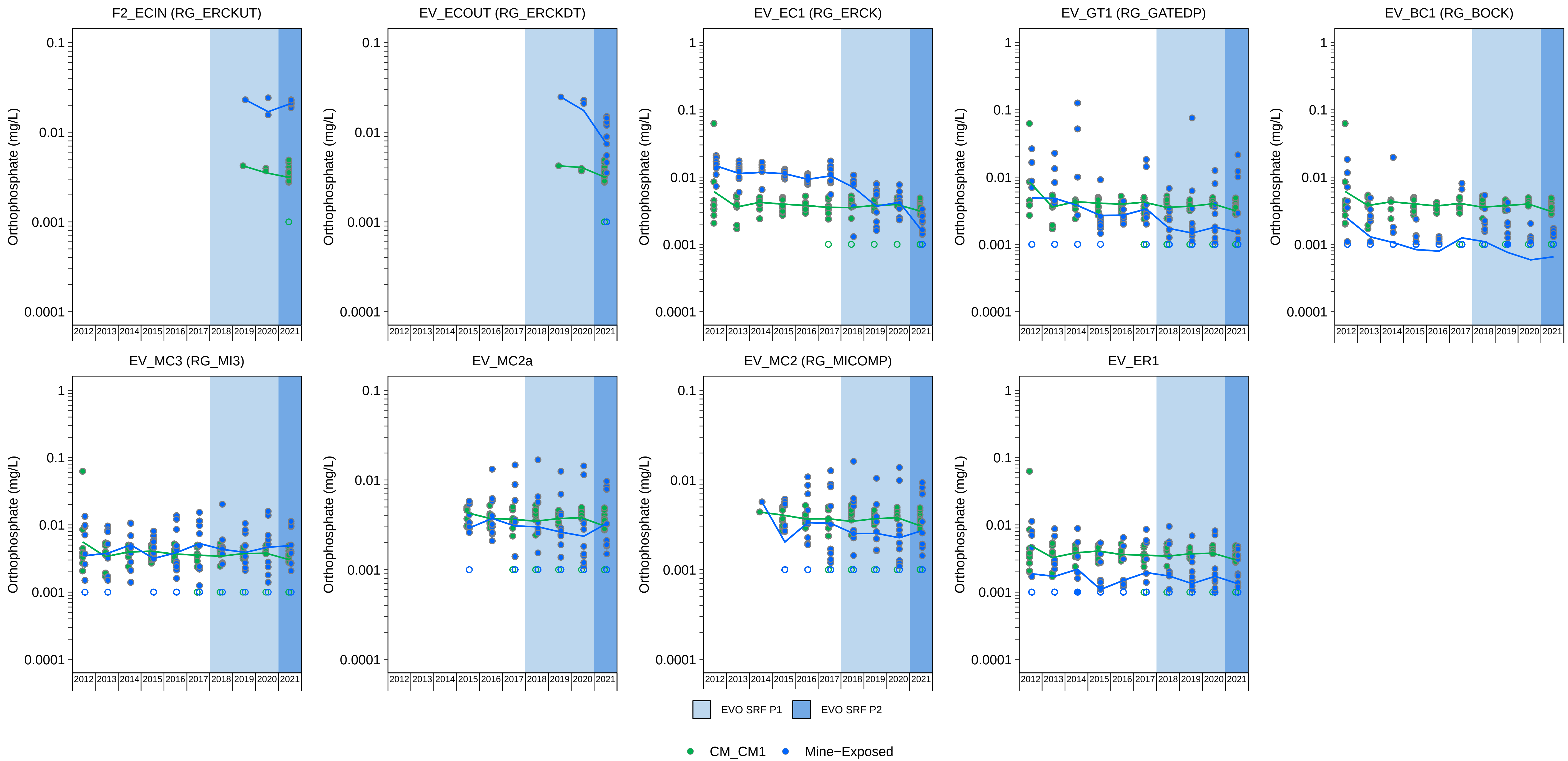

Figure D.1: Monthly Means of Key Constituents from EVO LAEMP Areas, 2012 to 2021

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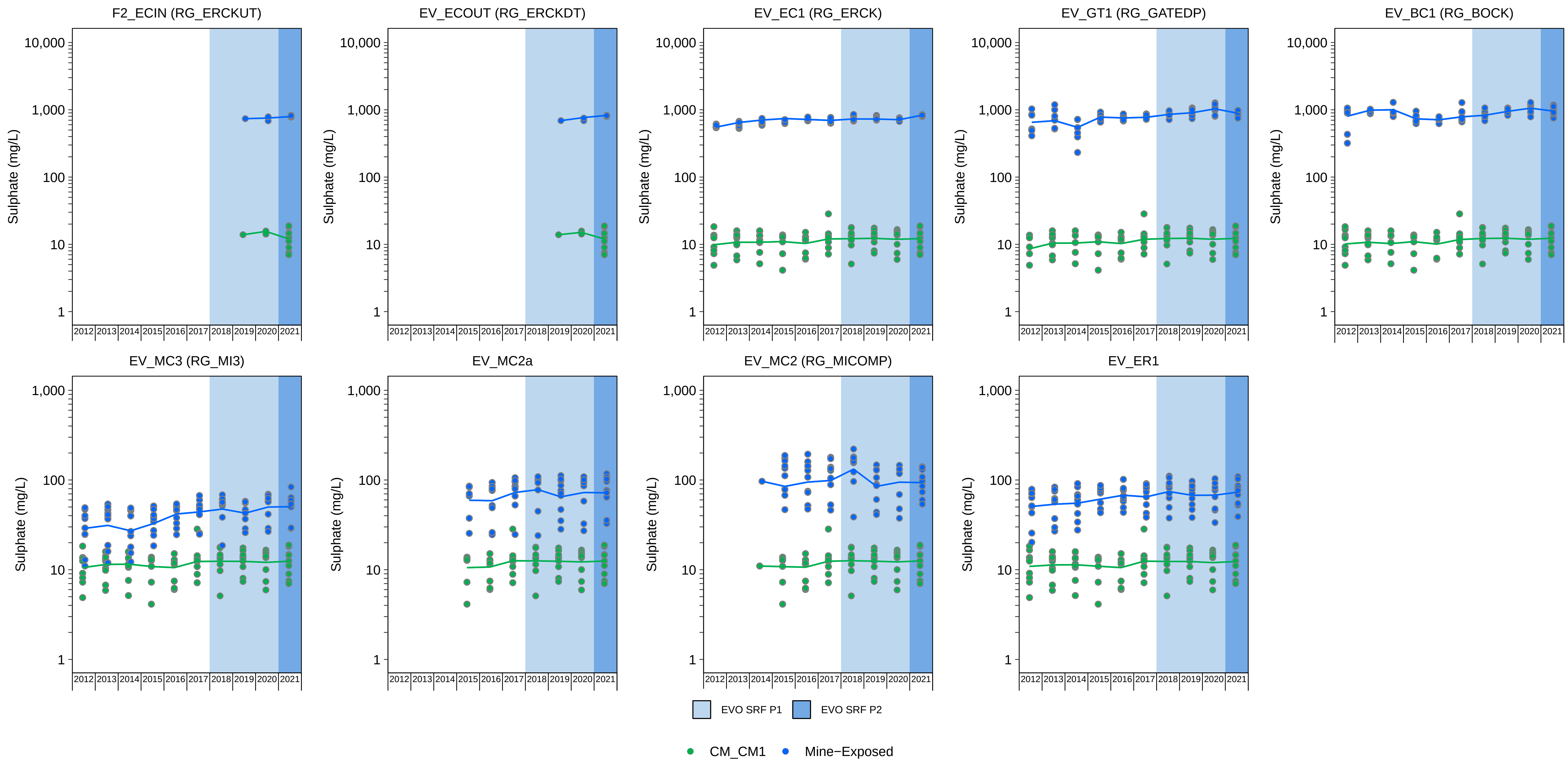

Figure D.1: **Monthly Means of Key Constituents from EVO LAEMP Areas, 2012 to 2021**

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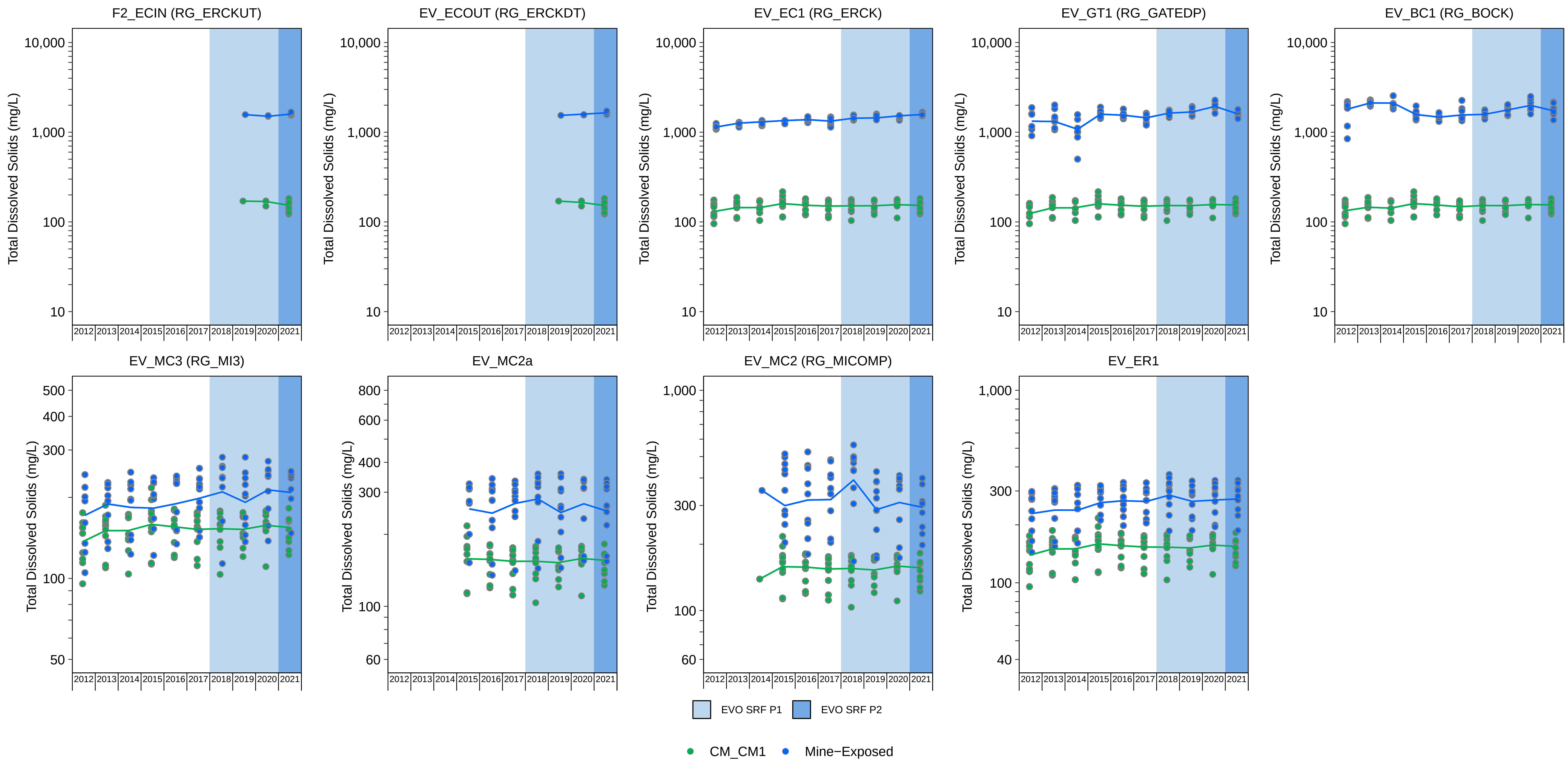

Figure D.1: Monthly Means of Key Constituents from EVO LAEMP Areas, 2012 to 2021

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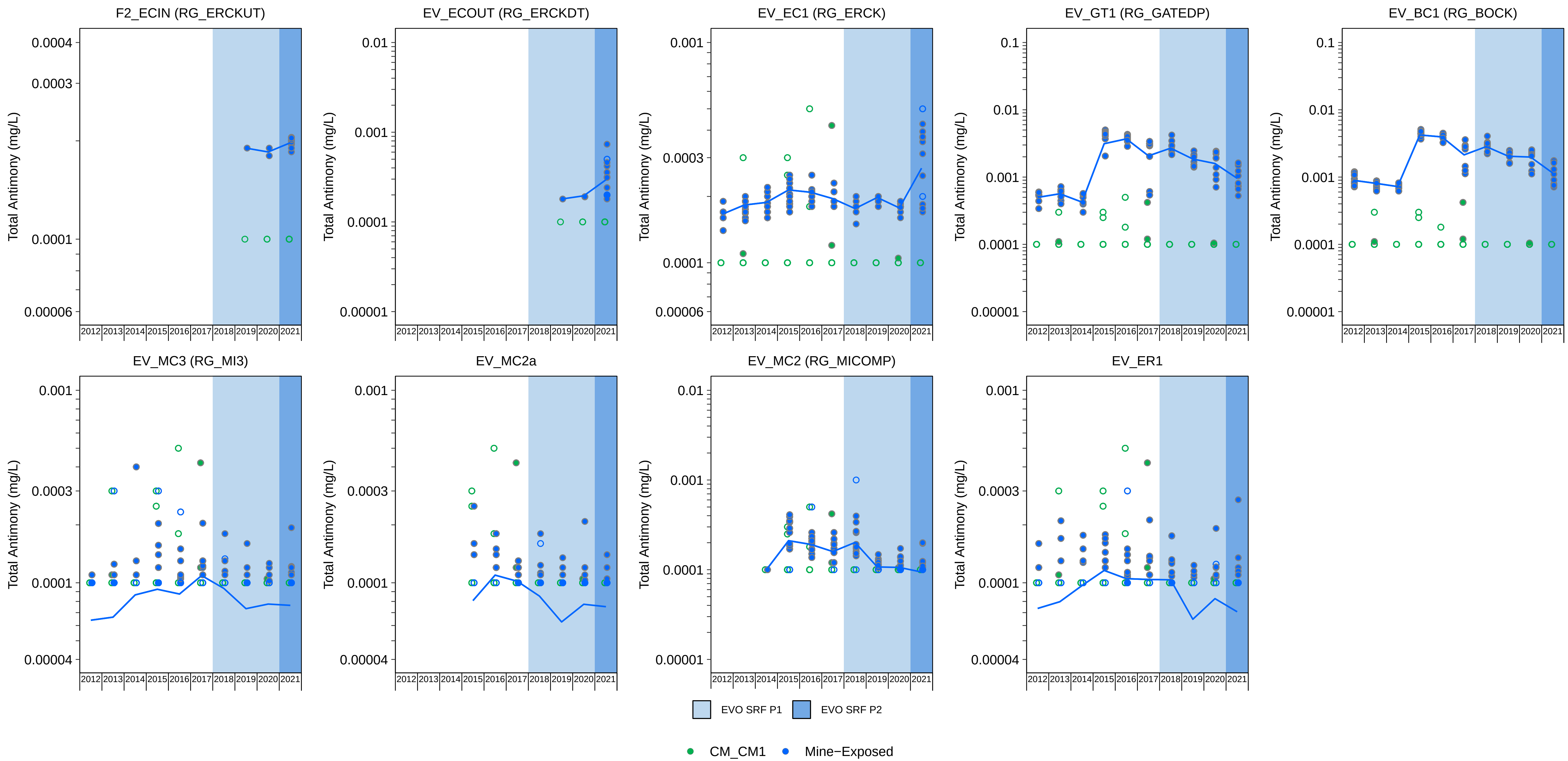

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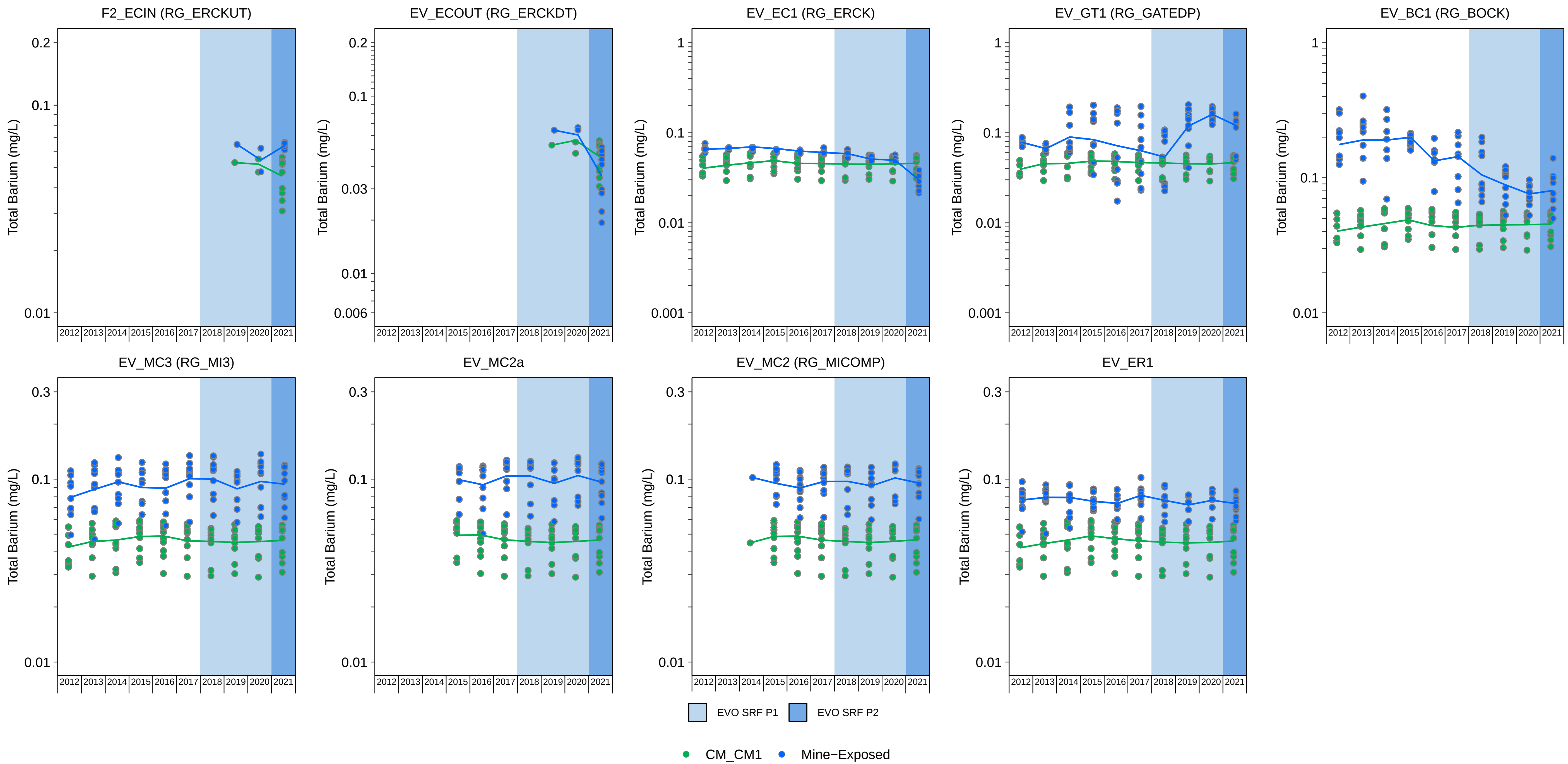

Figure D.1: Monthly Means of Key Constituents from EVO LAEMP Areas, 2012 to 2021

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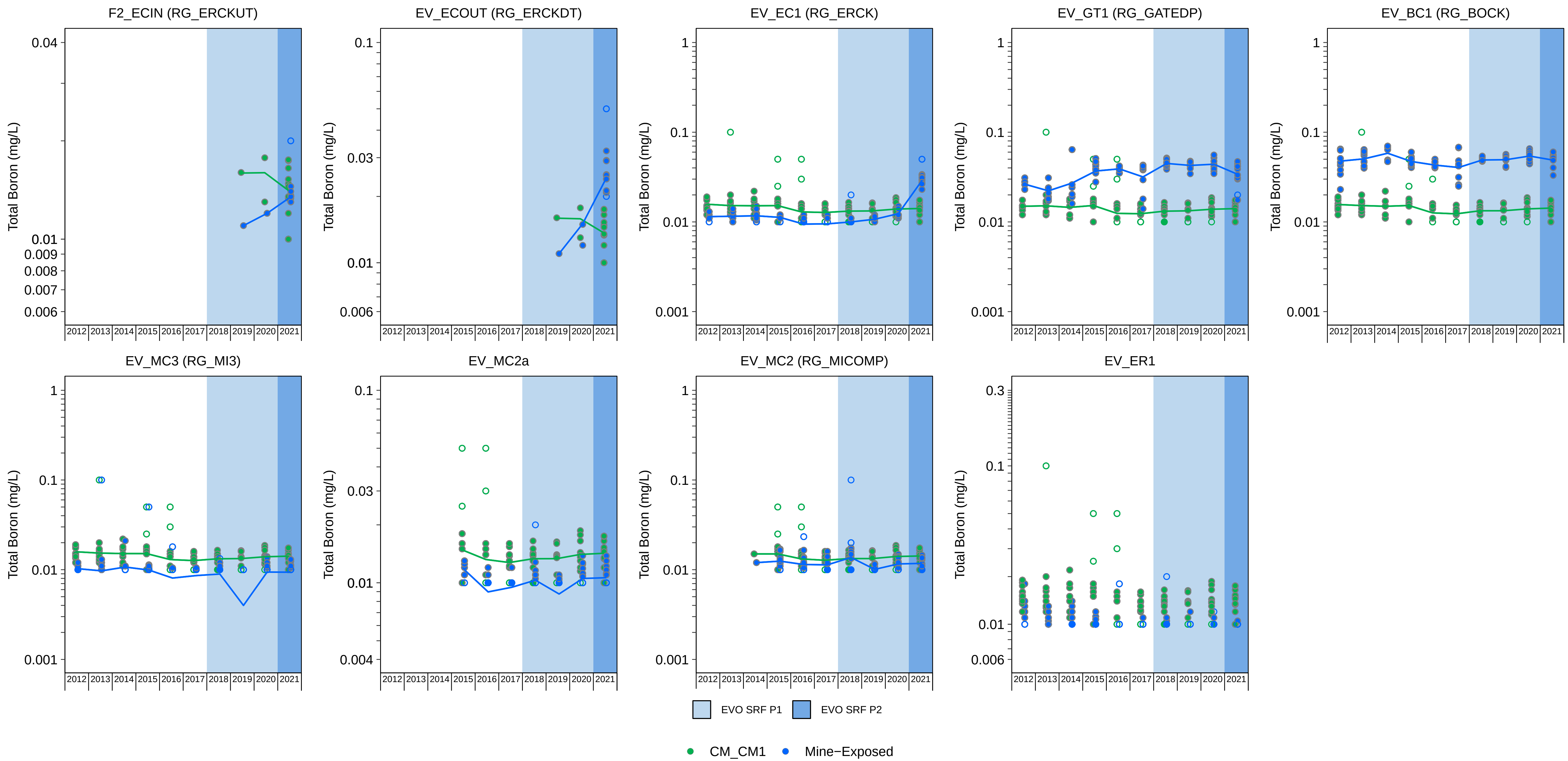

Figure D.1: Monthly Means of Key Constituents from EVO LAEMP Areas, 2012 to 2021

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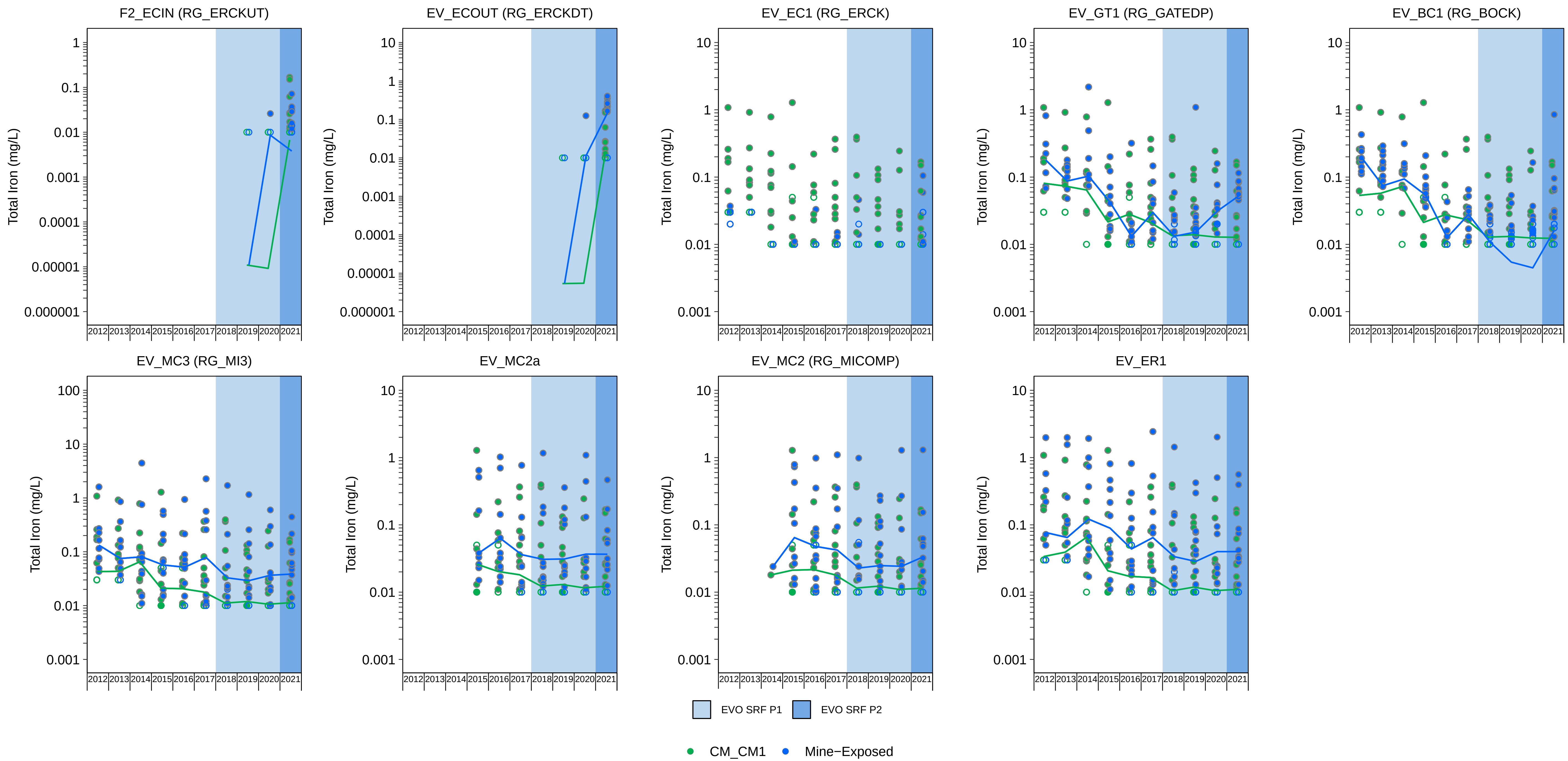

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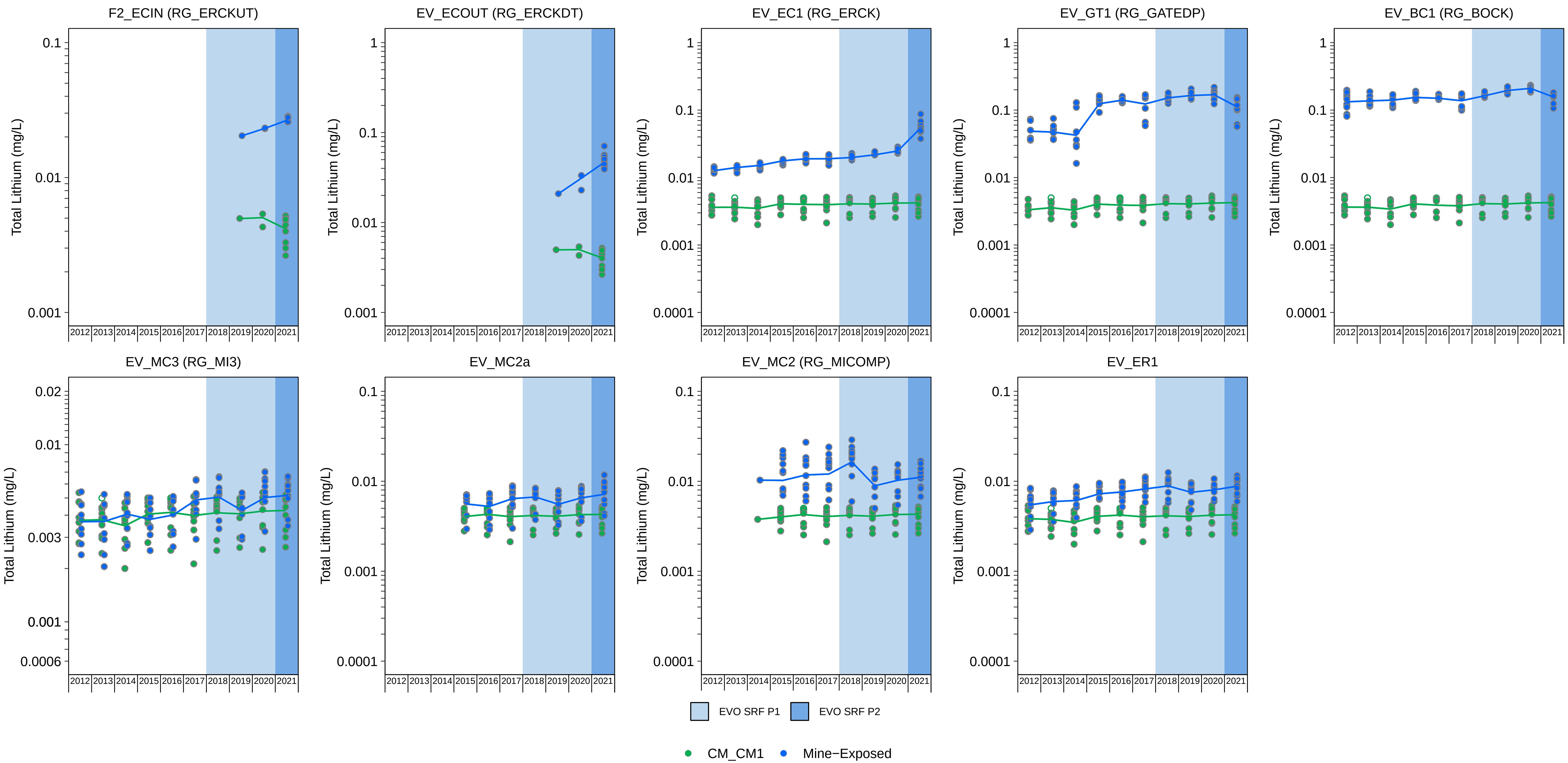

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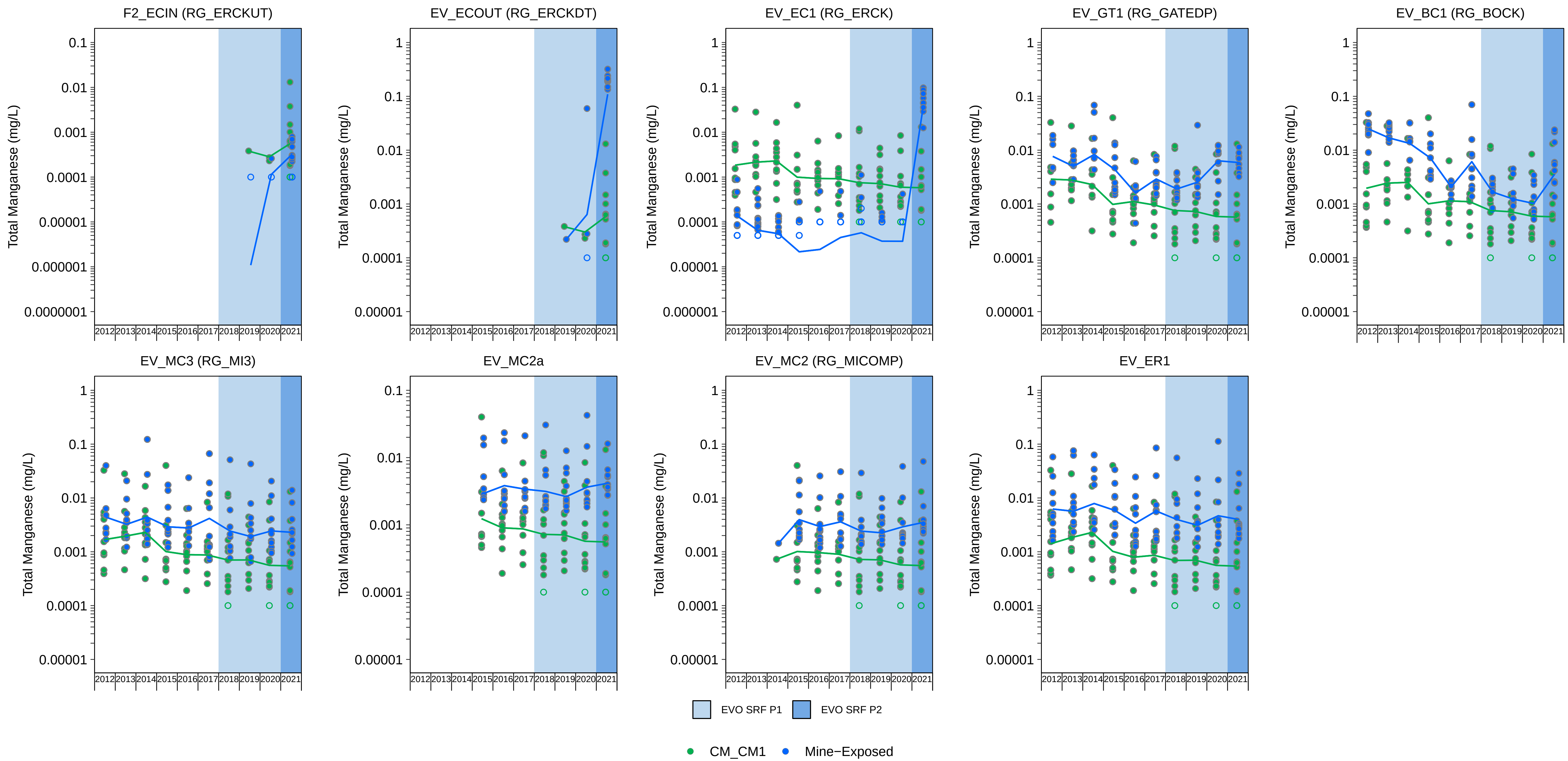

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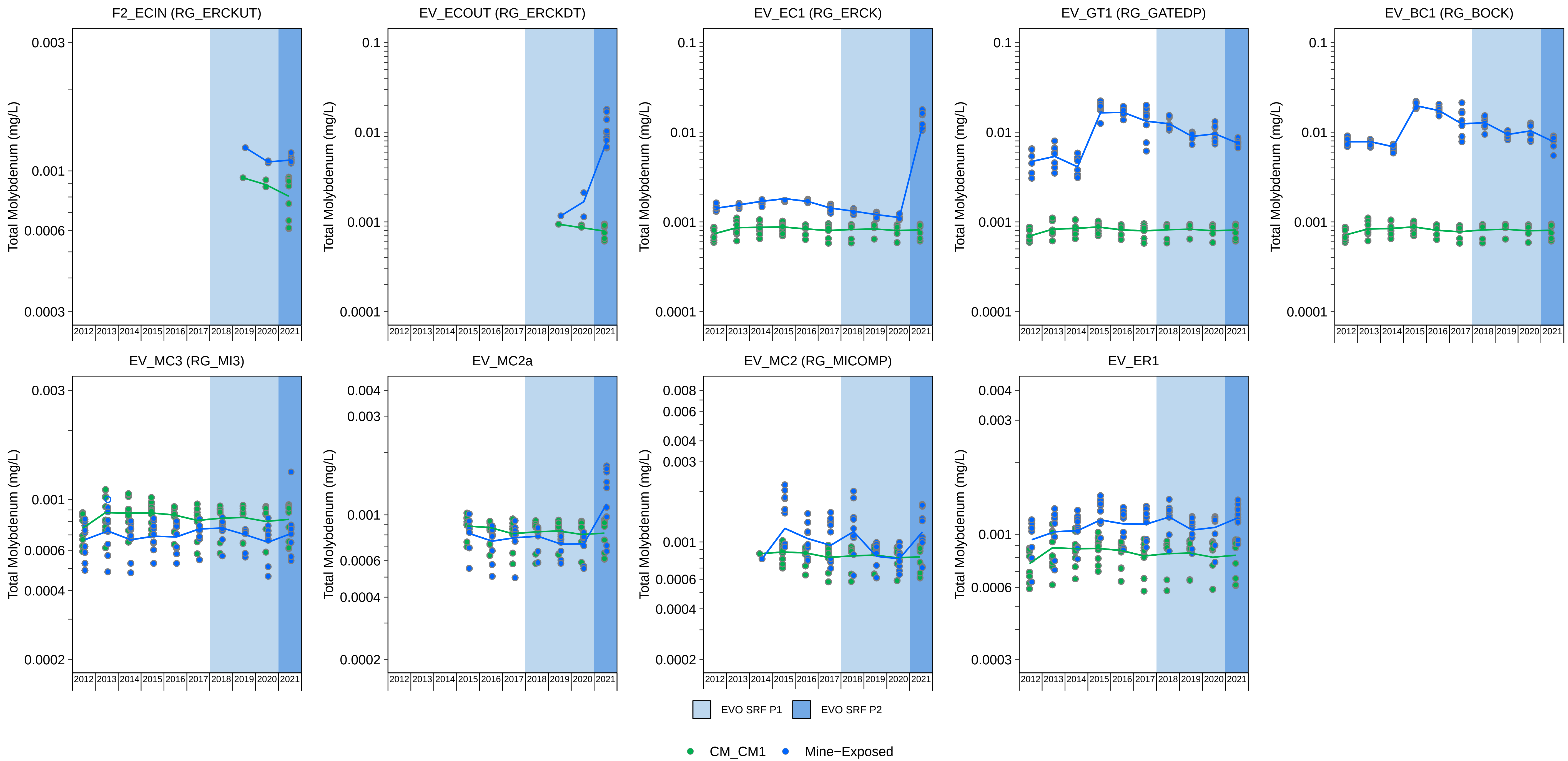

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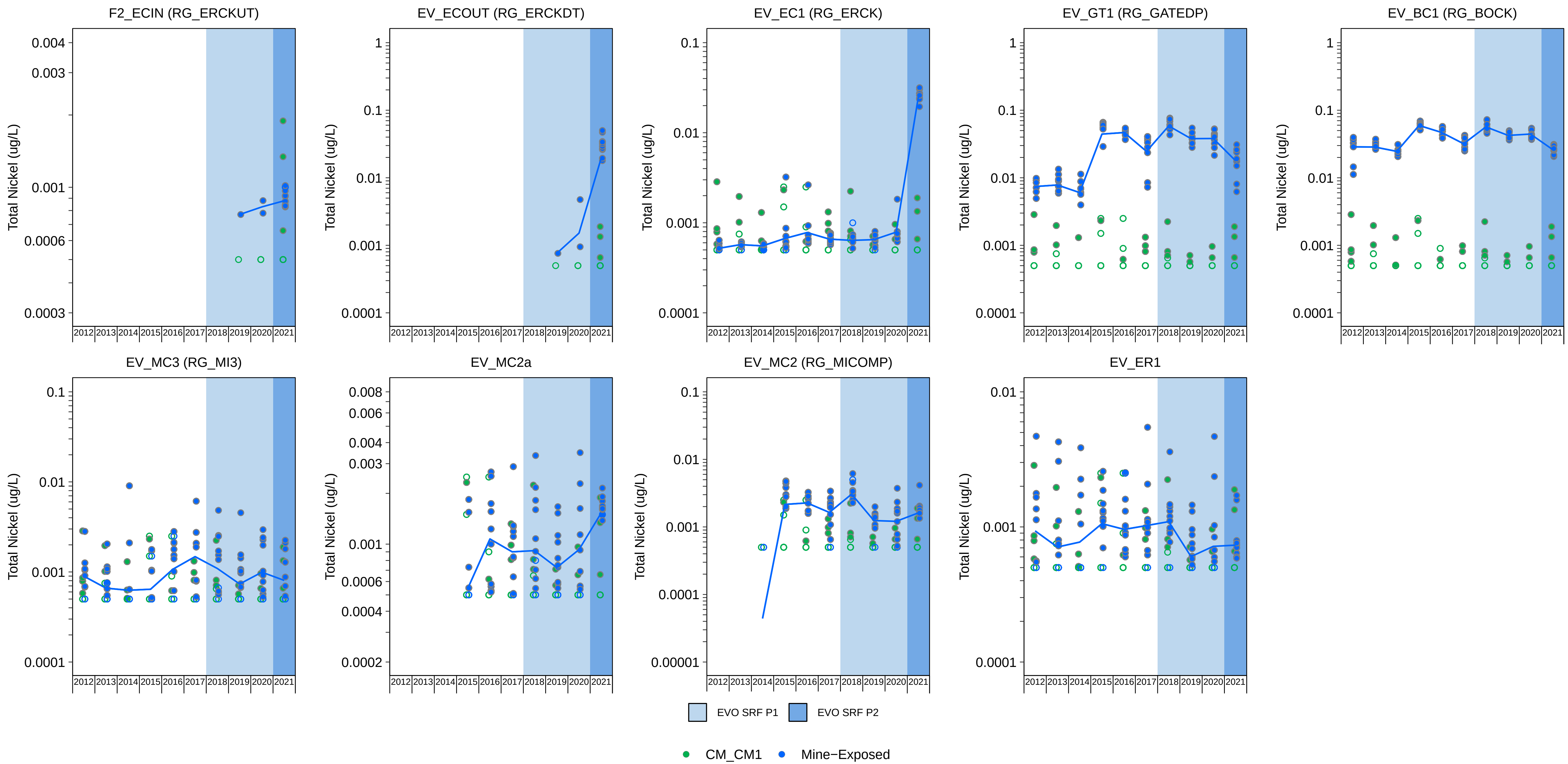

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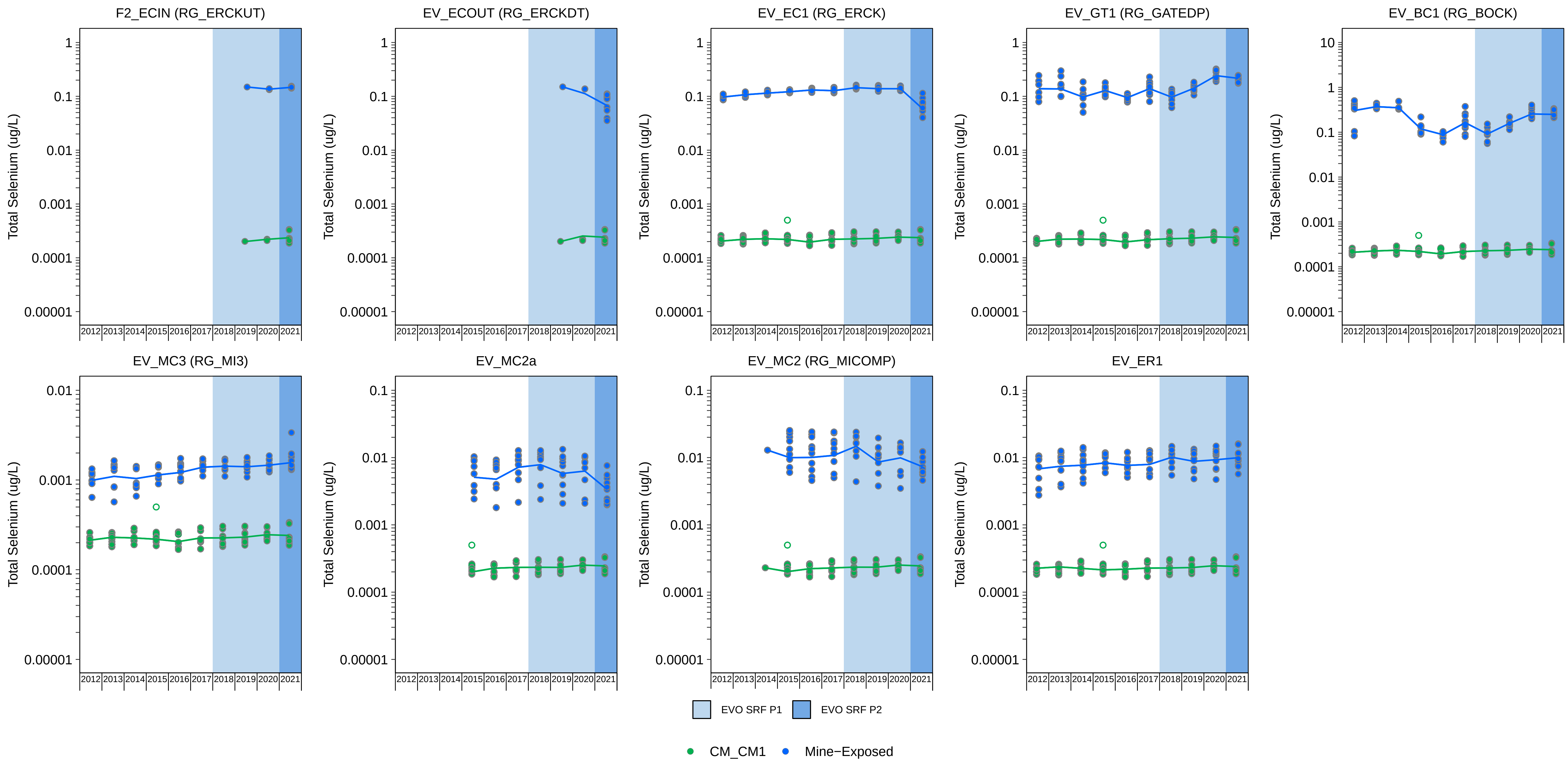

Figure D.1: **Monthly Means of Key Constituents from EVO LAEMP Areas, 2012 to 2021**

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Solid lines connect annual means of each area. Annual mean of each year was calculated where the percentage of data below the laboratory reporting limit was less than 80%.

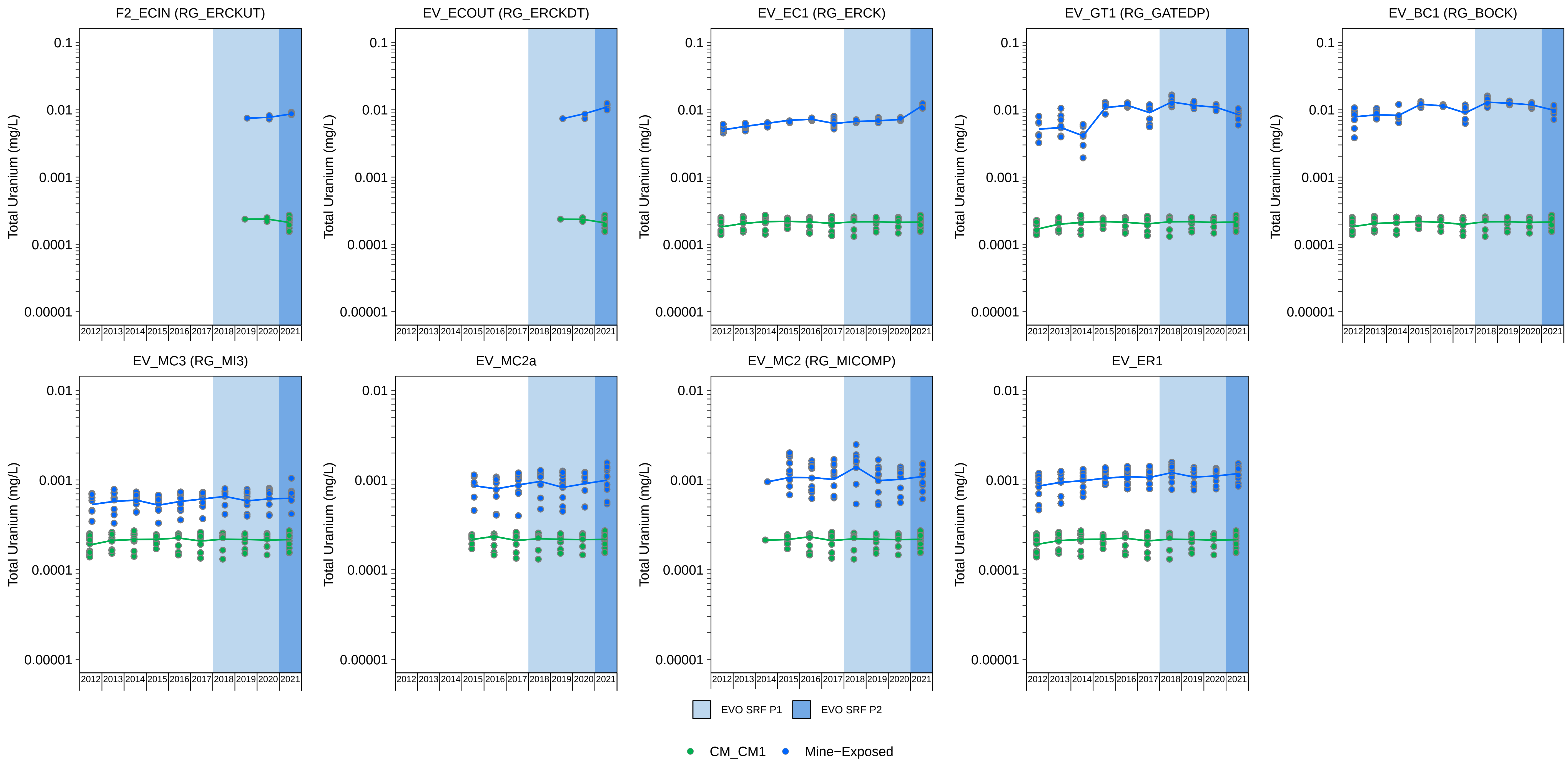

Figure D.1: Monthly Means of Key Constituents from EVO LAEMP Areas, 2012 to 2021

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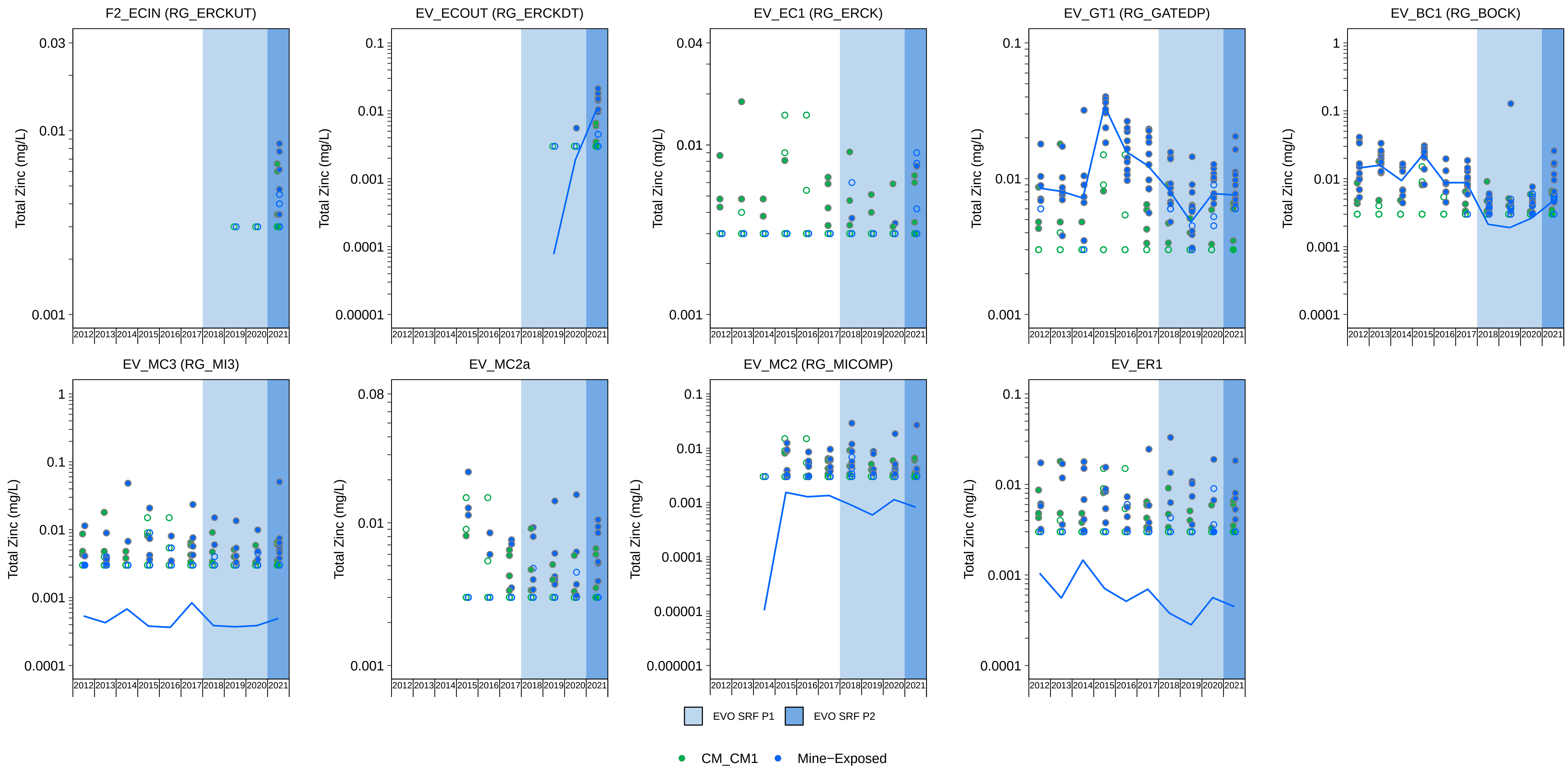

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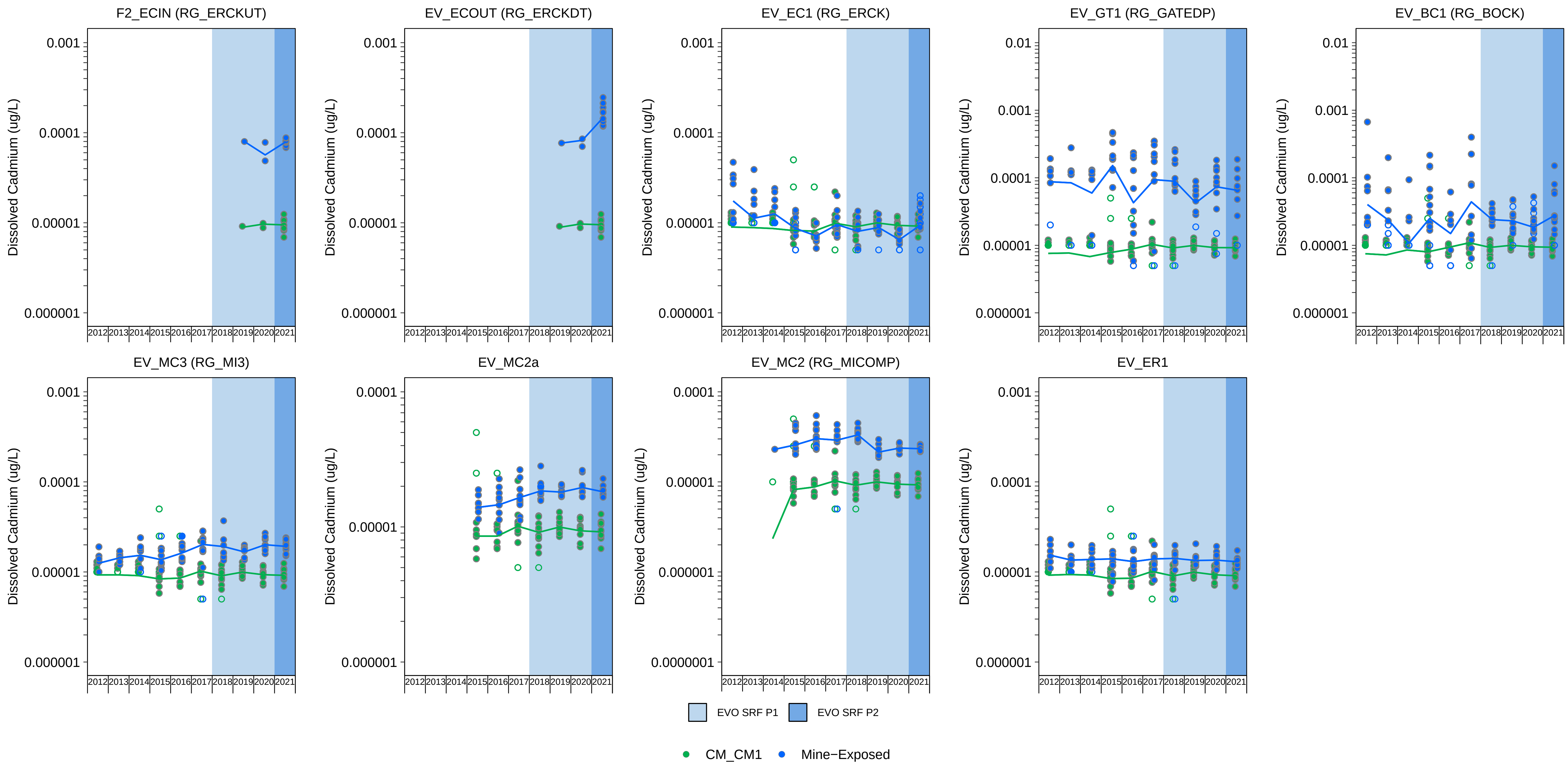
Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Solid lines connect annual means of each area. Annual mean of each year was calculated where the percentage of data below the laboratory reporting limit was less than 80%.



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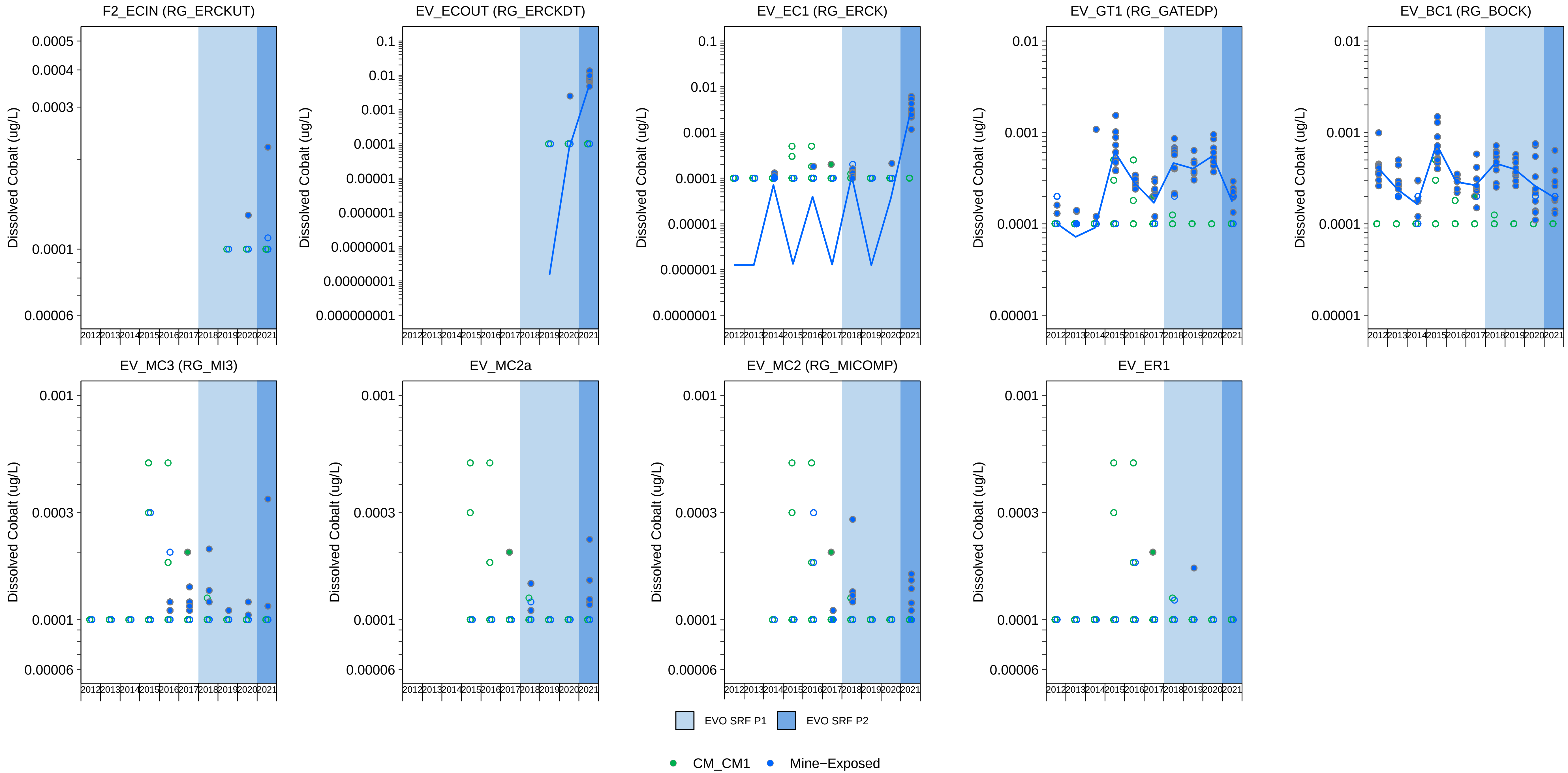

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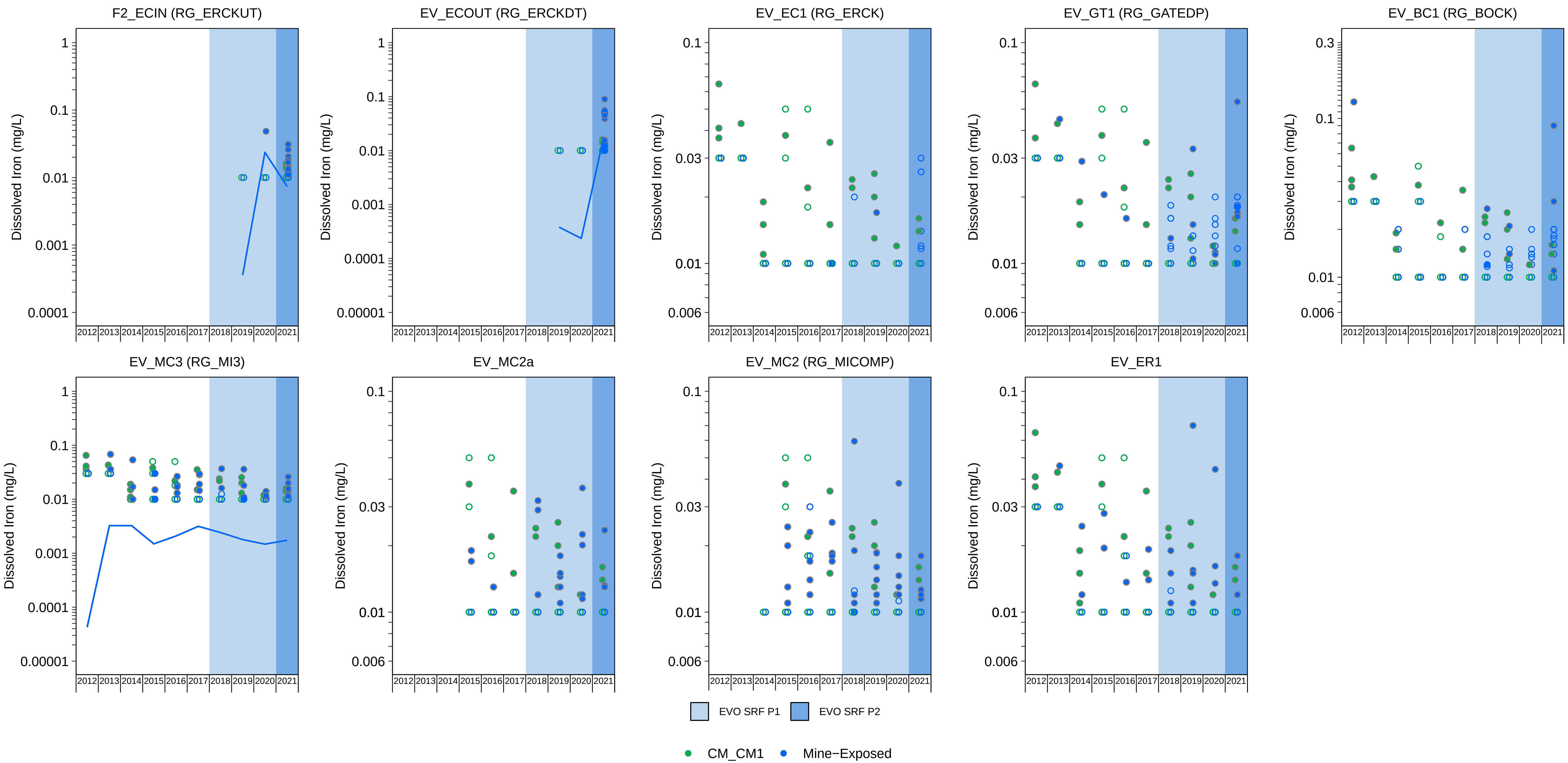

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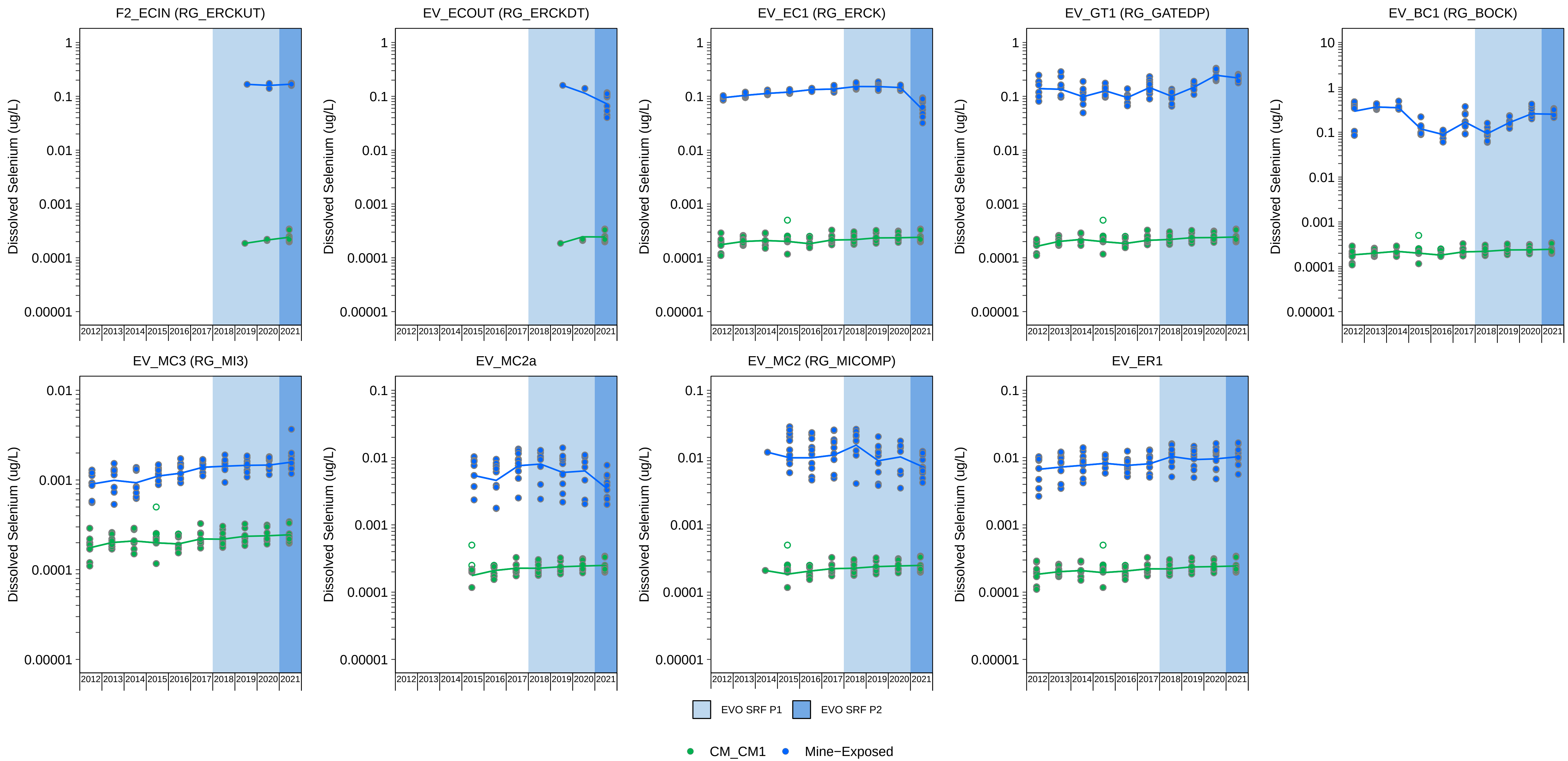

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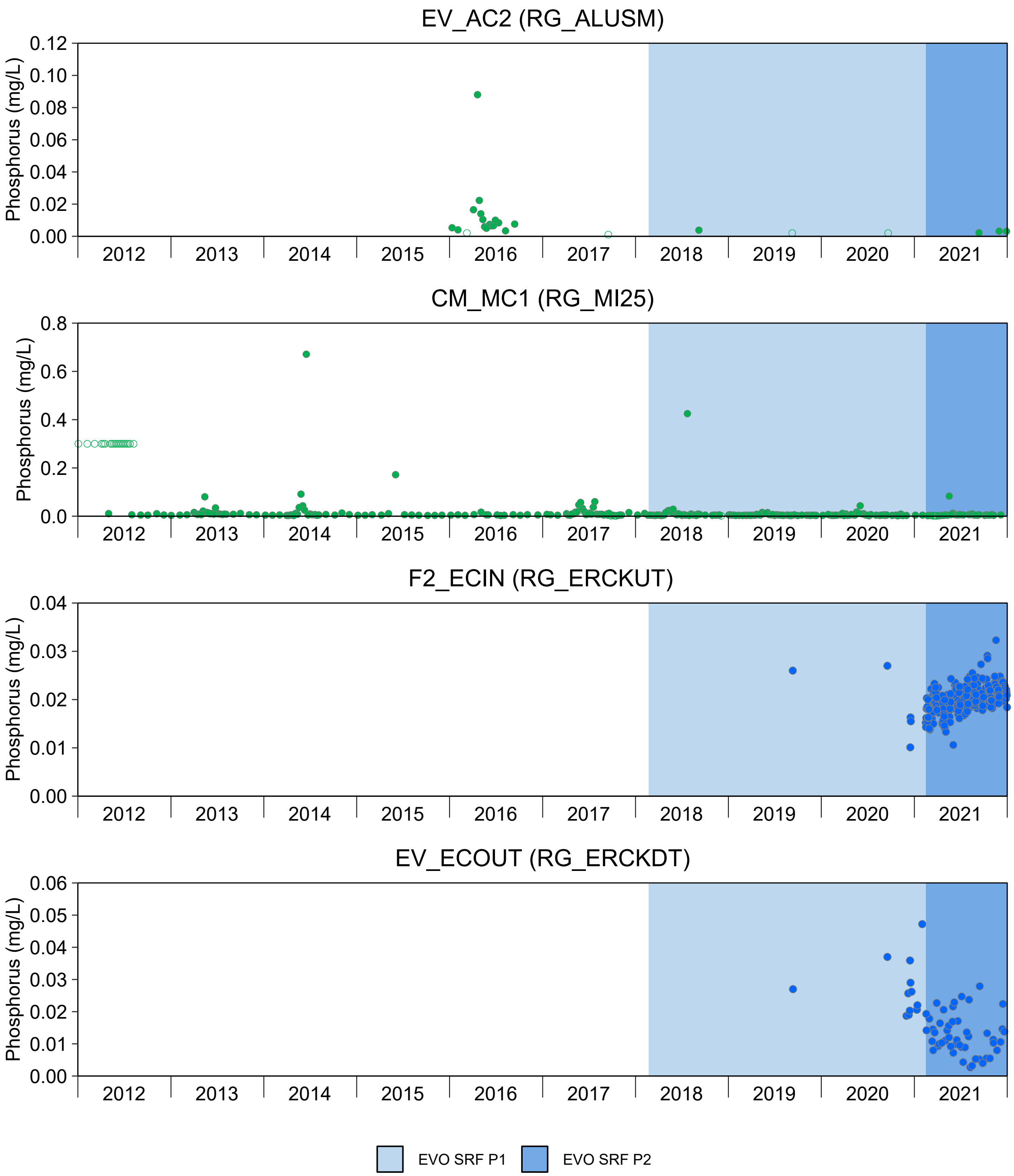
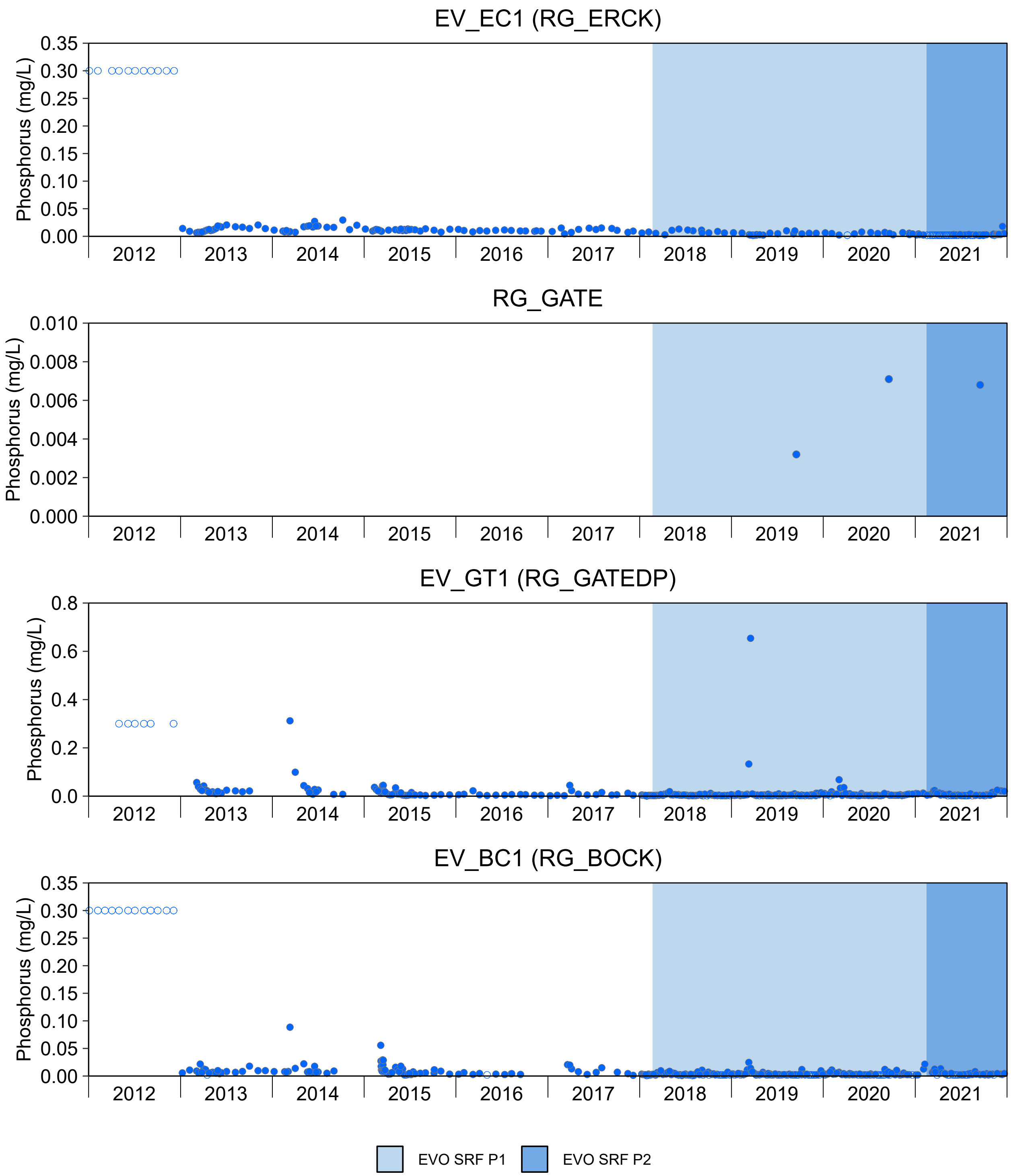


Figure D.2: Time Series Plots for Phosphorus from EVO LAEMP Areas, 2012 to 2021

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).



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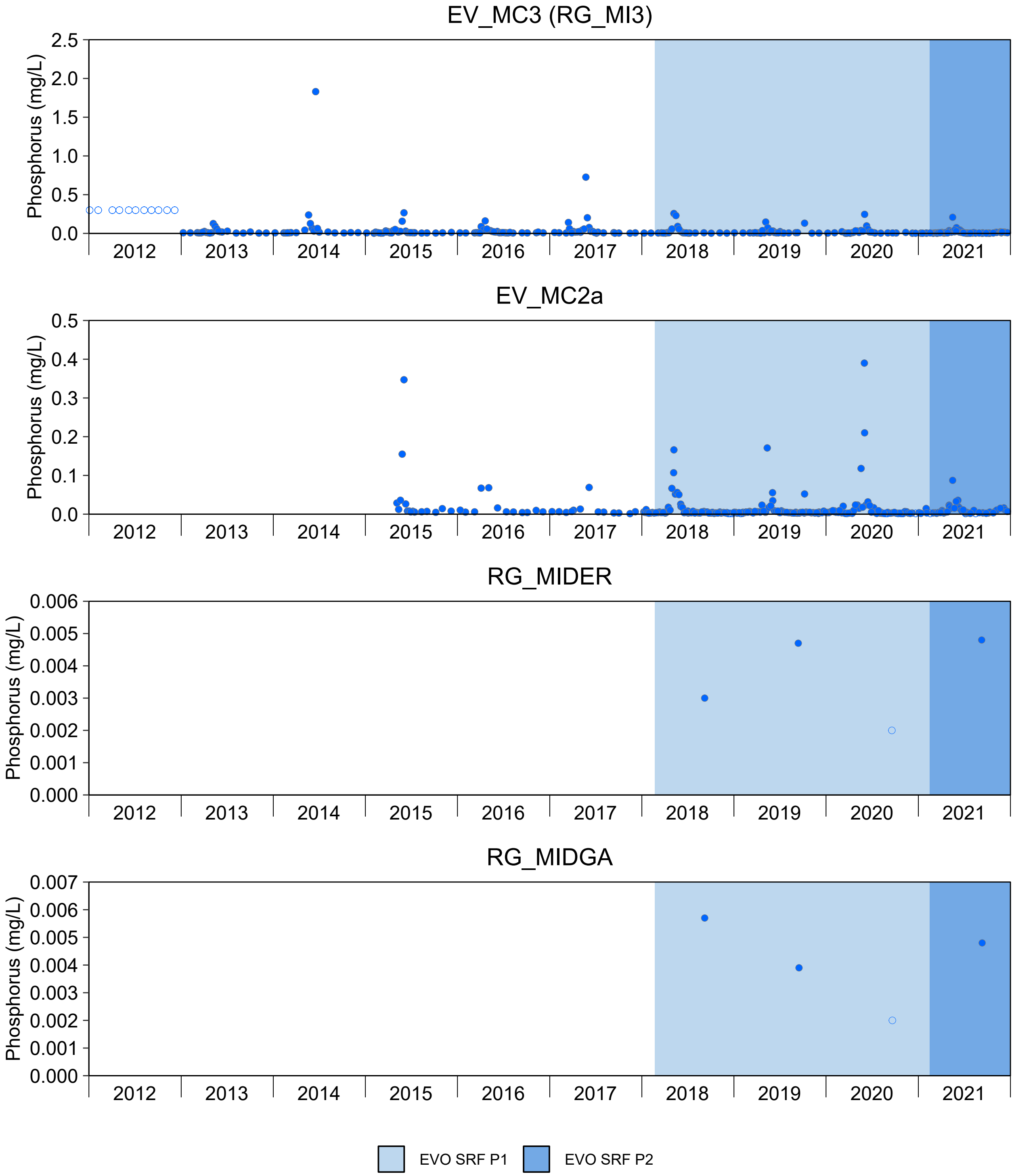

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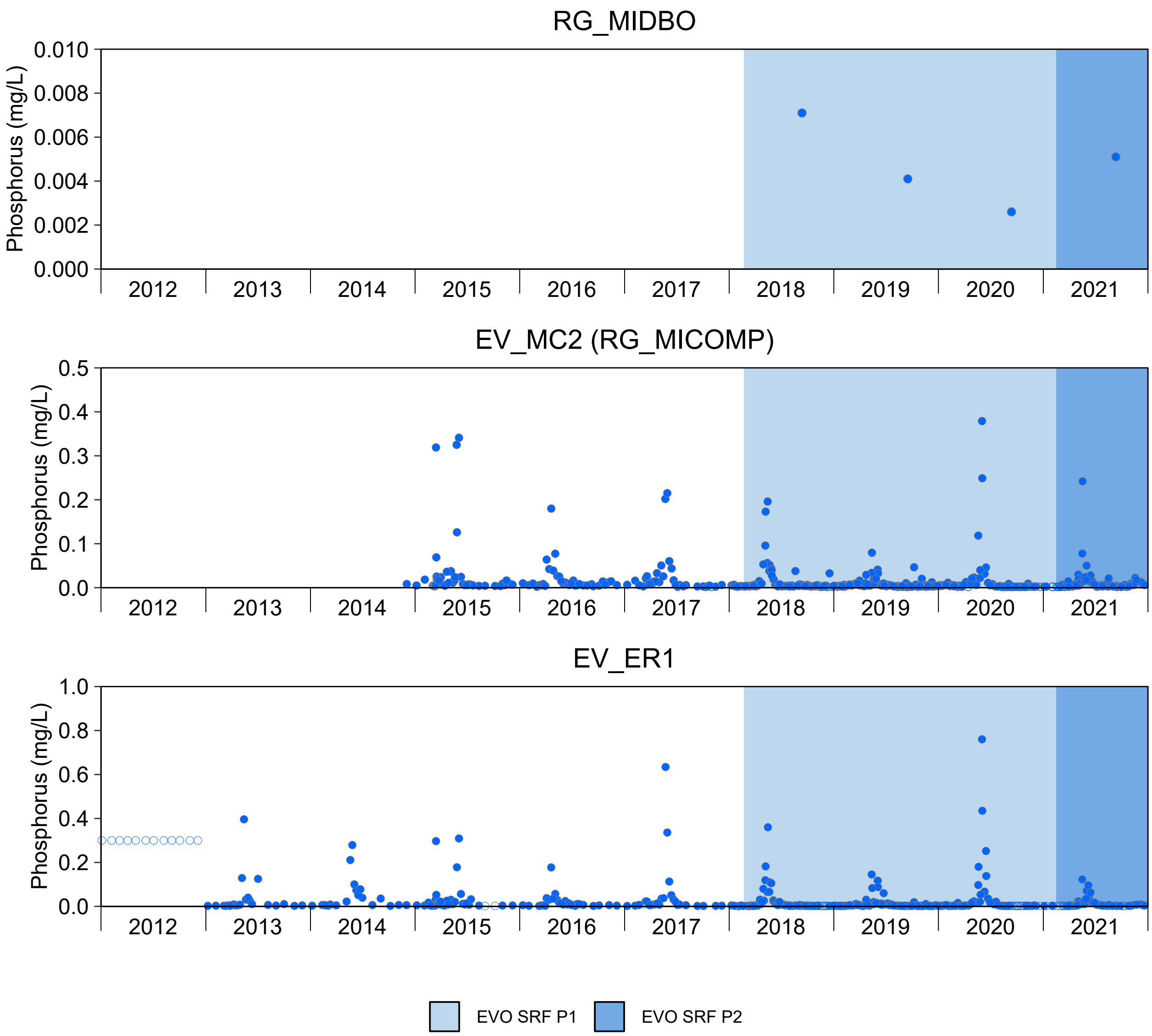

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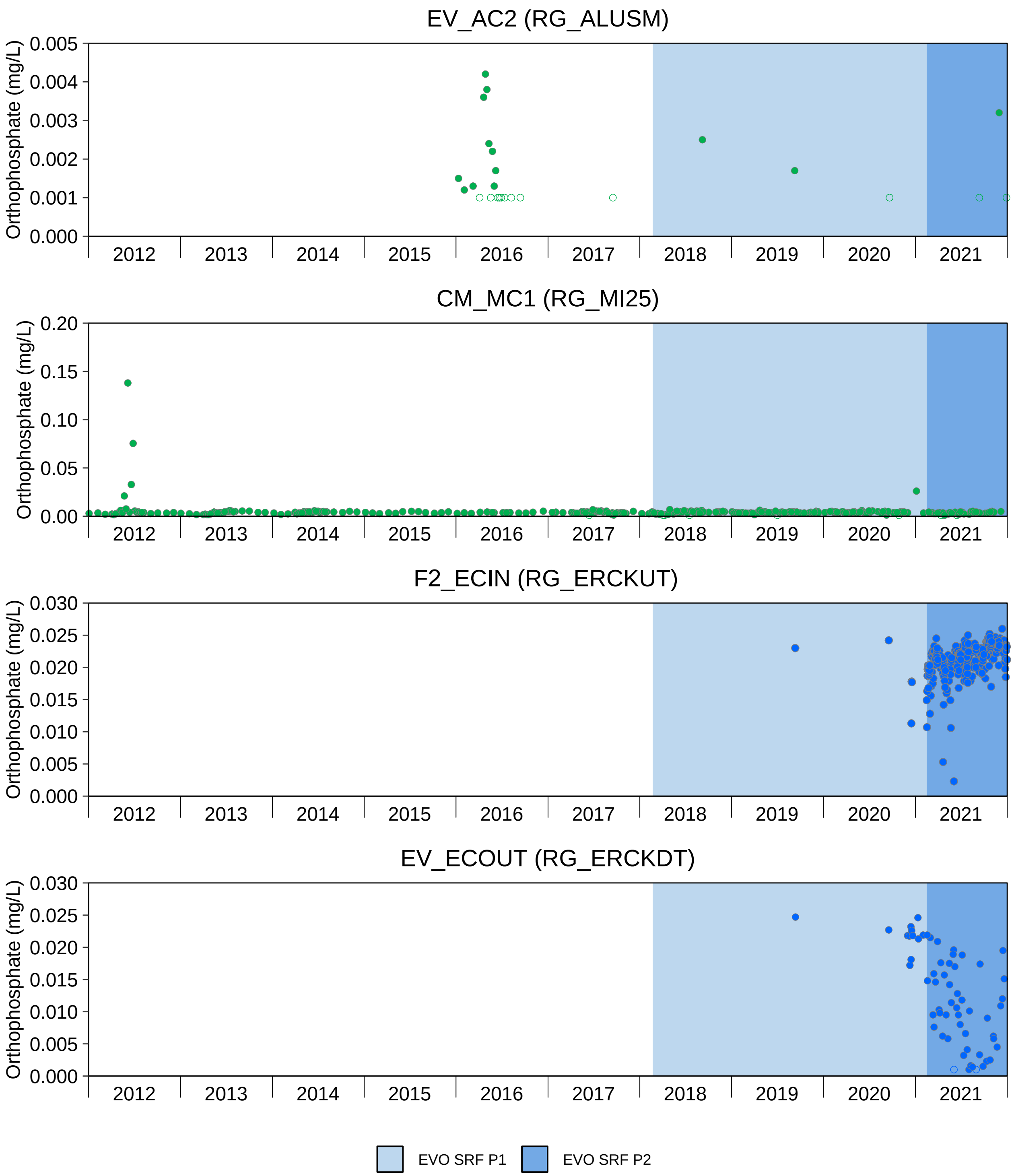

Figure D.3: Time Series Plots for Orthophosphate from EVO LAEMP Areas, 2012 to 2021

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).

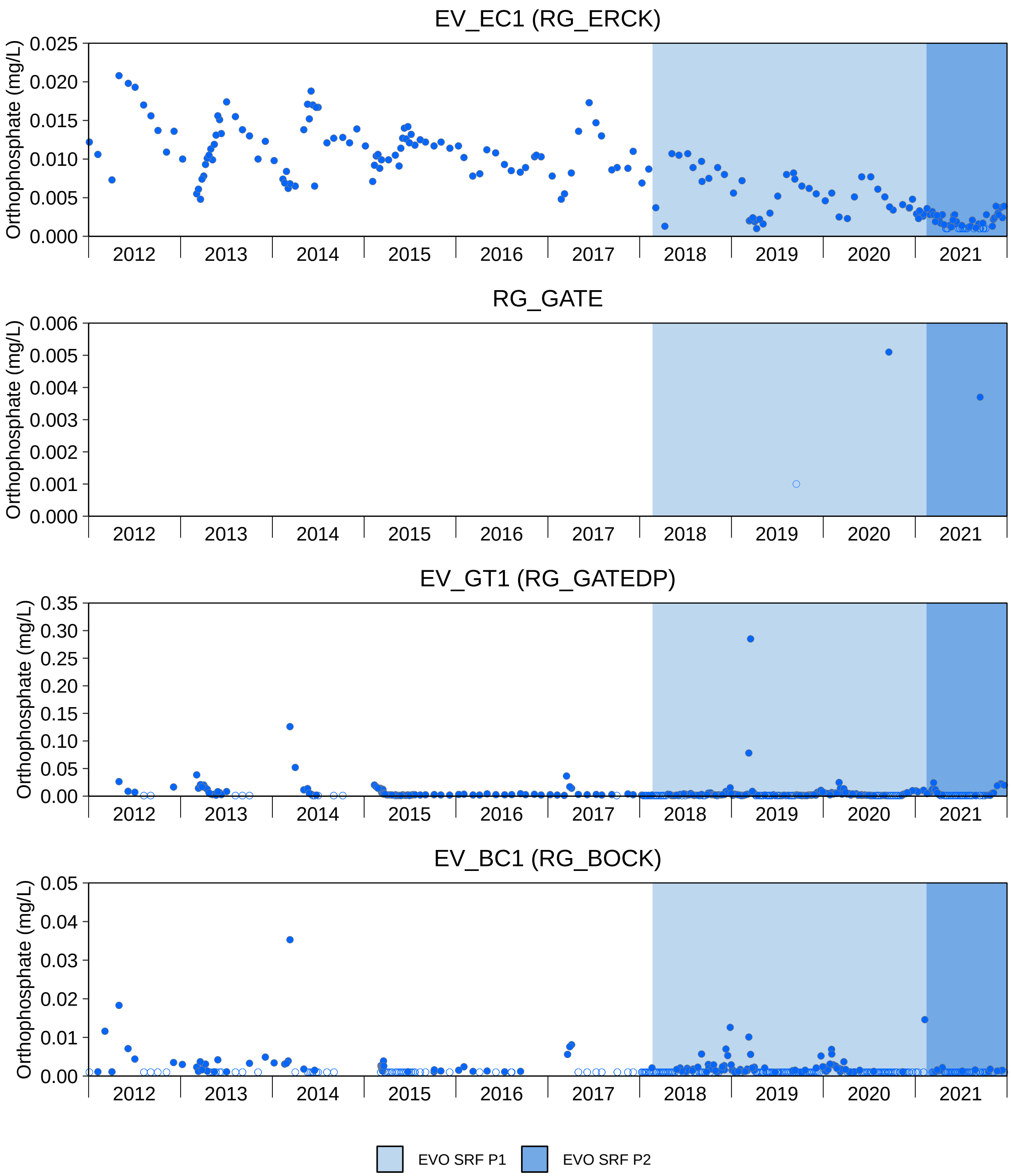

Figure D.3: Time Series Plots for Orthophosphate from EVO LAEMP Areas, 2012 to 2021

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).

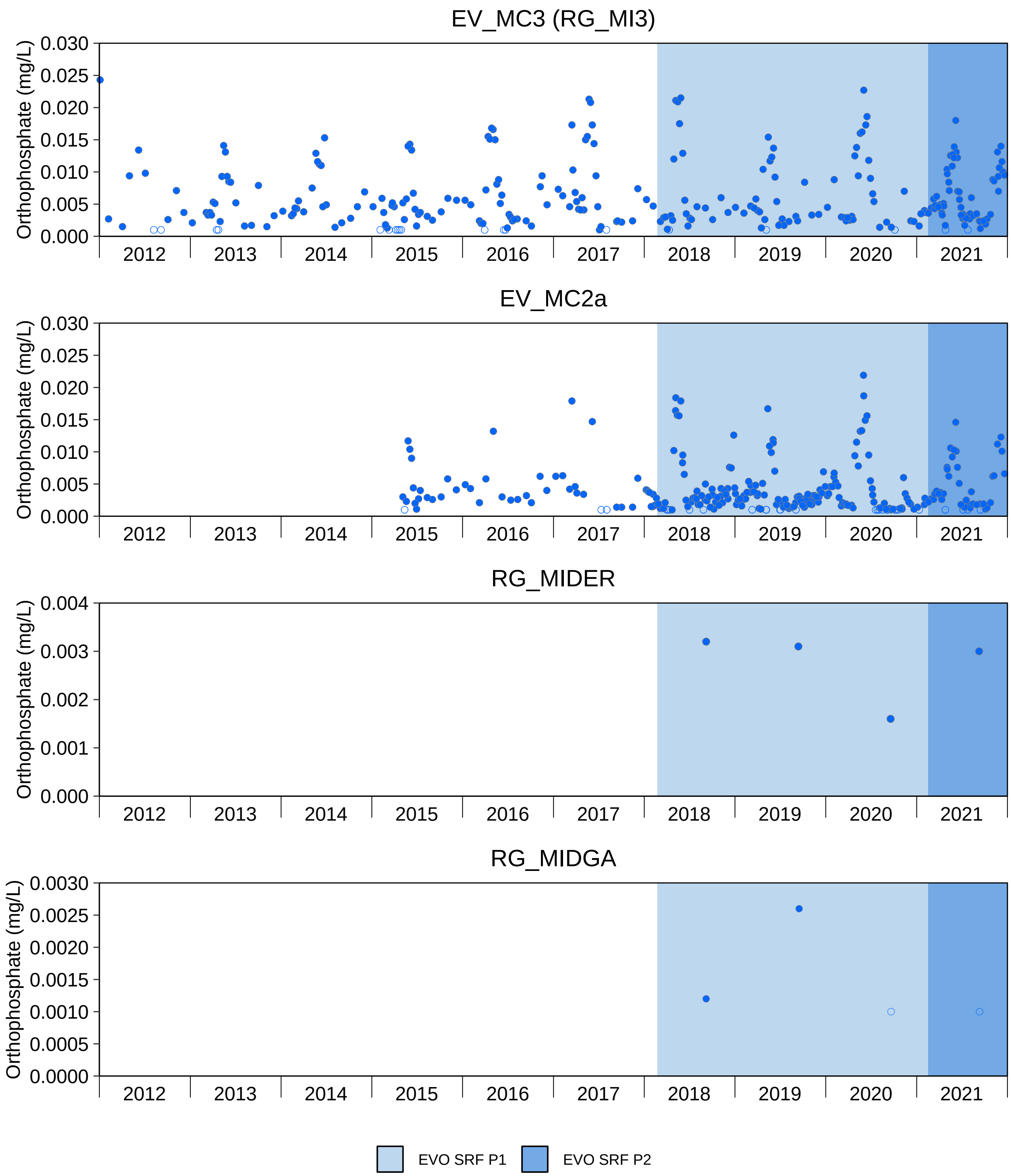

Figure D.3: Time Series Plots for Orthophosphate from EVO LAEMP Areas, 2012 to 2021

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).

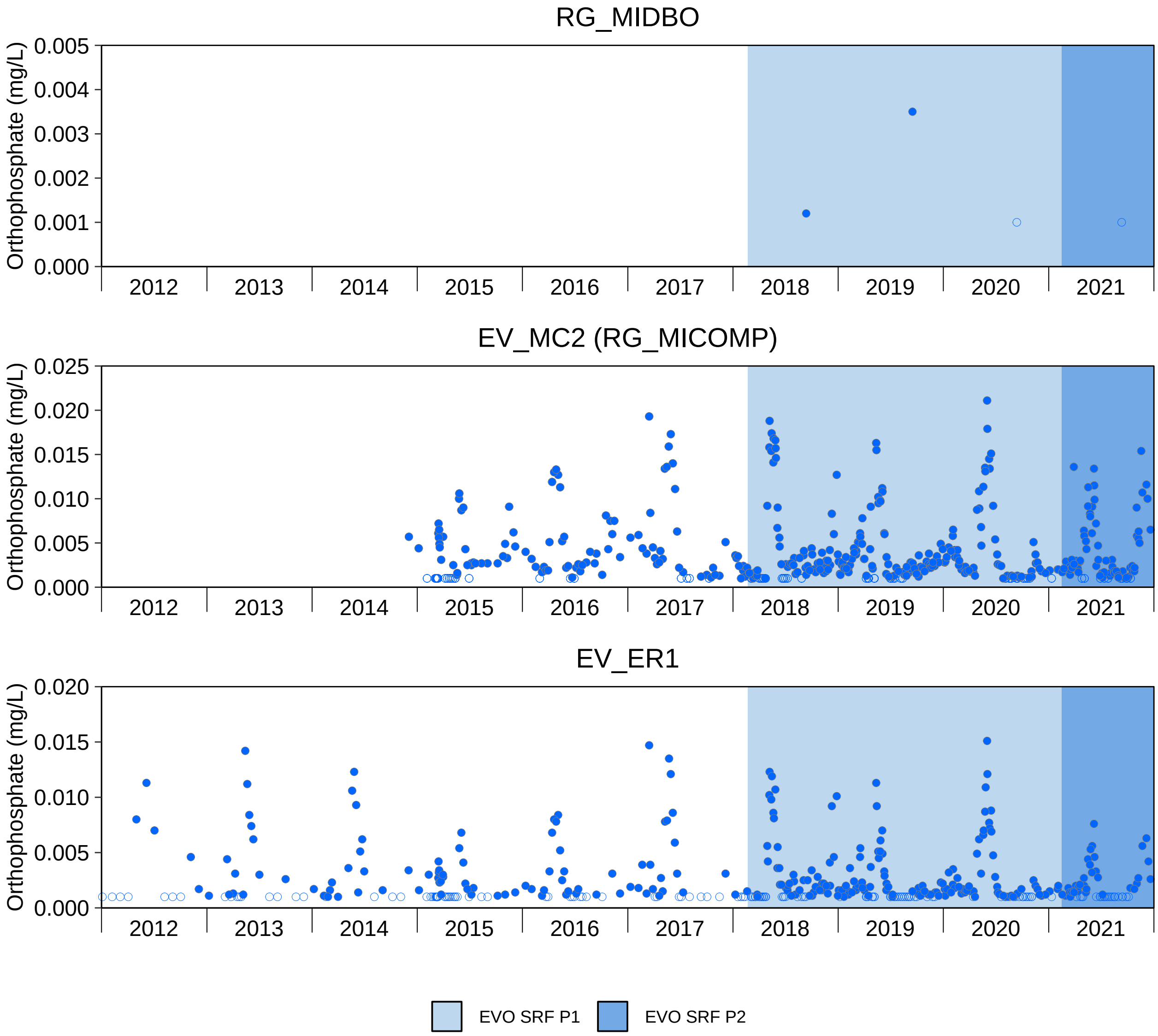

Figure D.3: Time Series Plots for Orthophosphate from EVO LAEMP Areas, 2012 to 2021

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).

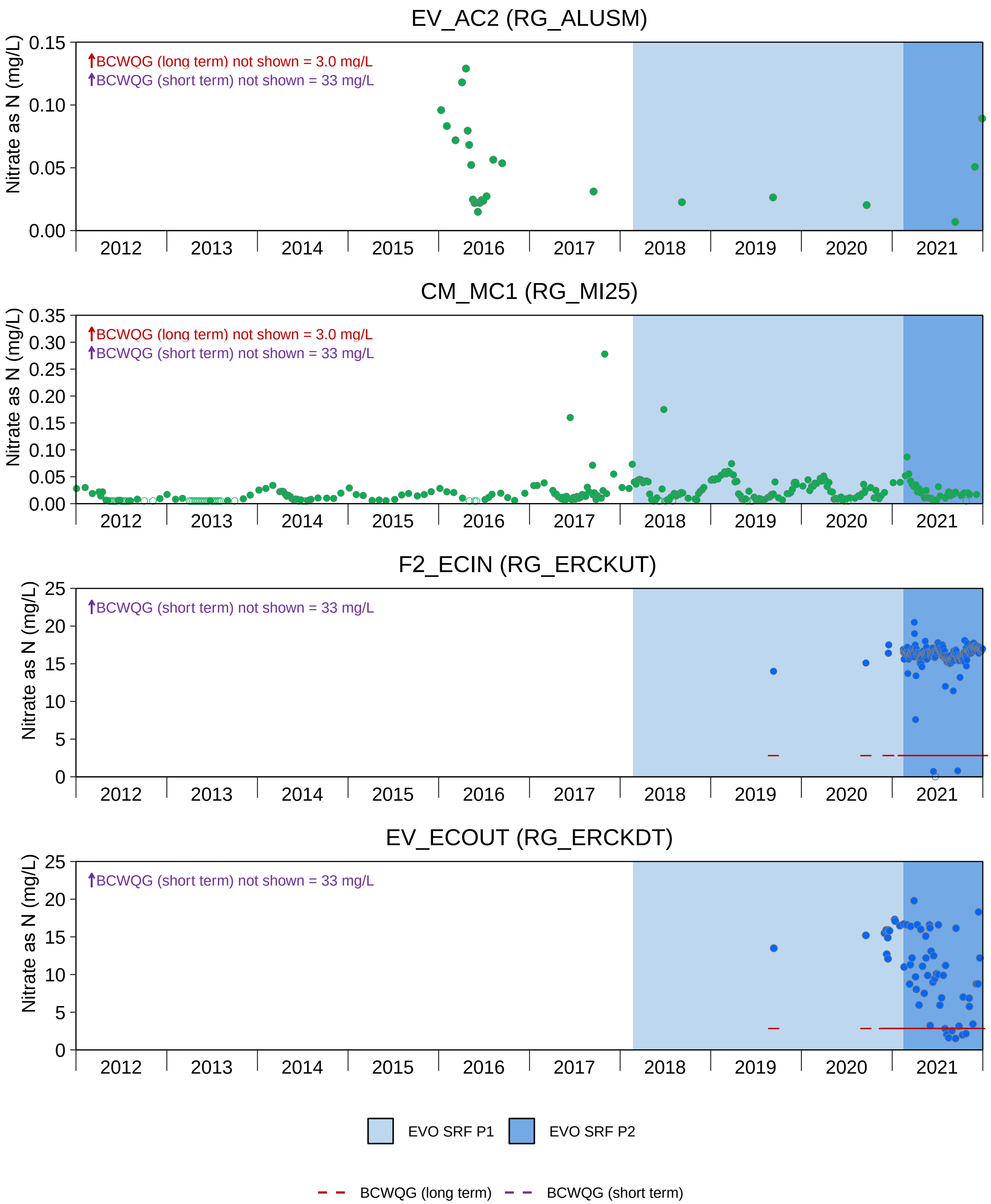

Figure D.4: Time Series Plots for Nitrate as N from EVO LAEMP Areas, 2012 to 2021

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). The EVWQP Level 1 Benchmark for Nitrate is consistent with the long term BCWQG.

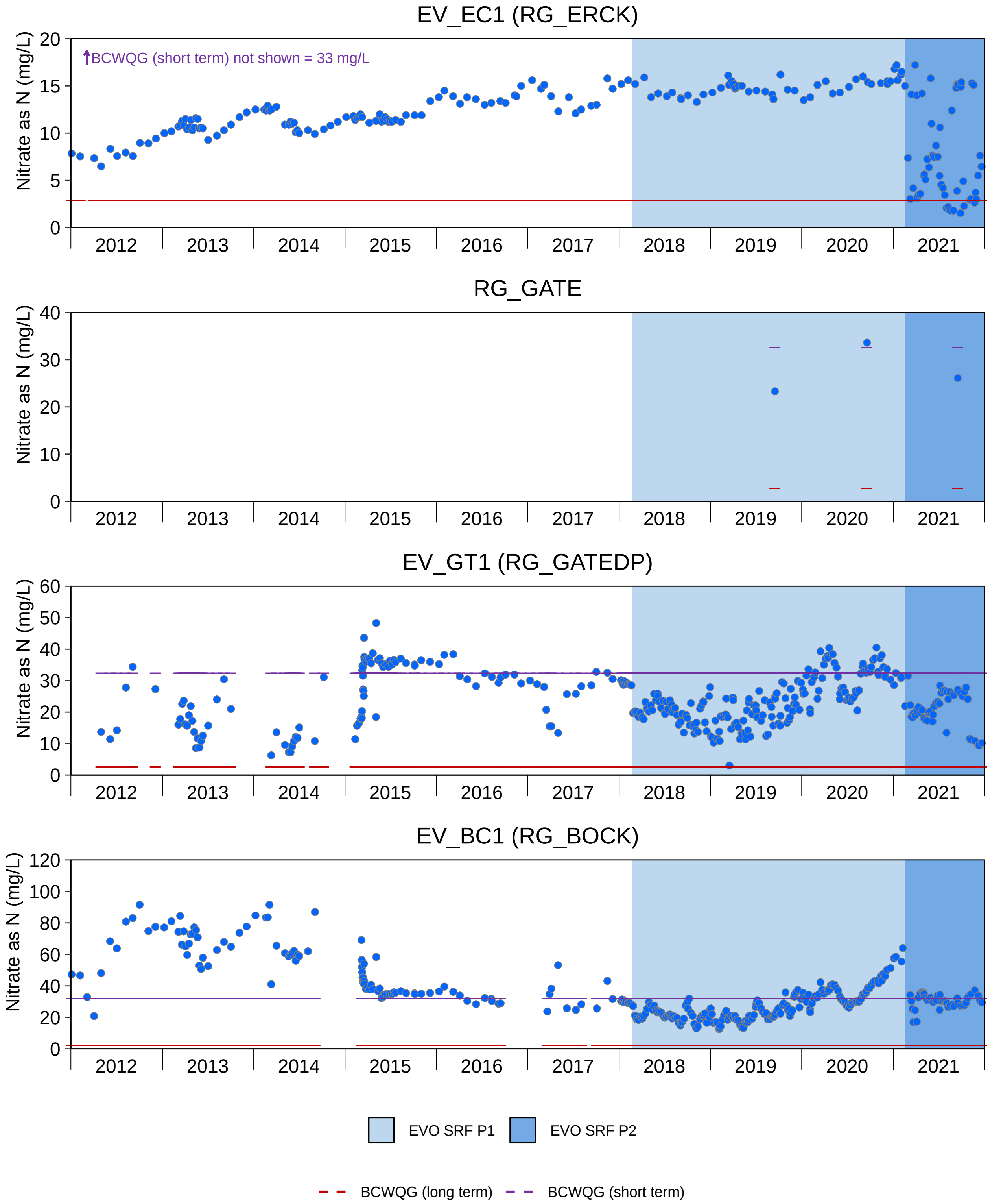

Figure D.4: Time Series Plots for Nitrate as N from EVO LAEMP Areas, 2012 to 2021

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). The EVWQP Level 1 Benchmark for Nitrate is consistent with the long term BCWQG.

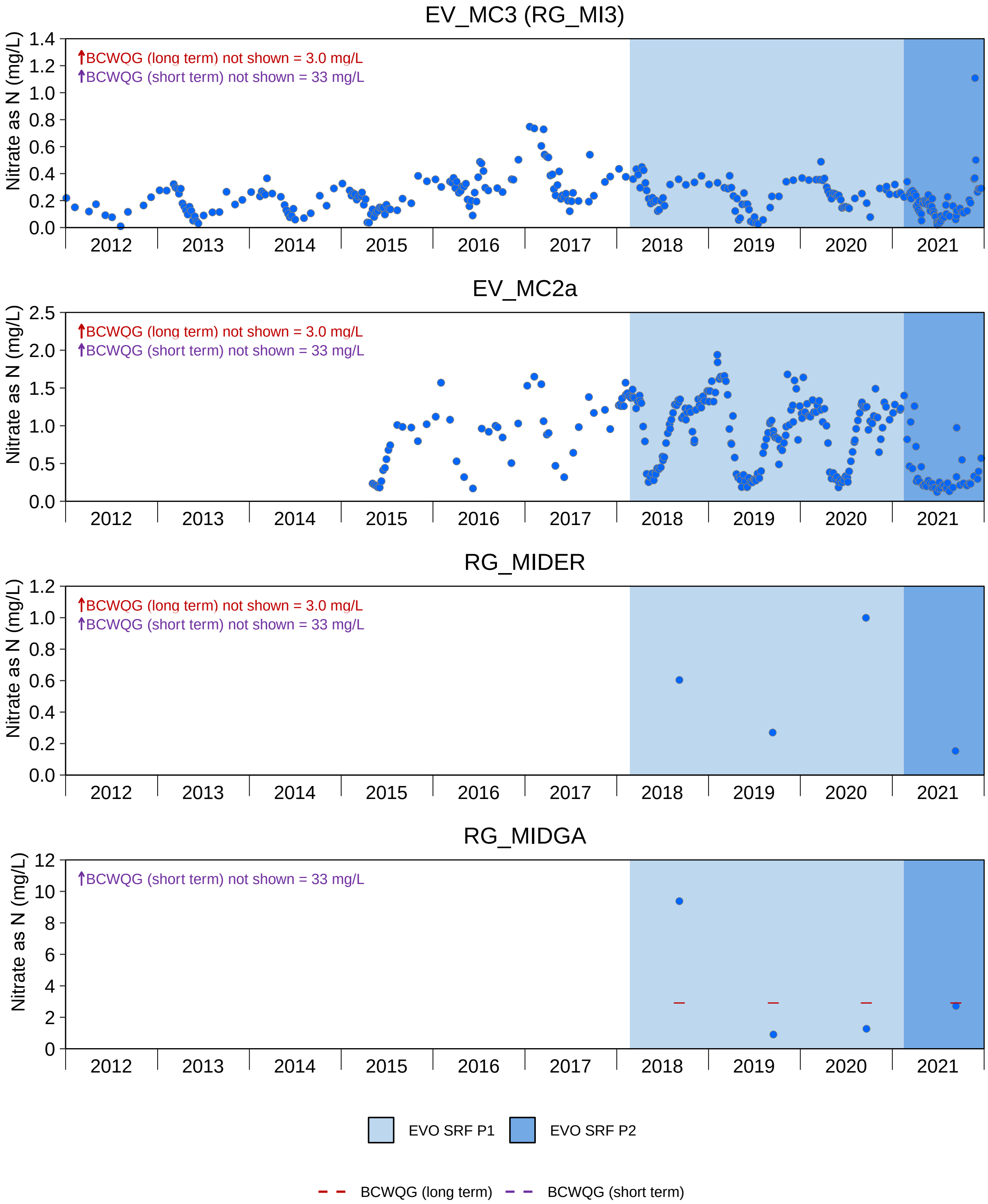

Figure D.4: Time Series Plots for Nitrate as N from EVO LAEMP Areas, 2012 to 2021

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). The EVWQP Level 1 Benchmark for Nitrate is consistent with the long term BCWQG.

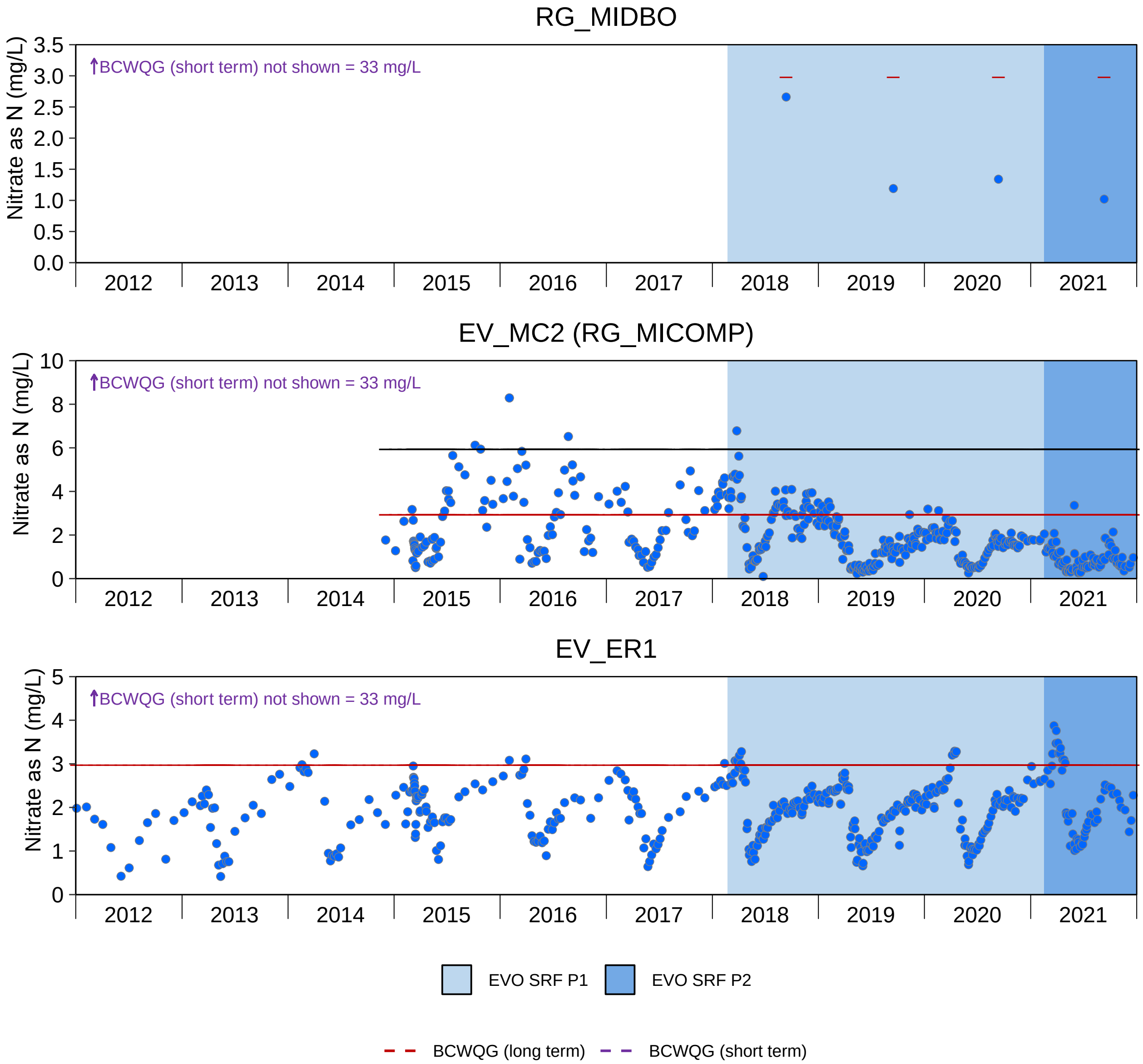

Figure D.4: Time Series Plots for Nitrate as N from EVO LAEMP Areas, 2012 to 2021

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). The EVWQP Level 1 Benchmark for Nitrate is consistent with the long term BCWQG.

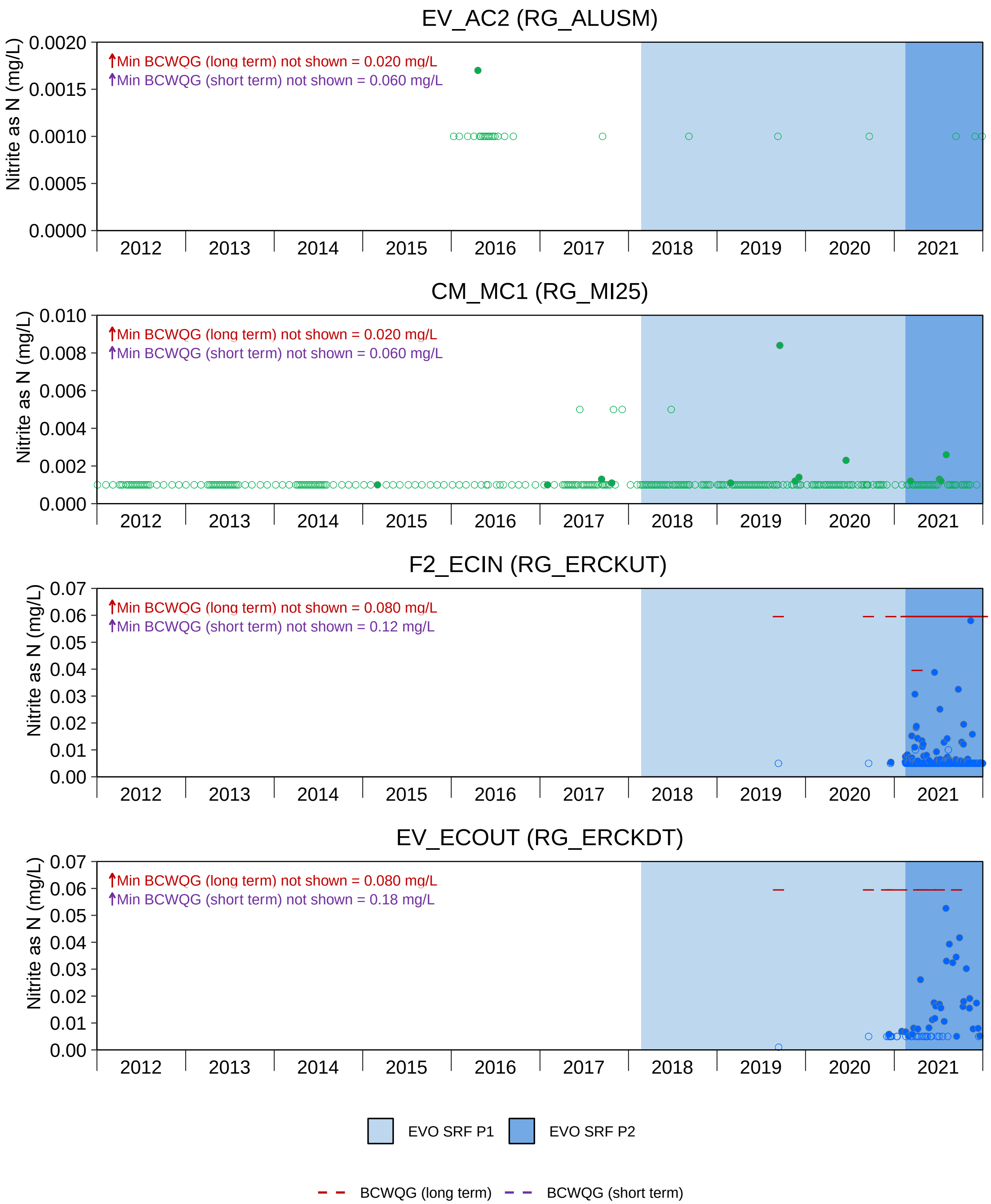

Figure D.5: Time Series Plots for Nitrite as N from EVO LAEMP Areas, 2012 to 2021

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

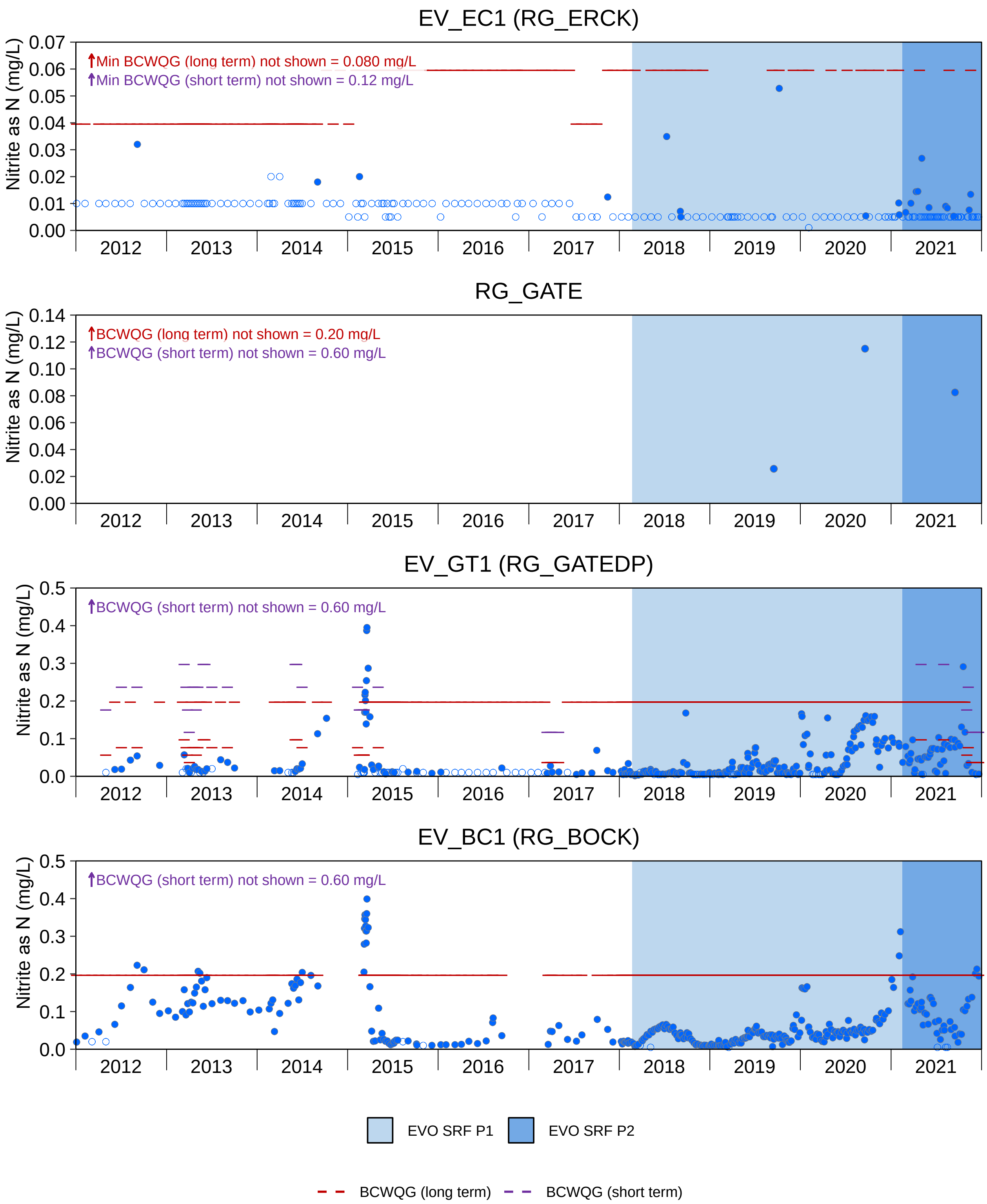

Figure D.5: Time Series Plots for Nitrite as N from EVO LAEMP Areas, 2012 to 2021

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

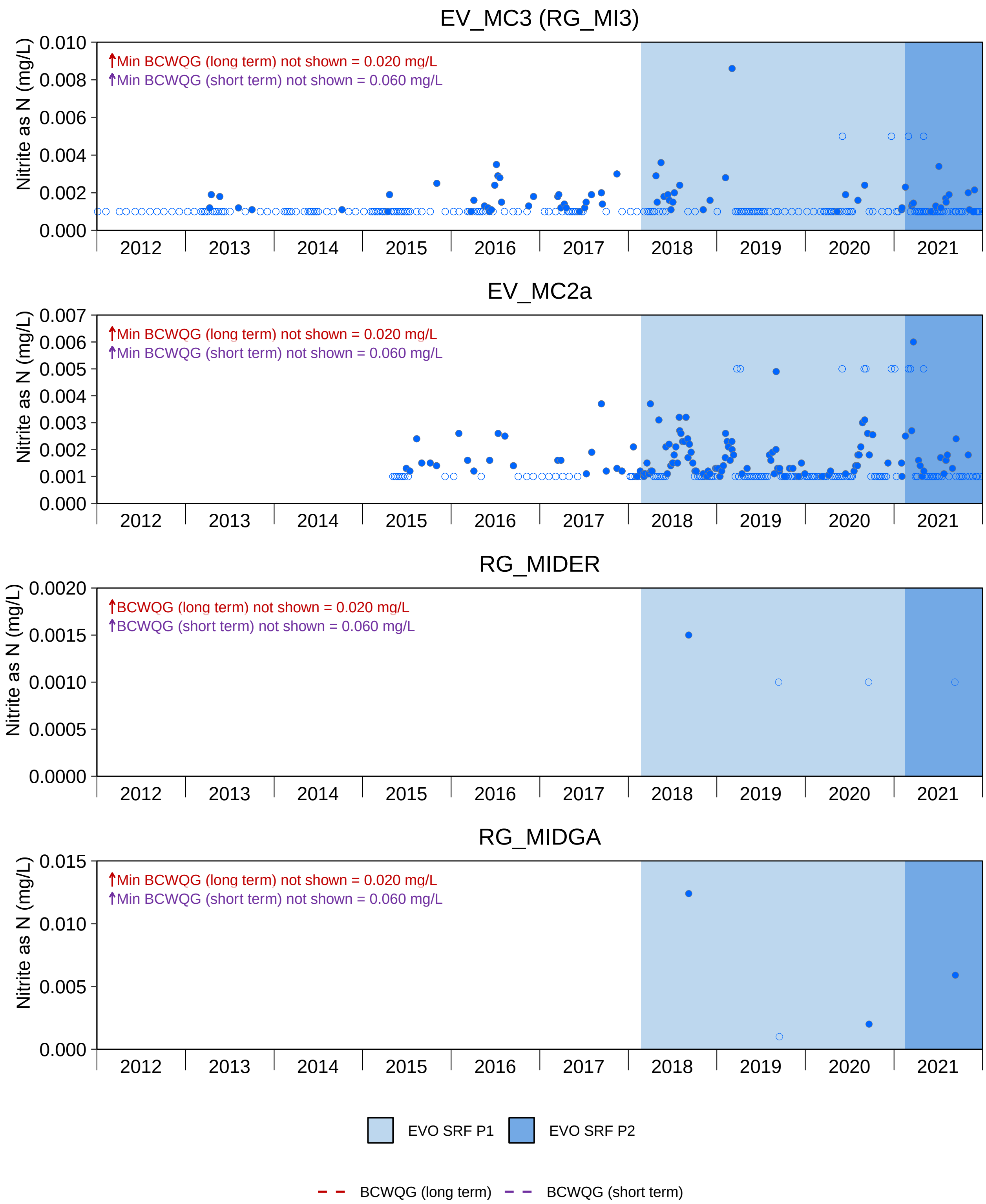

Figure D.5: Time Series Plots for Nitrite as N from EVO LAEMP Areas, 2012 to 2021

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

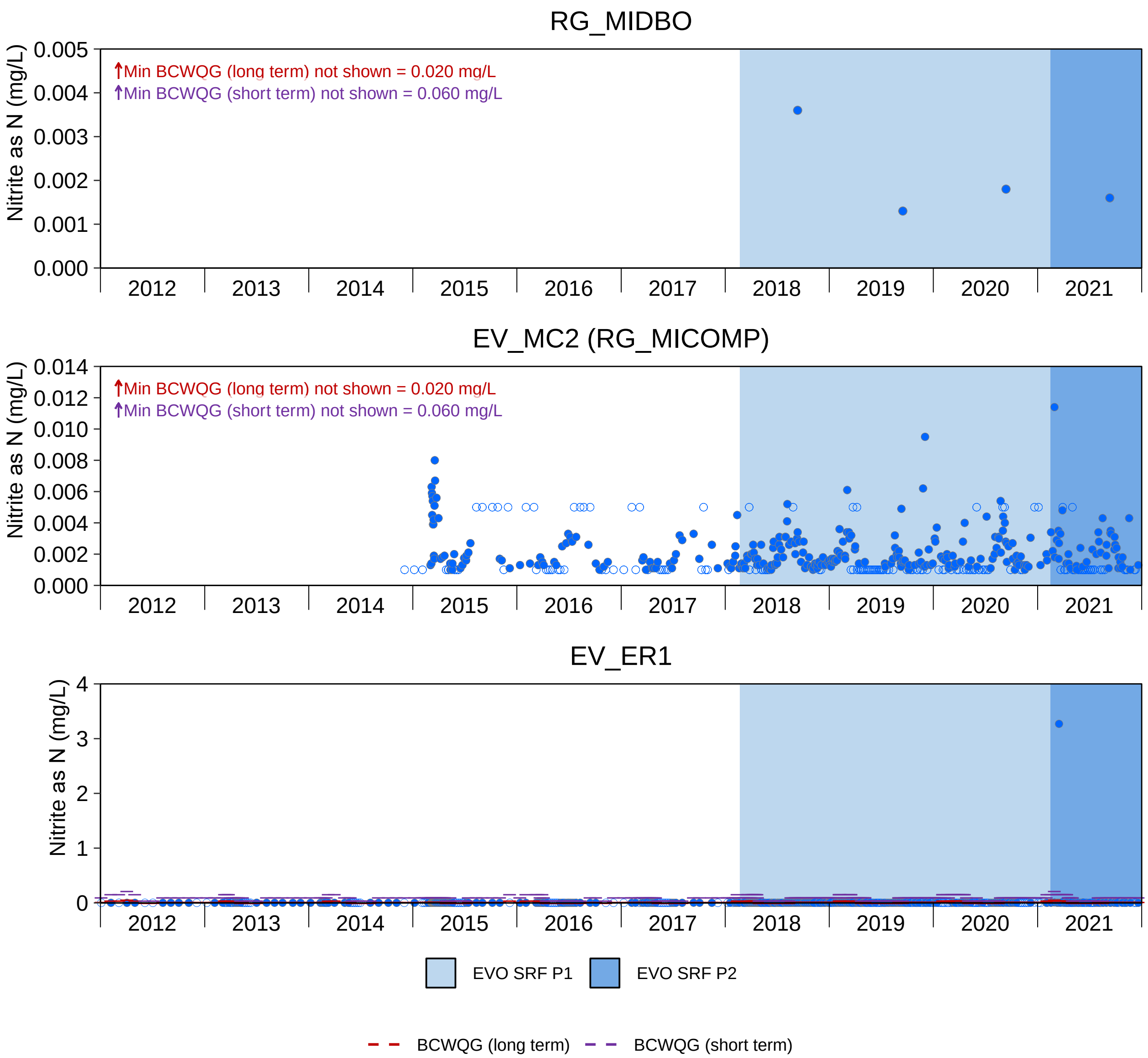

Figure D.5: Time Series Plots for Nitrite as N from EVO LAEMP Areas, 2012 to 2021

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

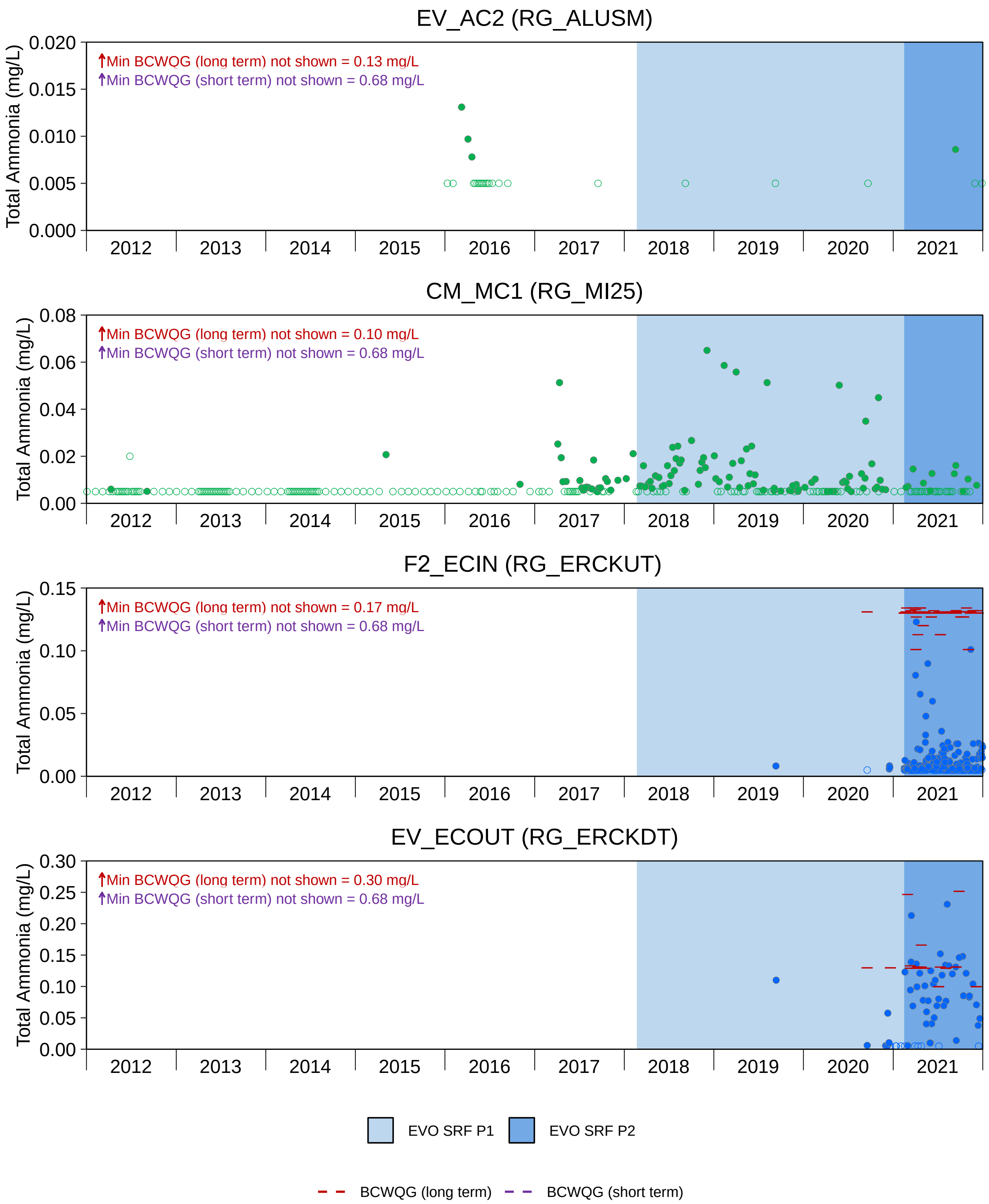

Figure D.6: Time Series Plots for Total Ammonia from EVO LAEMP Areas, 2012 to 2021

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

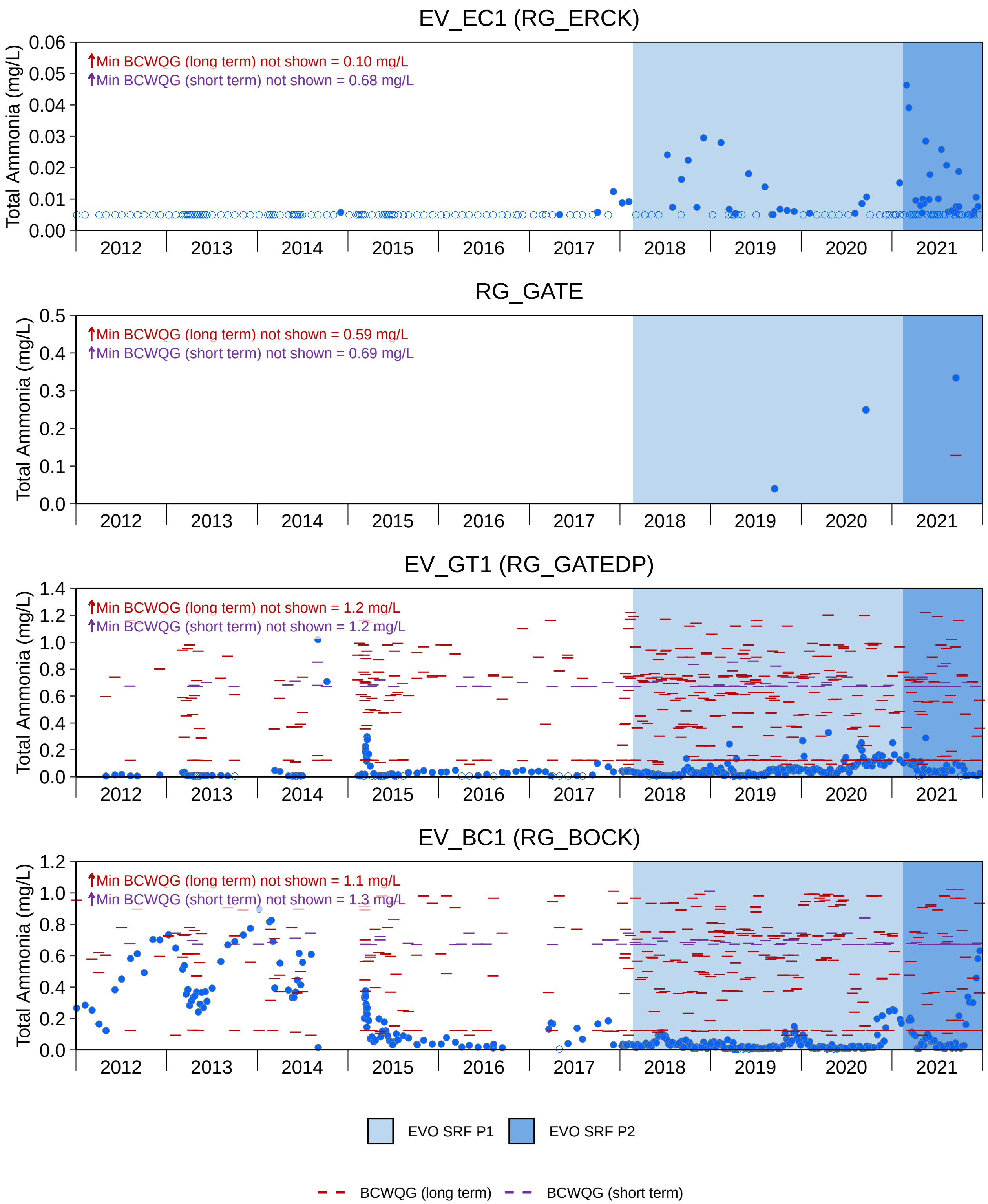

Figure D.6: Time Series Plots for Total Ammonia from EVO LAEMP Areas, 2012 to 2021

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

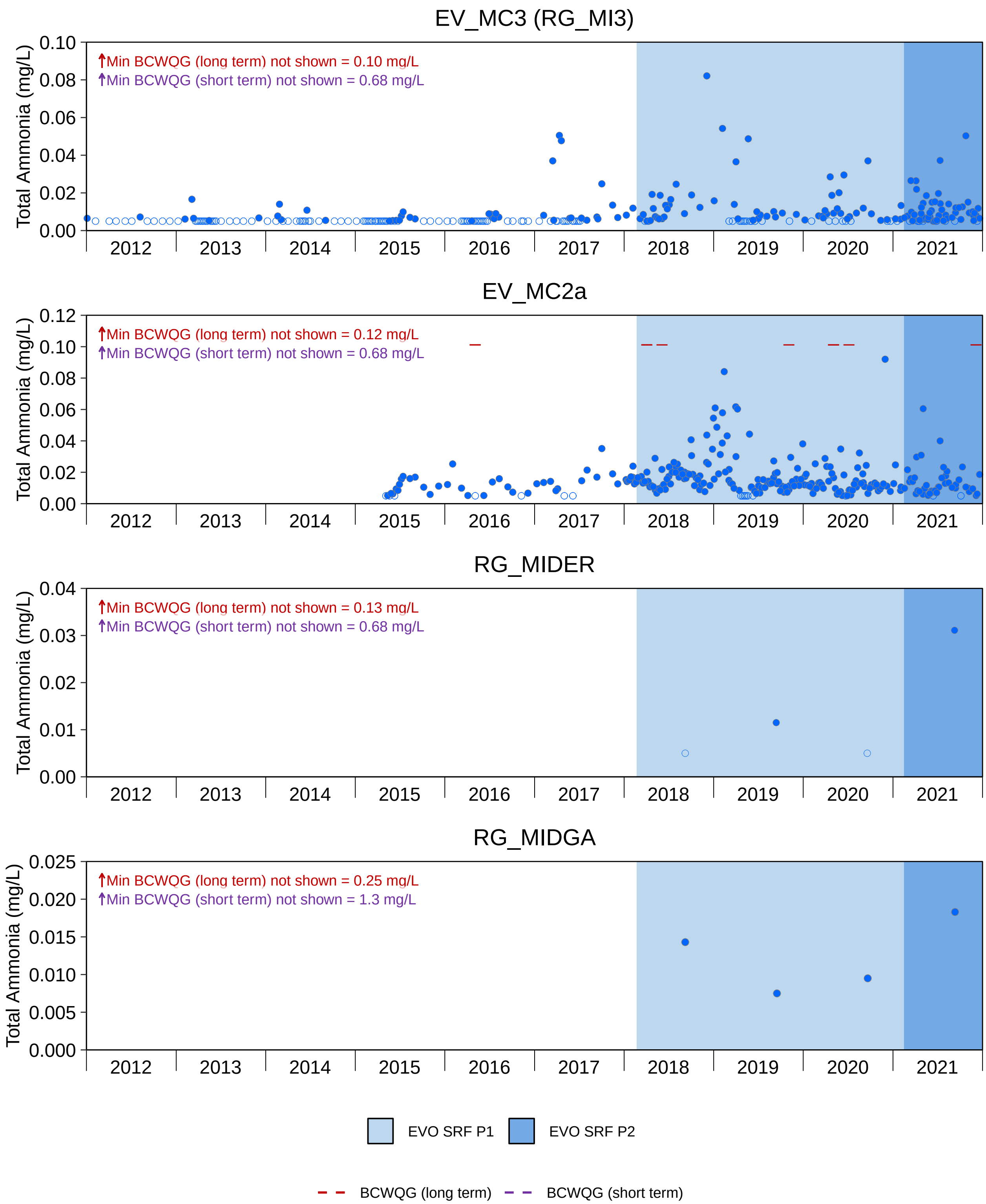

Figure D.6: Time Series Plots for Total Ammonia from EVO LAEMP Areas, 2012 to 2021

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

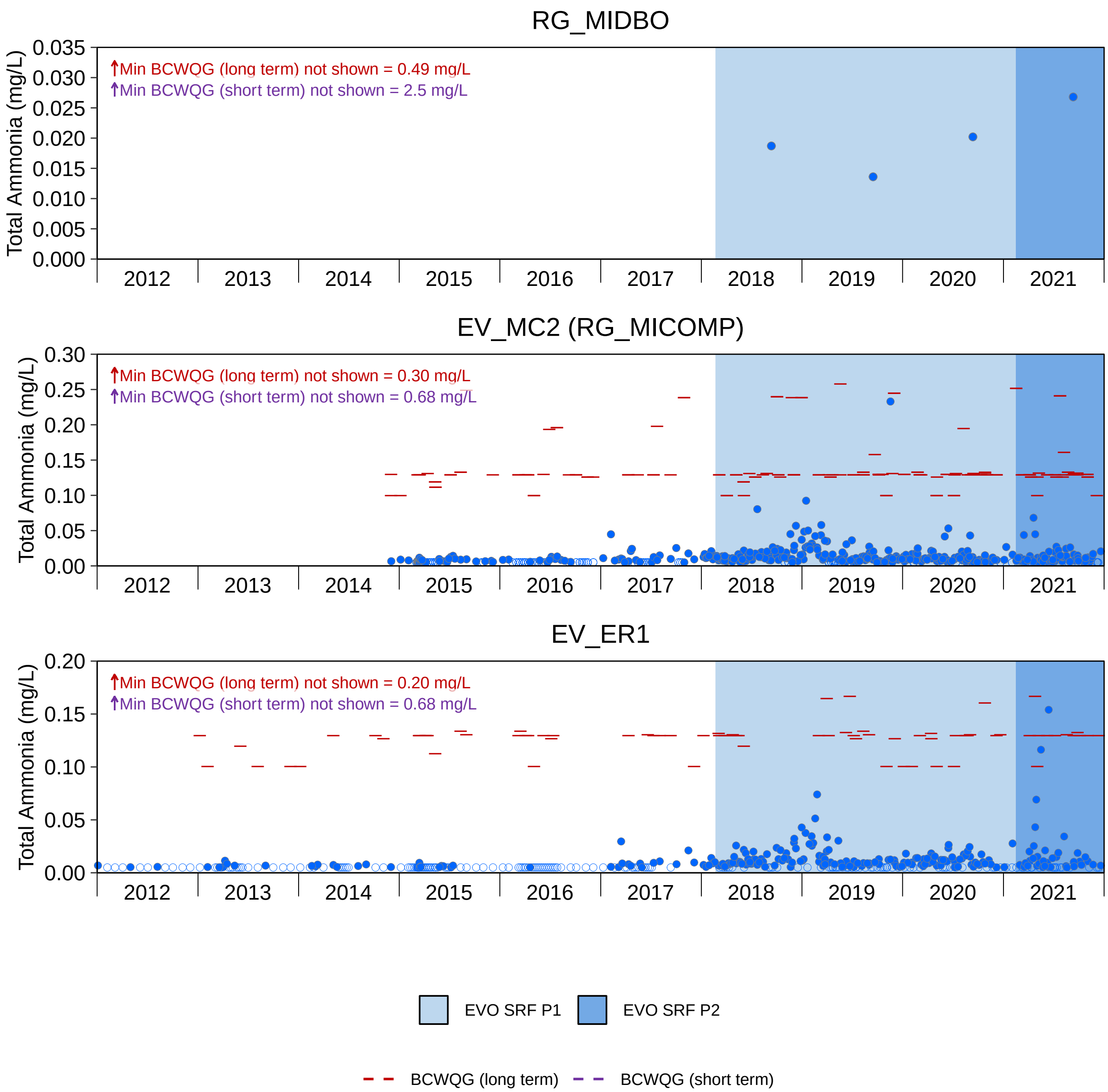

Figure D.6: Time Series Plots for Total Ammonia from EVO LAEMP Areas, 2012 to 2021

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

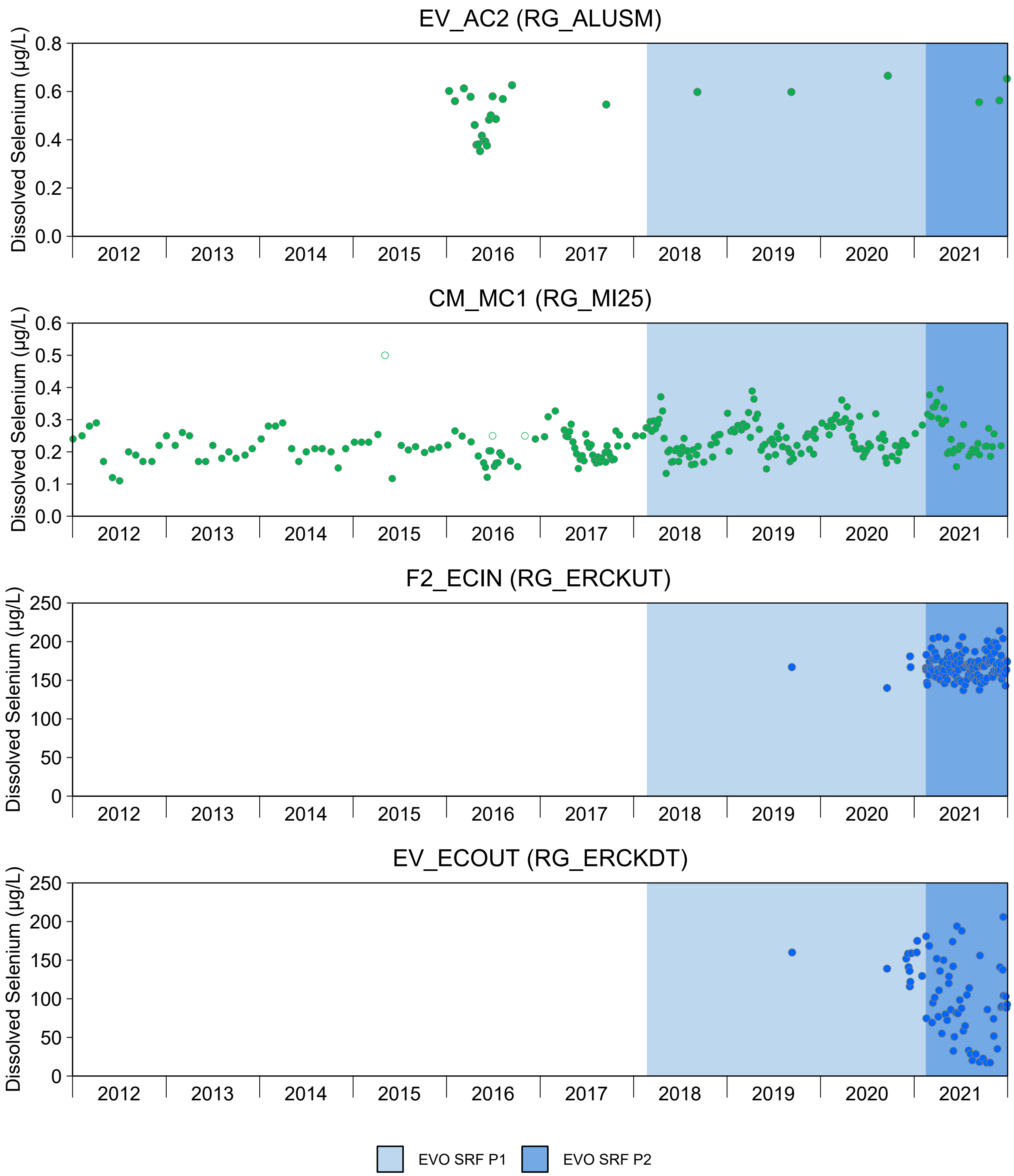

Figure D.7: Time Series Plots for Dissolved Selenium from EVO LAEMP Areas, 2012 to 2021

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).

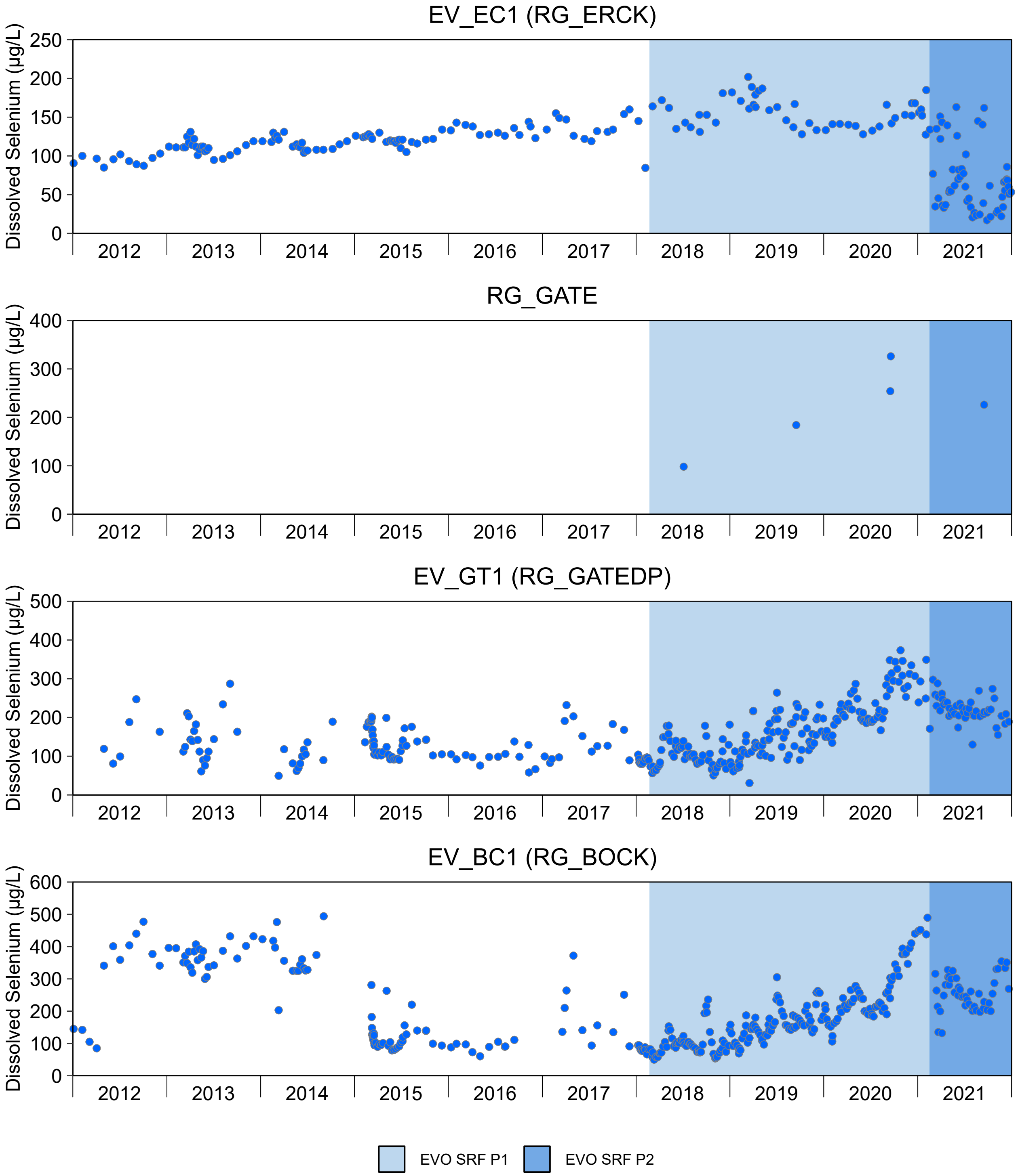

Figure D.7: Time Series Plots for Dissolved Selenium from EVO LAEMP Areas, 2012 to 2021

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).

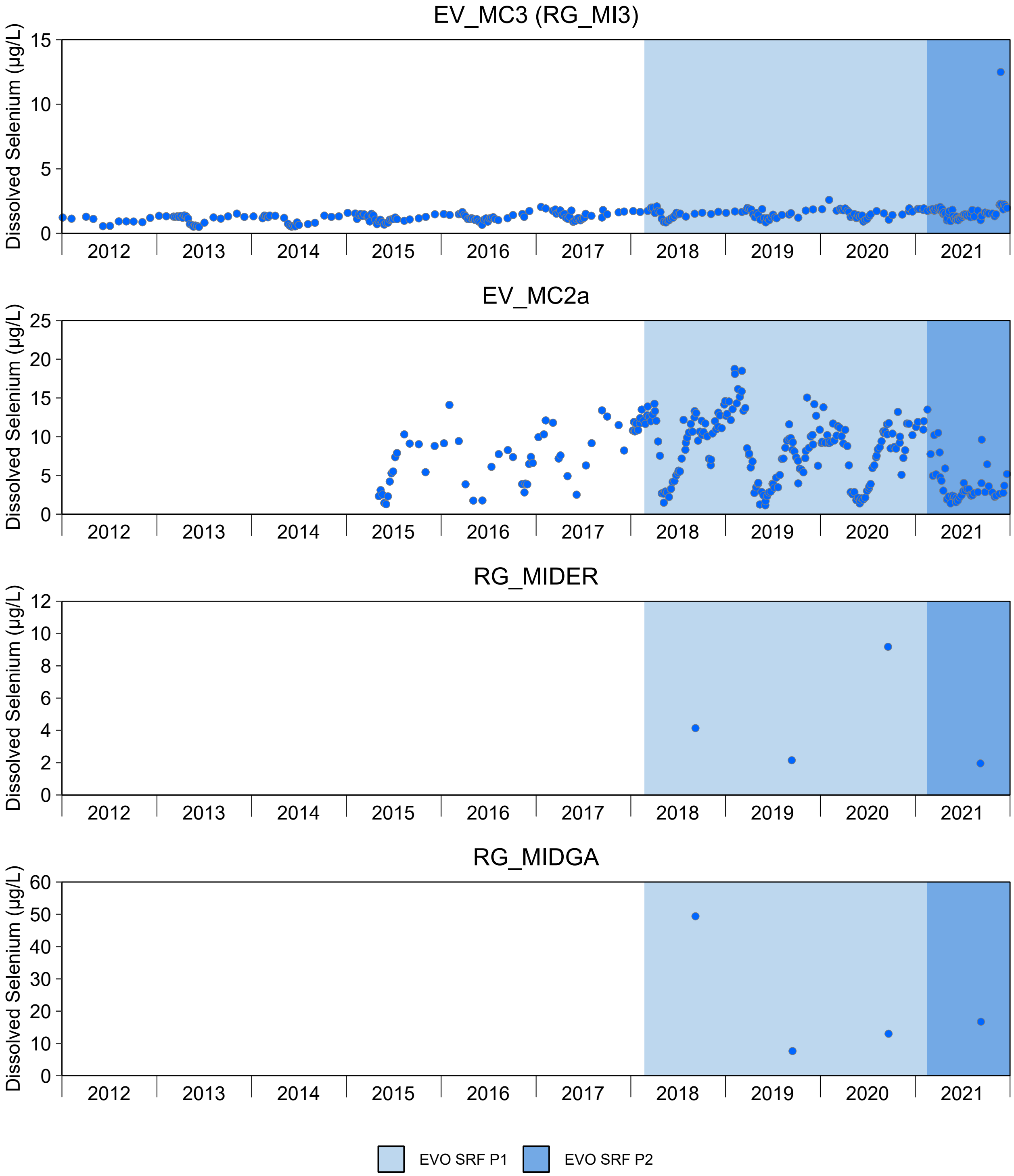

Figure D.7: Time Series Plots for Dissolved Selenium from EVO LAEMP Areas, 2012 to 2021

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).

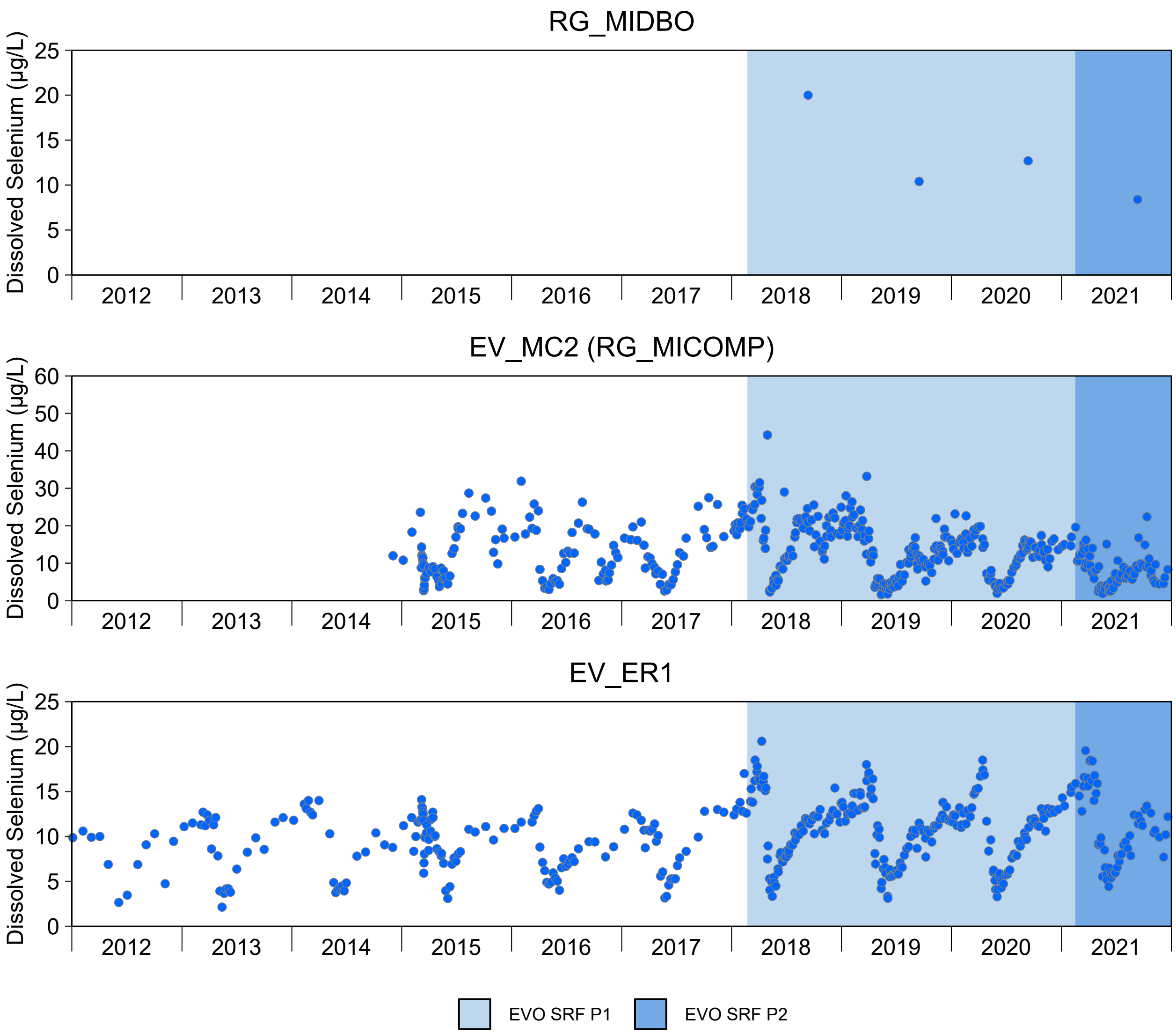

Figure D.7: Time Series Plots for Dissolved Selenium from EVO LAEMP Areas, 2012 to 2021

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).

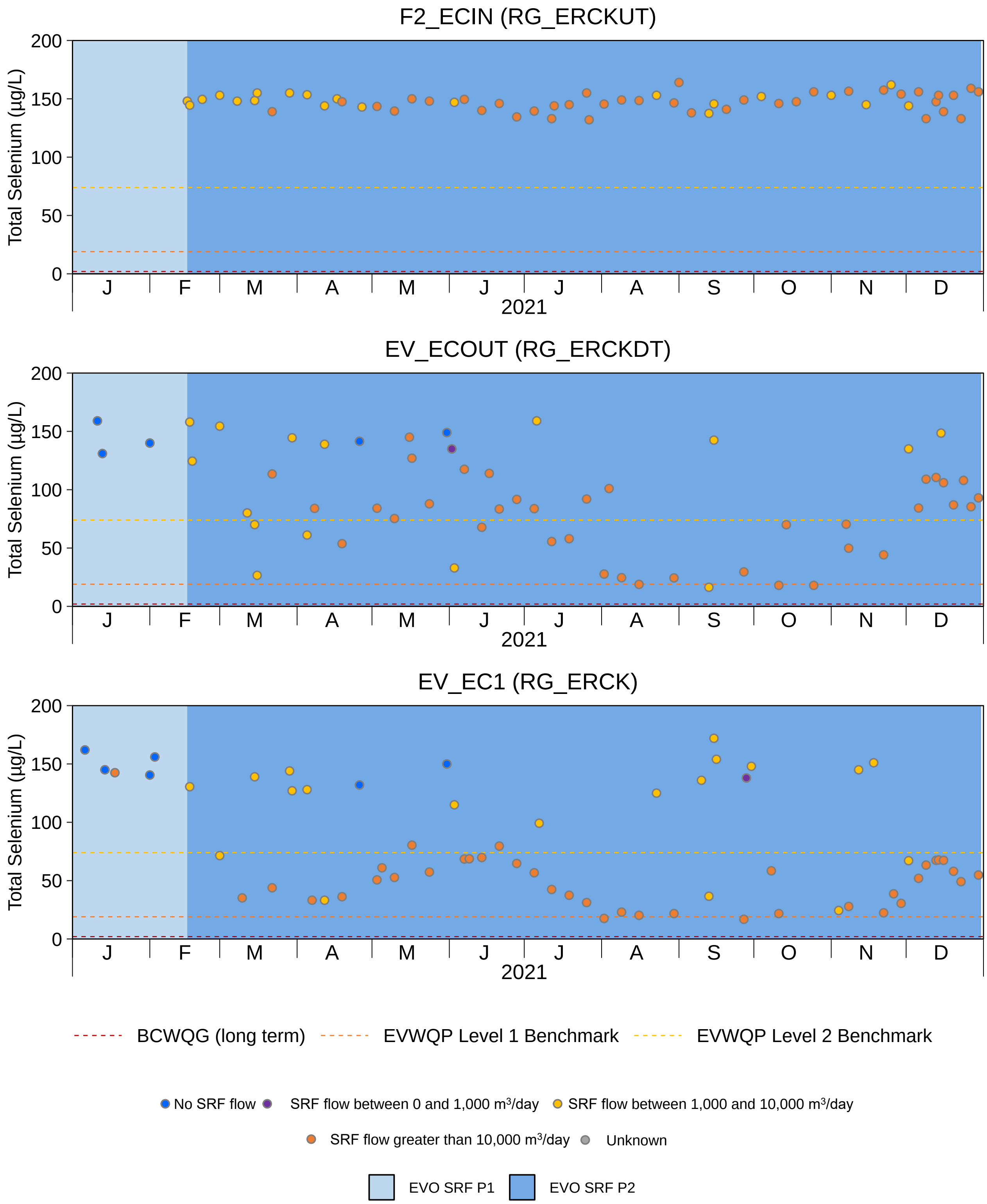

Figure D.8: Total Selenium Concentration EVO LAEMP Compared to Flow, 2021

Note: SRF = Saturated Rock Fill.

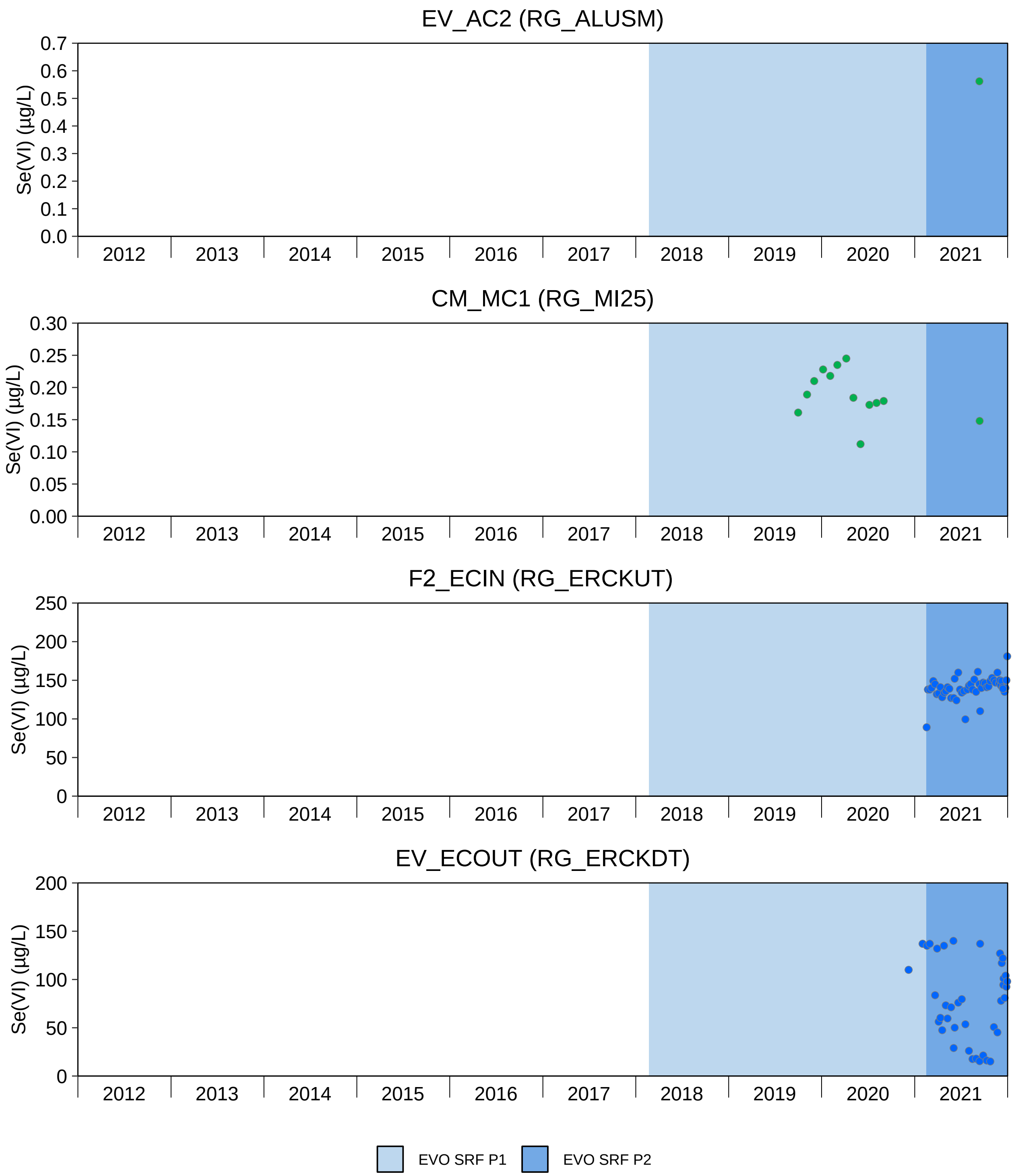

Figure D.9: Time Series Plots for Selenate from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

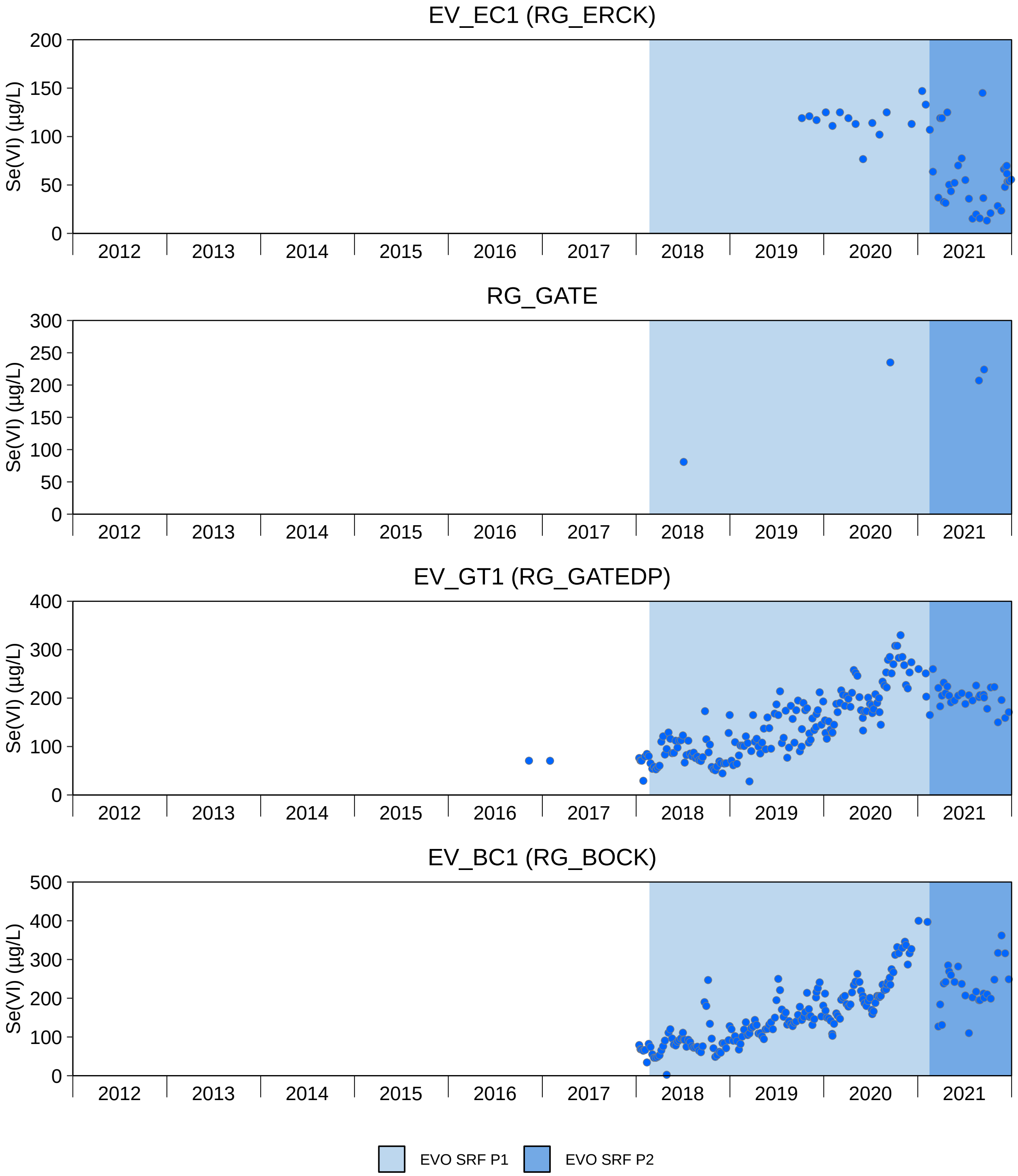

Figure D.9: Time Series Plots for Selenate from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

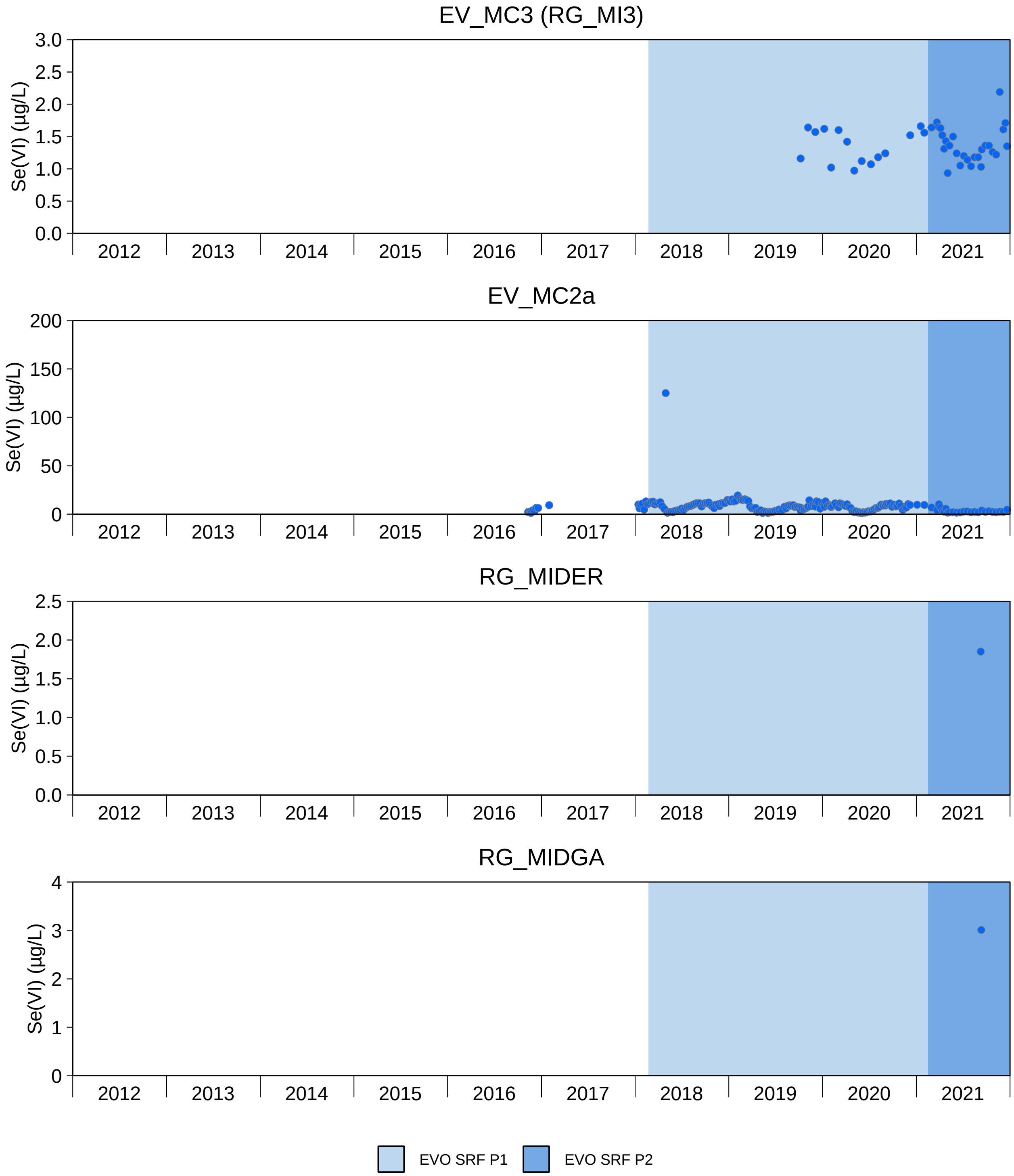

Figure D.9: Time Series Plots for Selenate from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

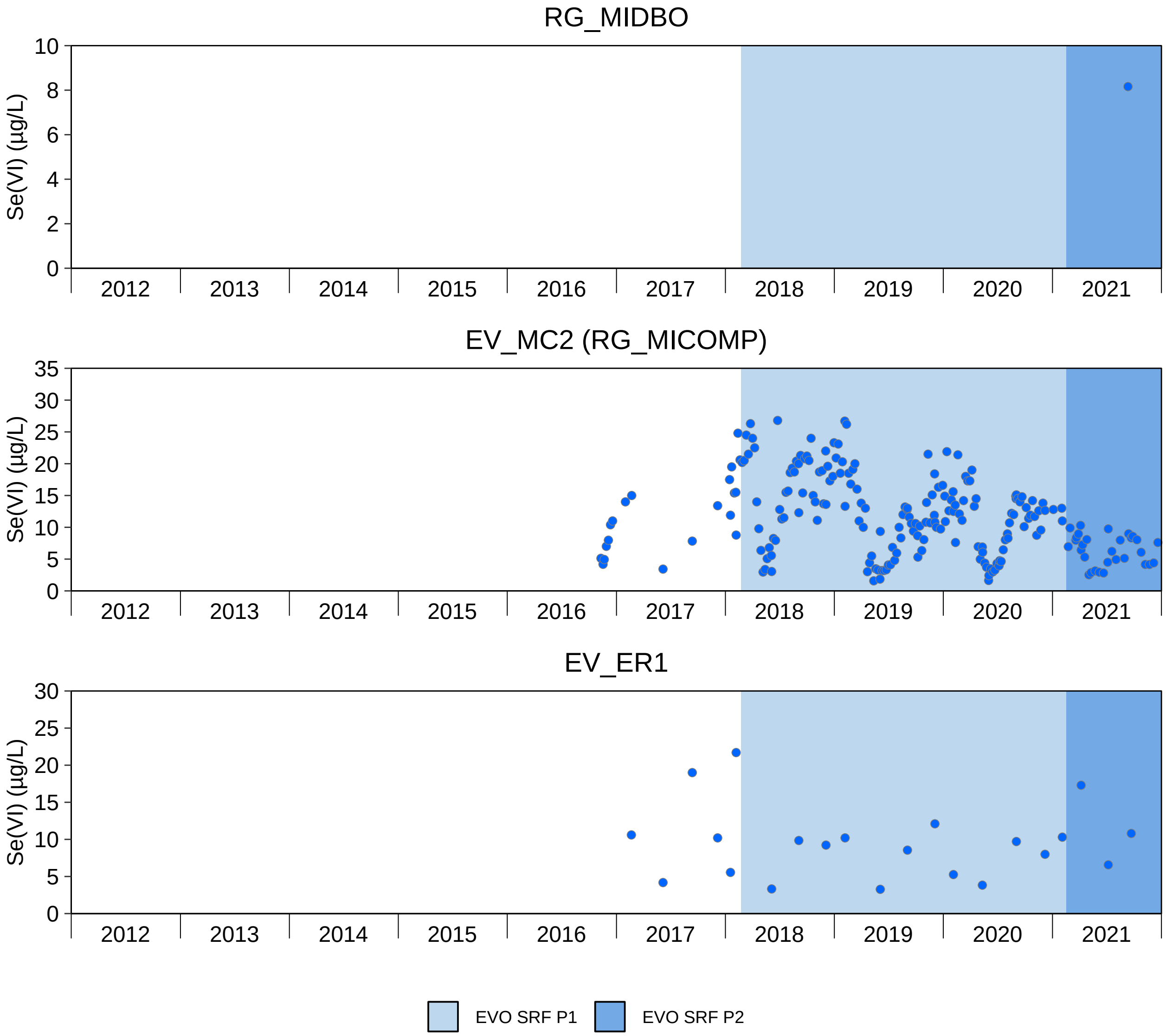

Figure D.9: Time Series Plots for Selenate from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

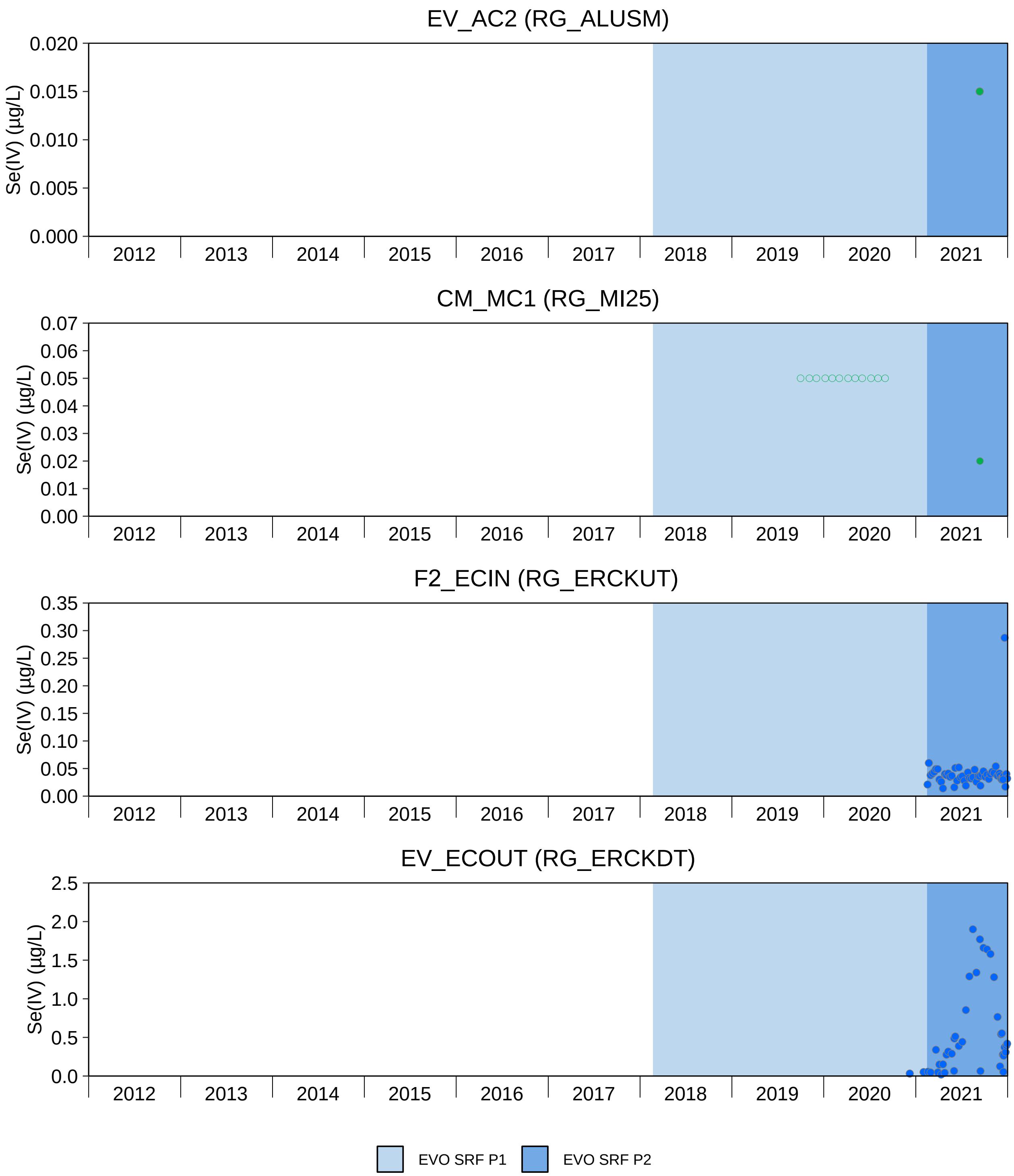

Figure D.10: Time Series Plots for Selenite from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

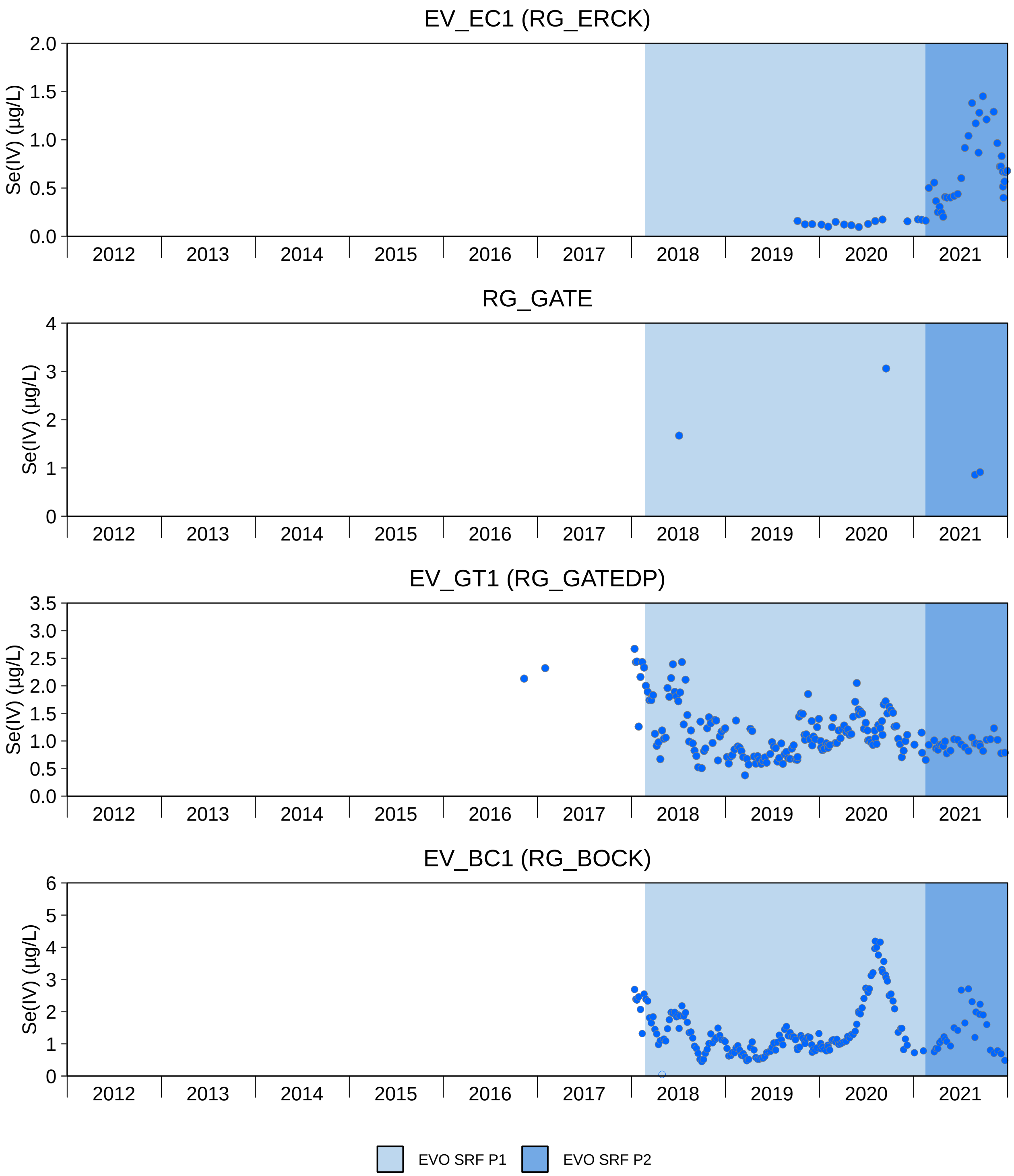

Figure D.10: Time Series Plots for Selenite from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

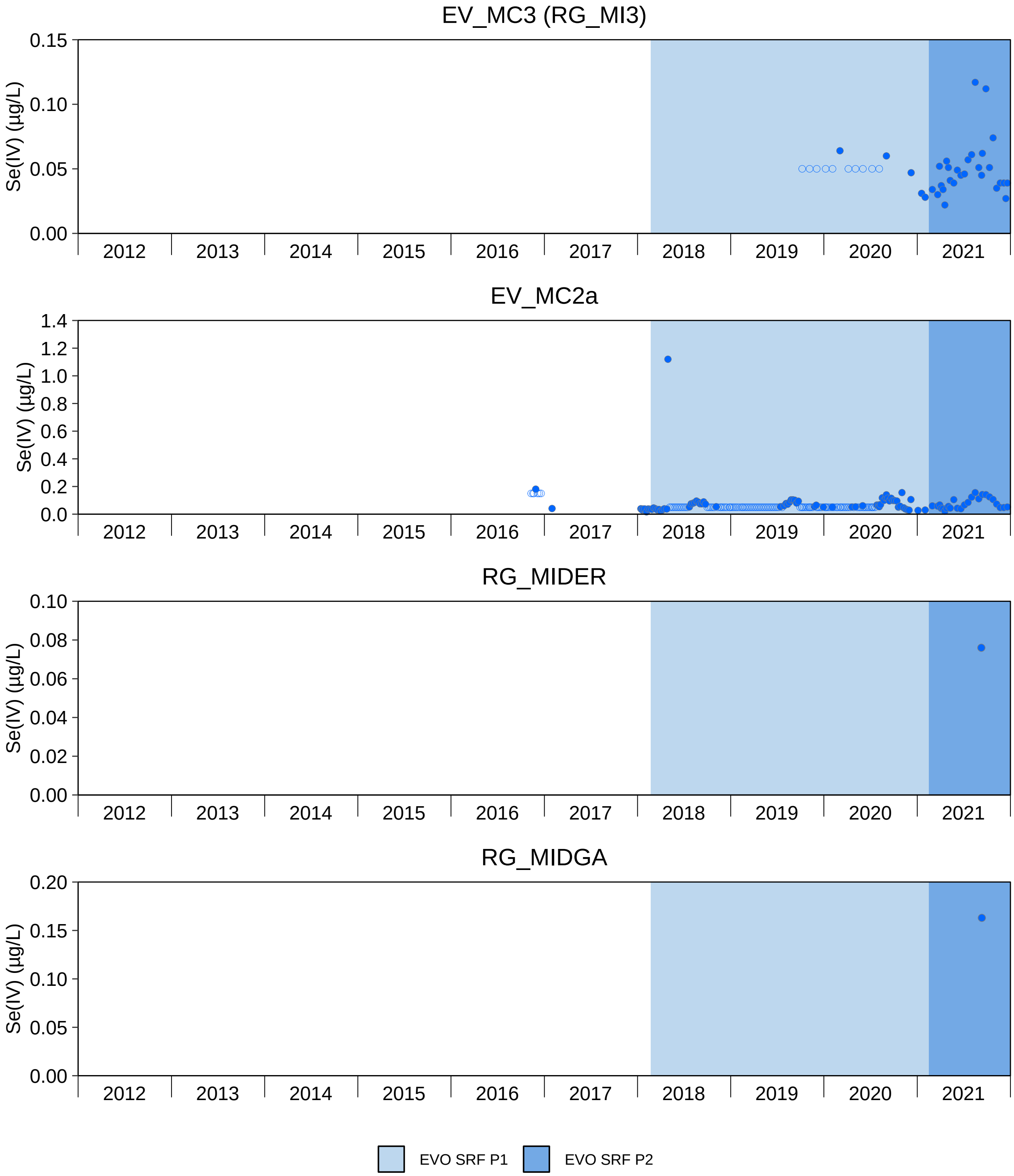

Figure D.10: Time Series Plots for Selenite from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

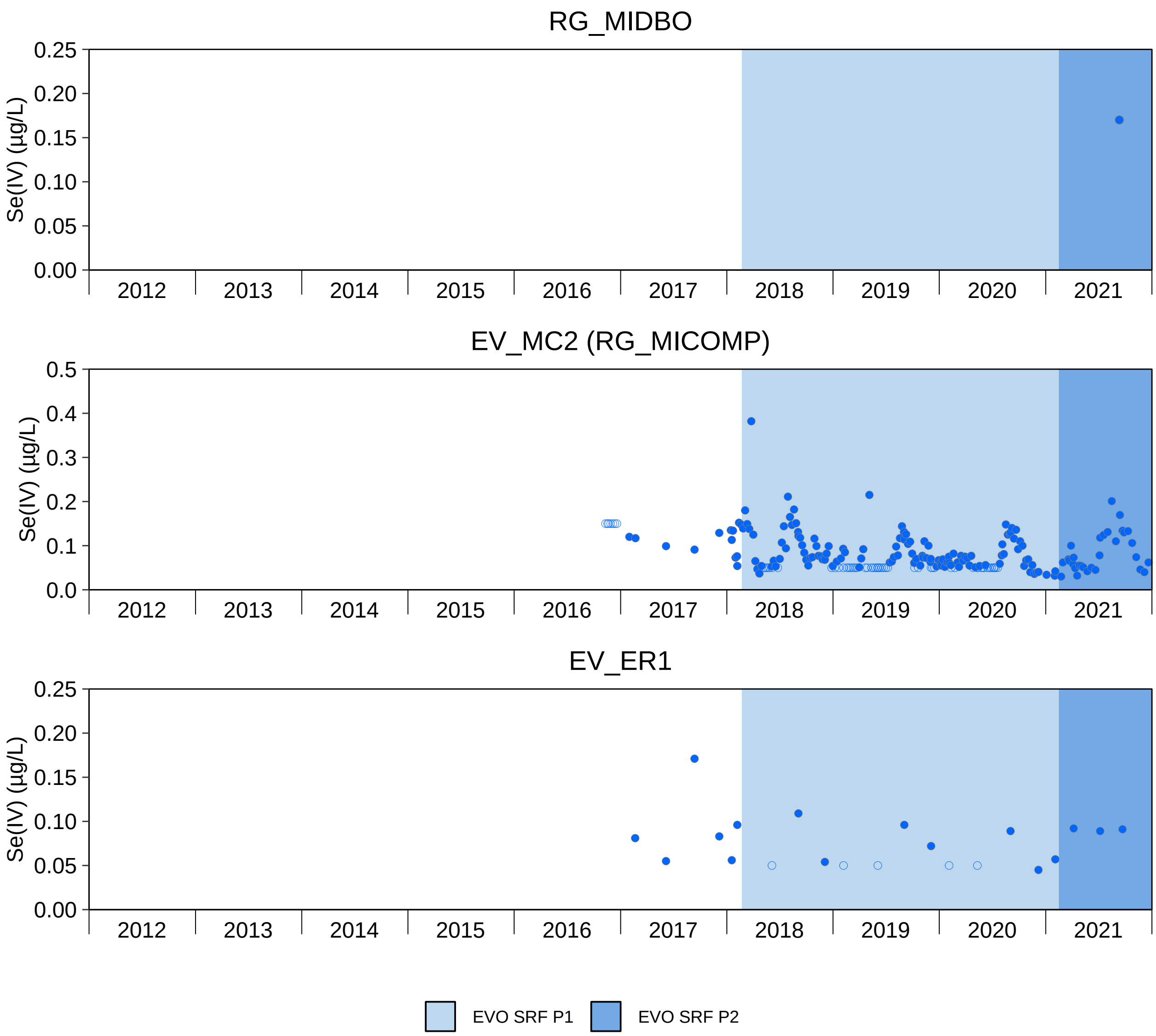

Figure D.10: Time Series Plots for Selenite from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

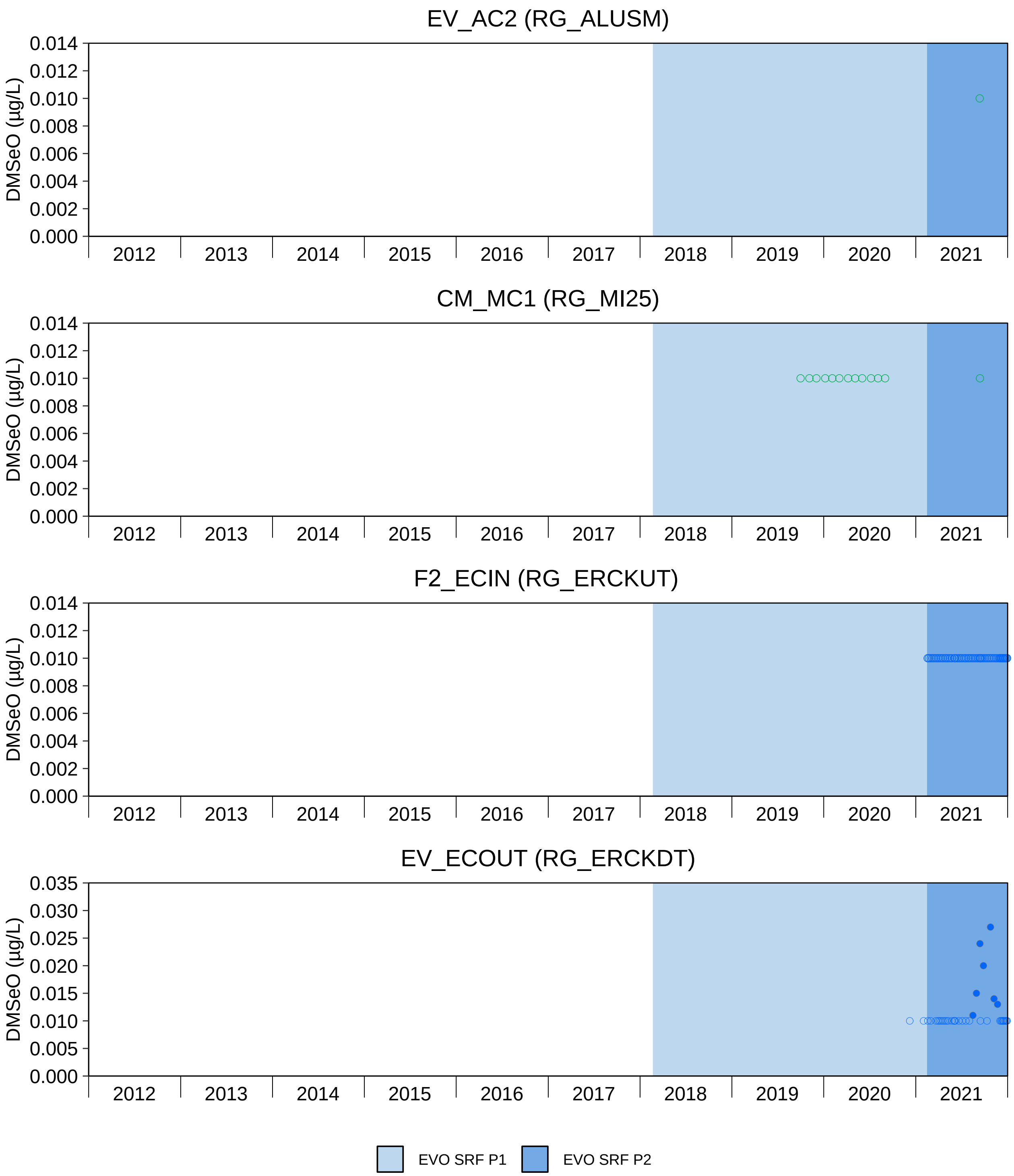

Figure D.11: Time Series Plots for Dimethylselenoxide from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

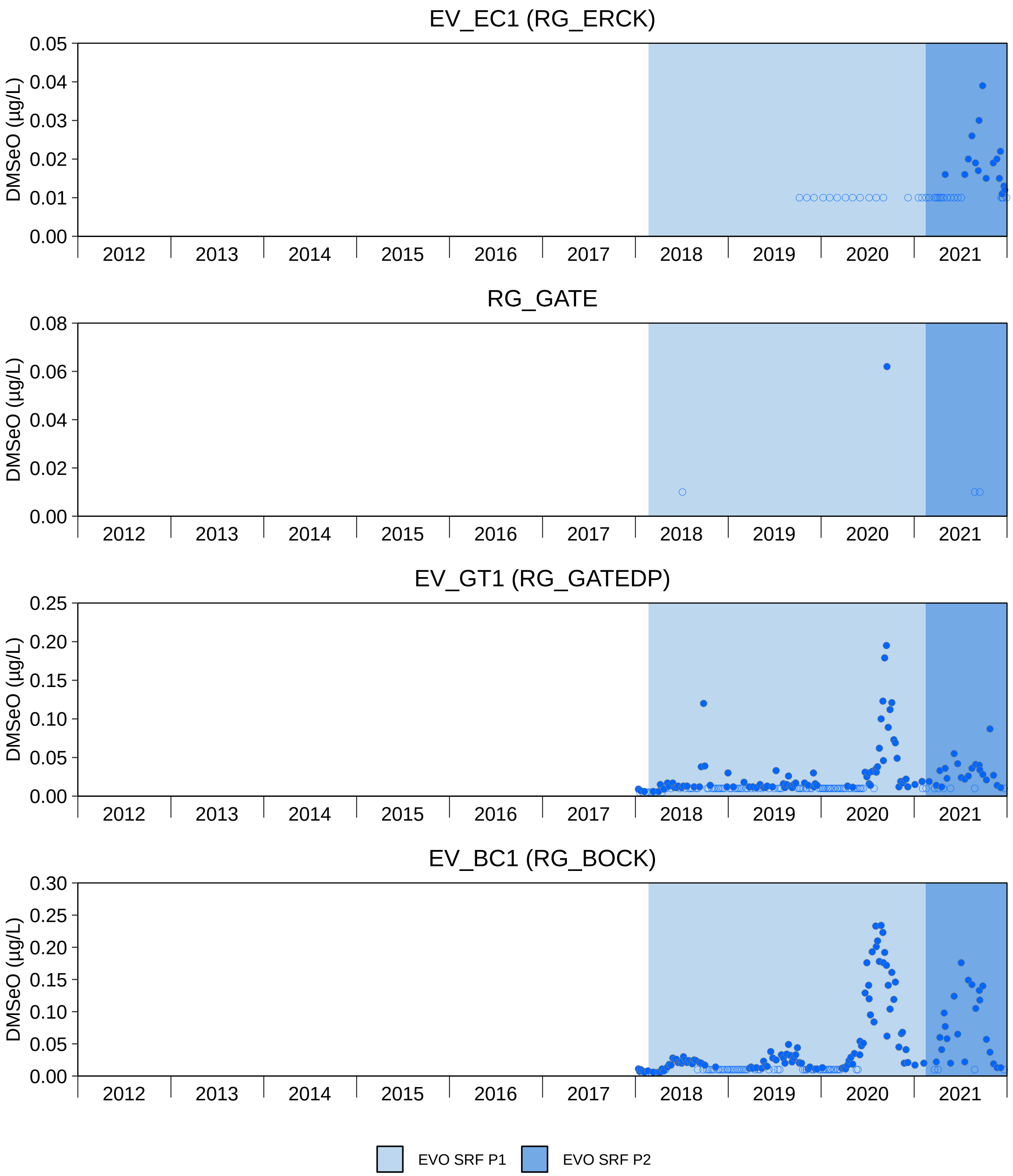

Figure D.11: Time Series Plots for Dimethylselenoxide from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

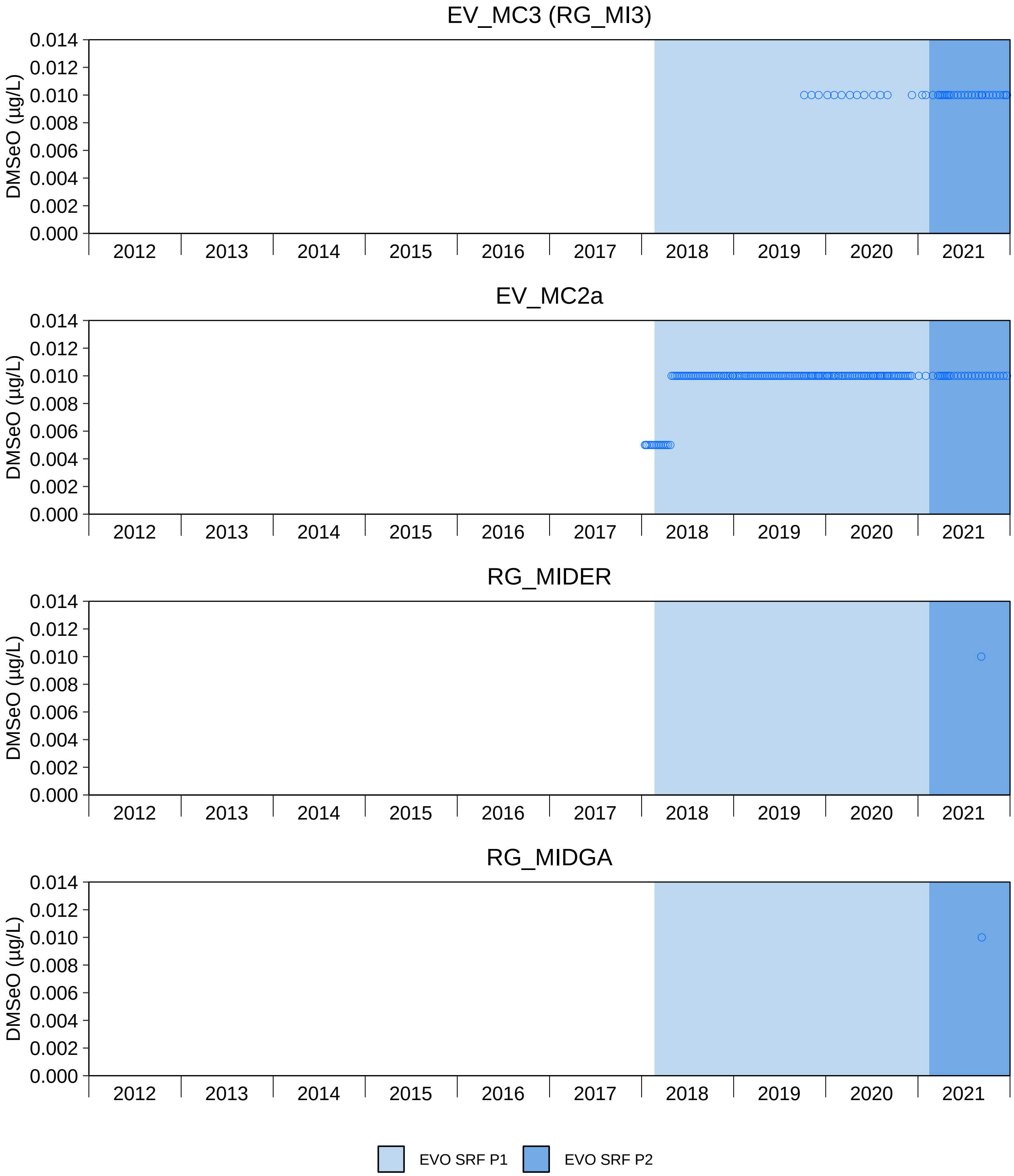

Figure D.11: Time Series Plots for Dimethylselenoxide from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

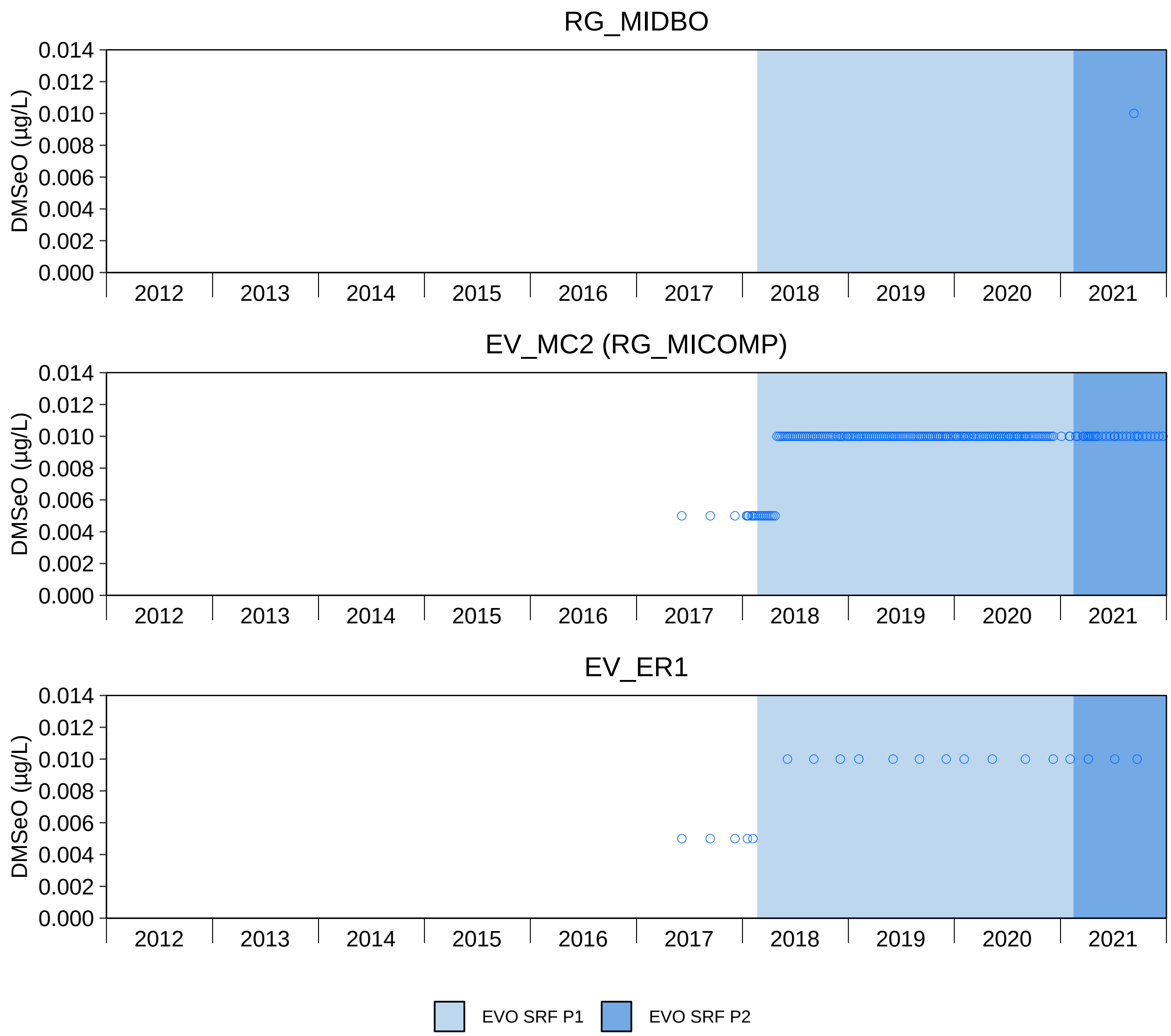

Figure D.11: Time Series Plots for Dimethylselenoxide from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

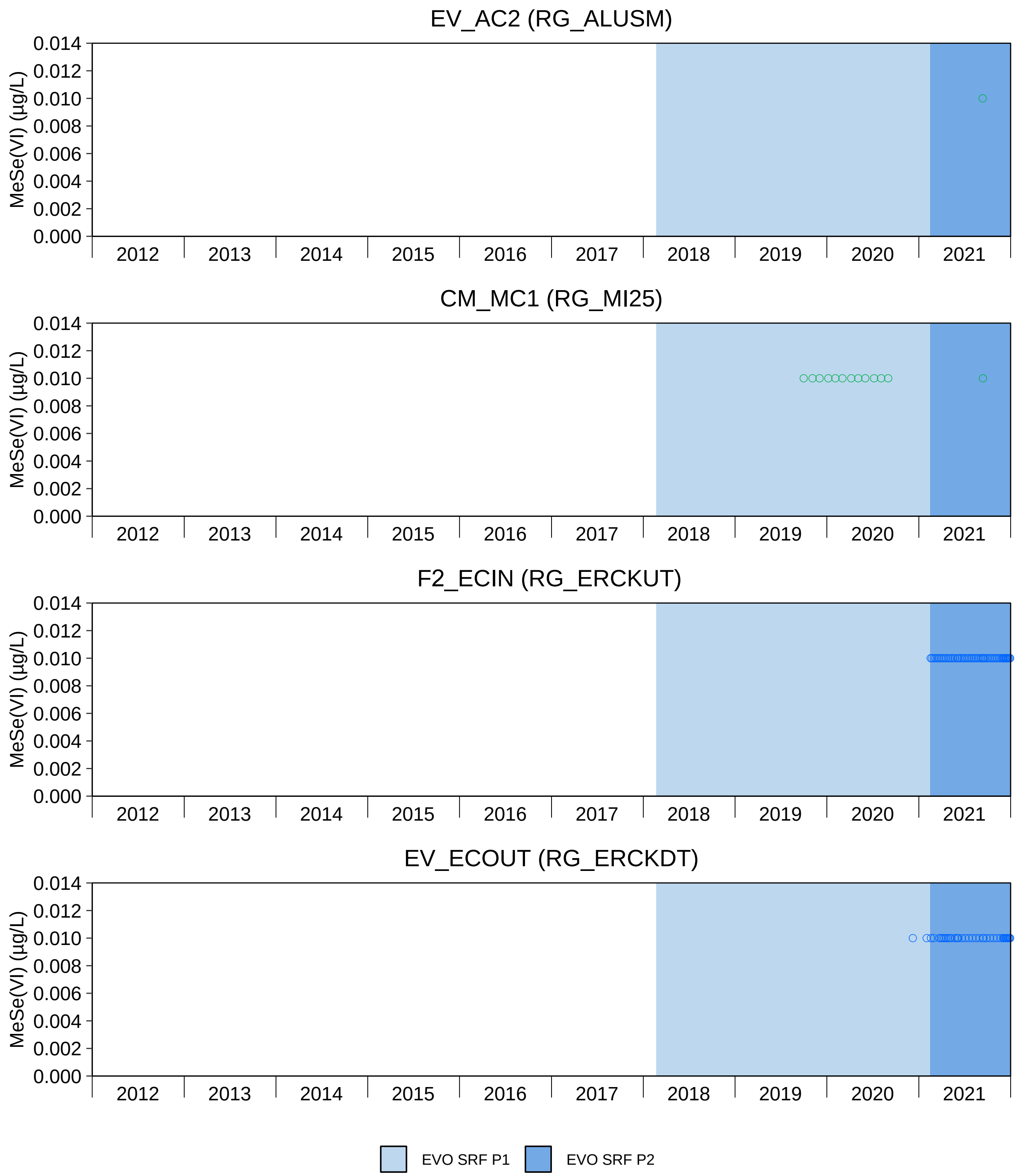

Figure D.12: Time Series Plots for Methaneselenonic Acid from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

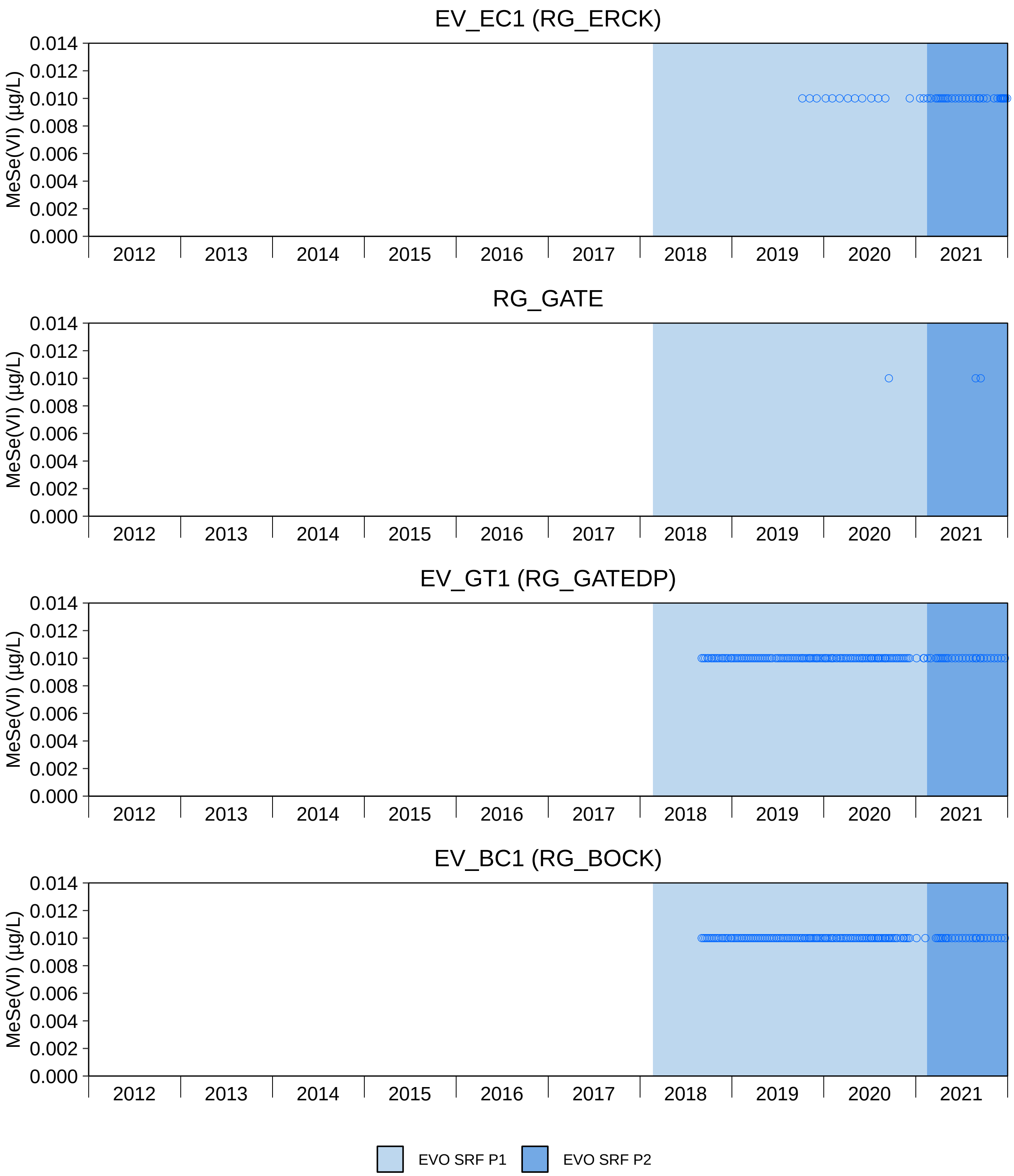

Figure D.12: Time Series Plots for Methaneselenonic Acid from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

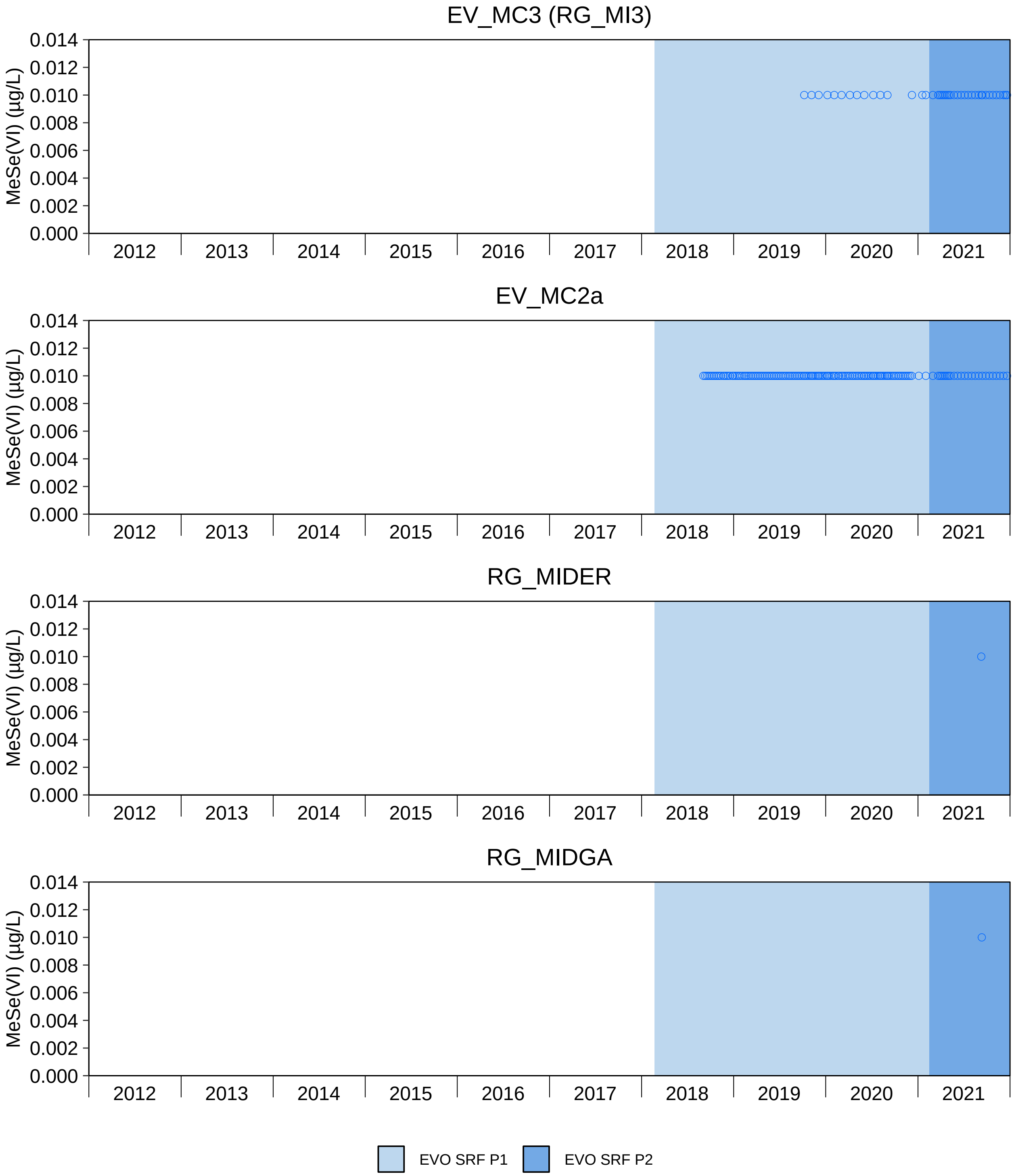

Figure D.12: **Time Series Plots for Methaneselenonic Acid from EVO LAEMP Areas, 2012 to 2021**

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

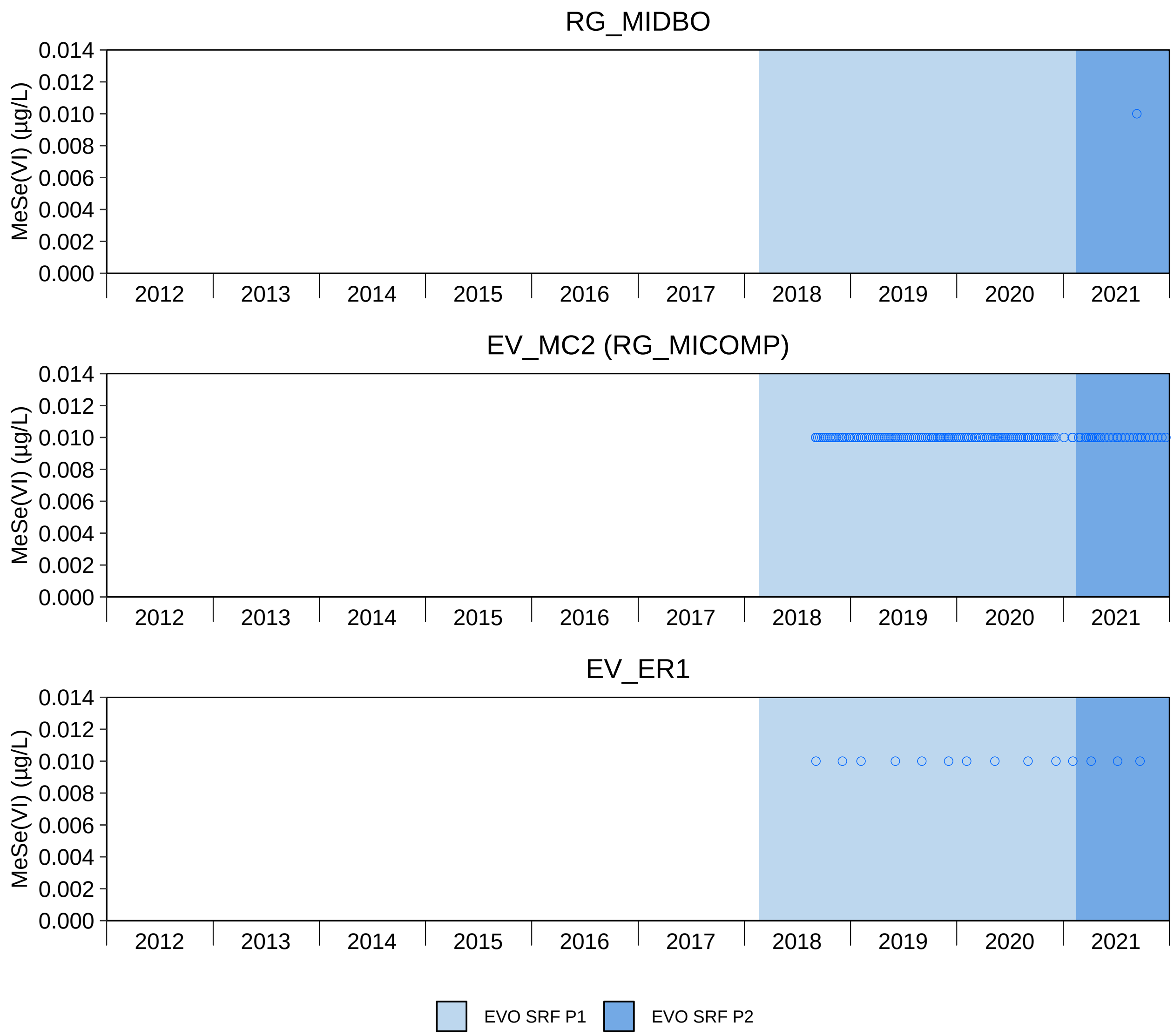

Figure D.12: Time Series Plots for Methaneselenonic Acid from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

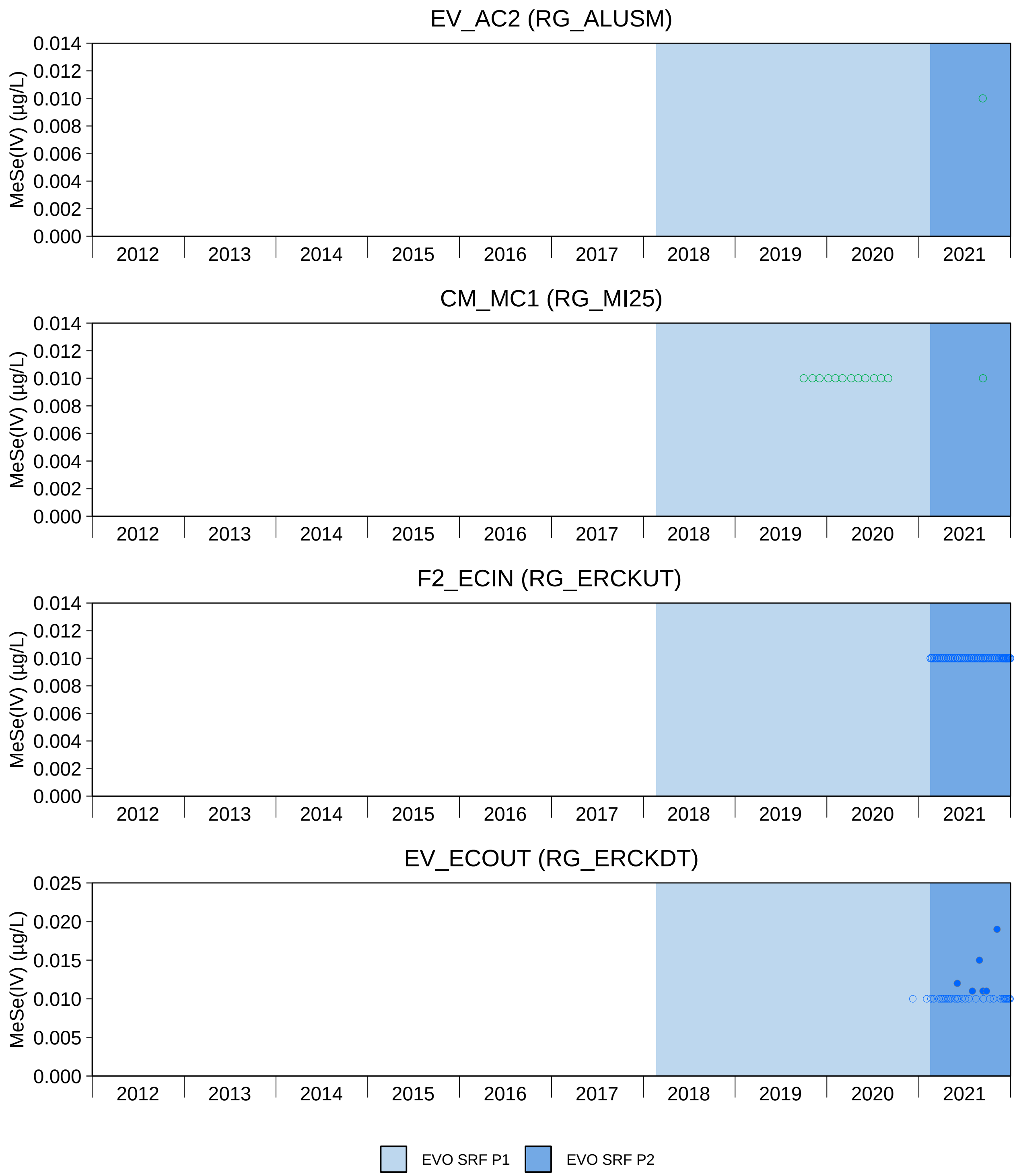

Figure D.13: Time Series Plots for Methylseleninic Acid from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

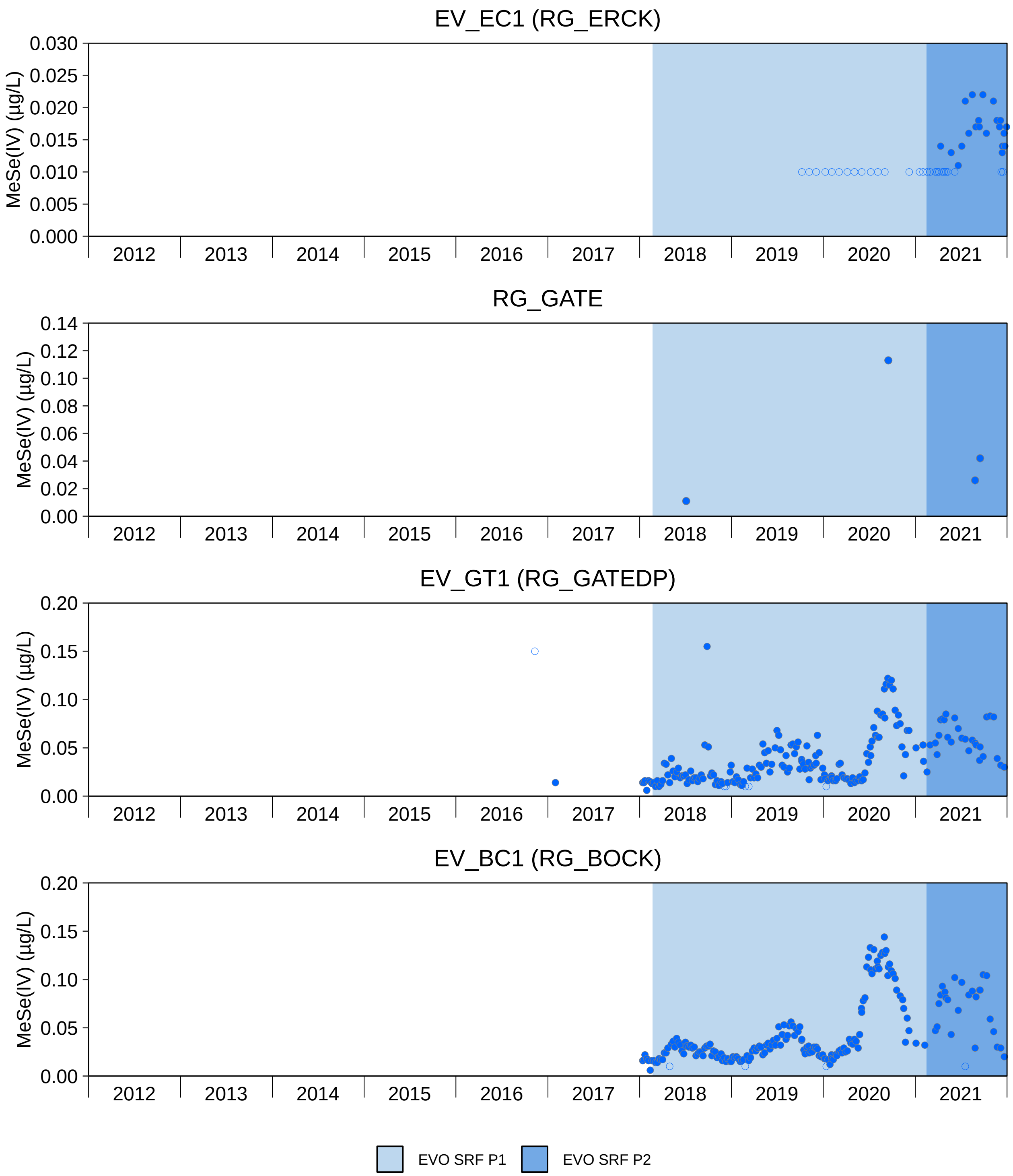

Figure D.13: Time Series Plots for Methylseleninic Acid from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

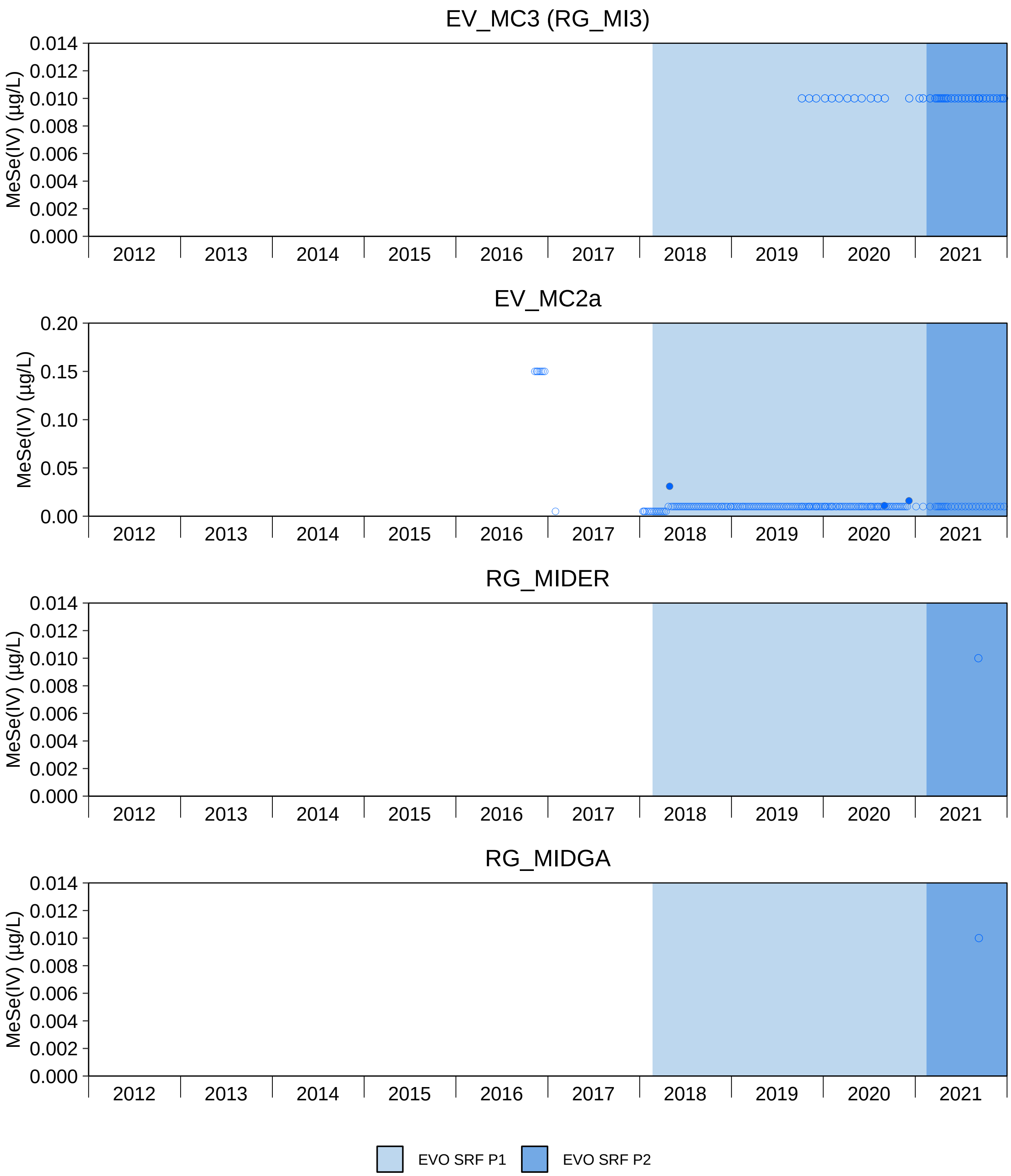

Figure D.13: Time Series Plots for Methylseleninic Acid from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

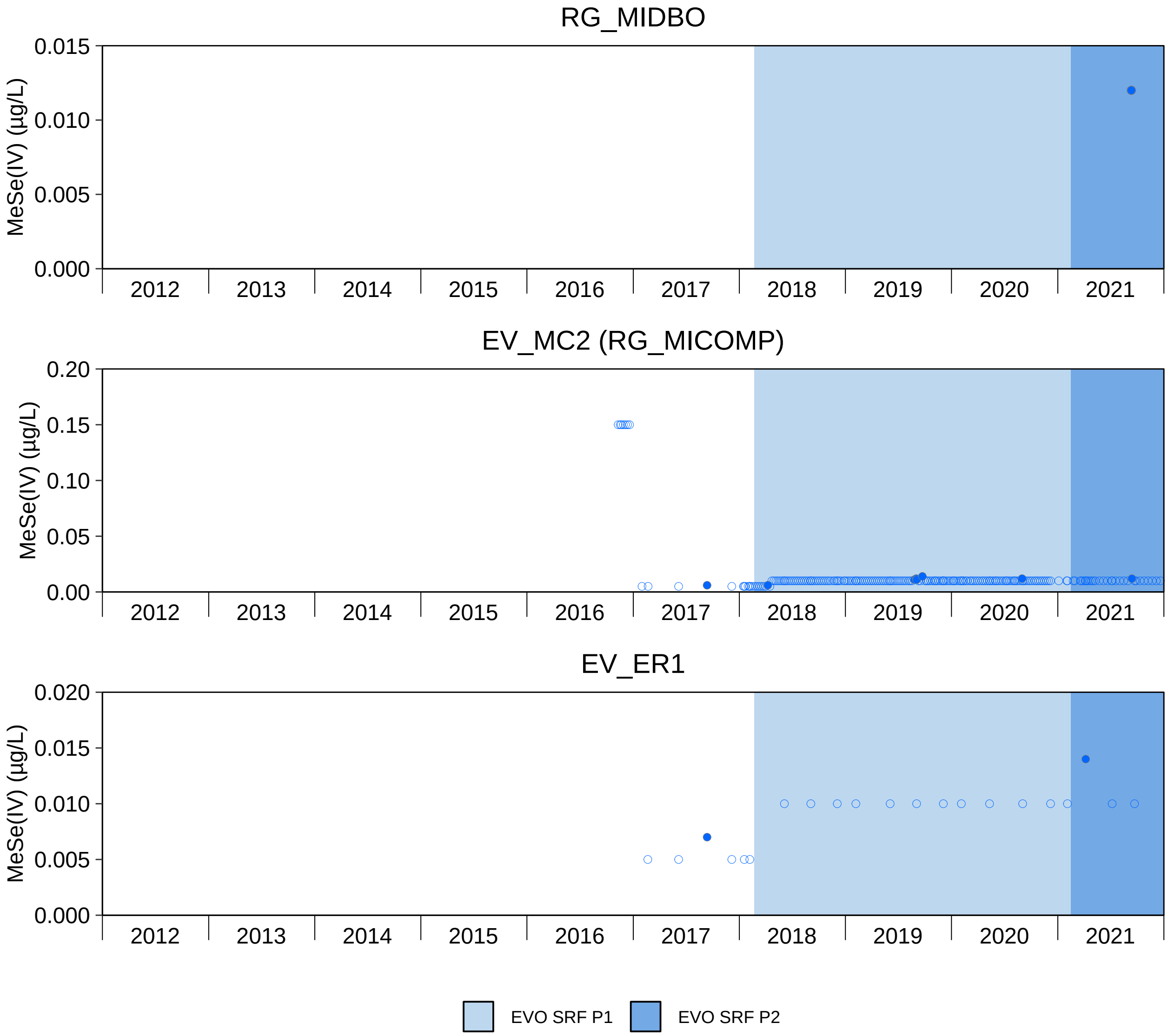

Figure D.13: Time Series Plots for Methylseleninic Acid from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

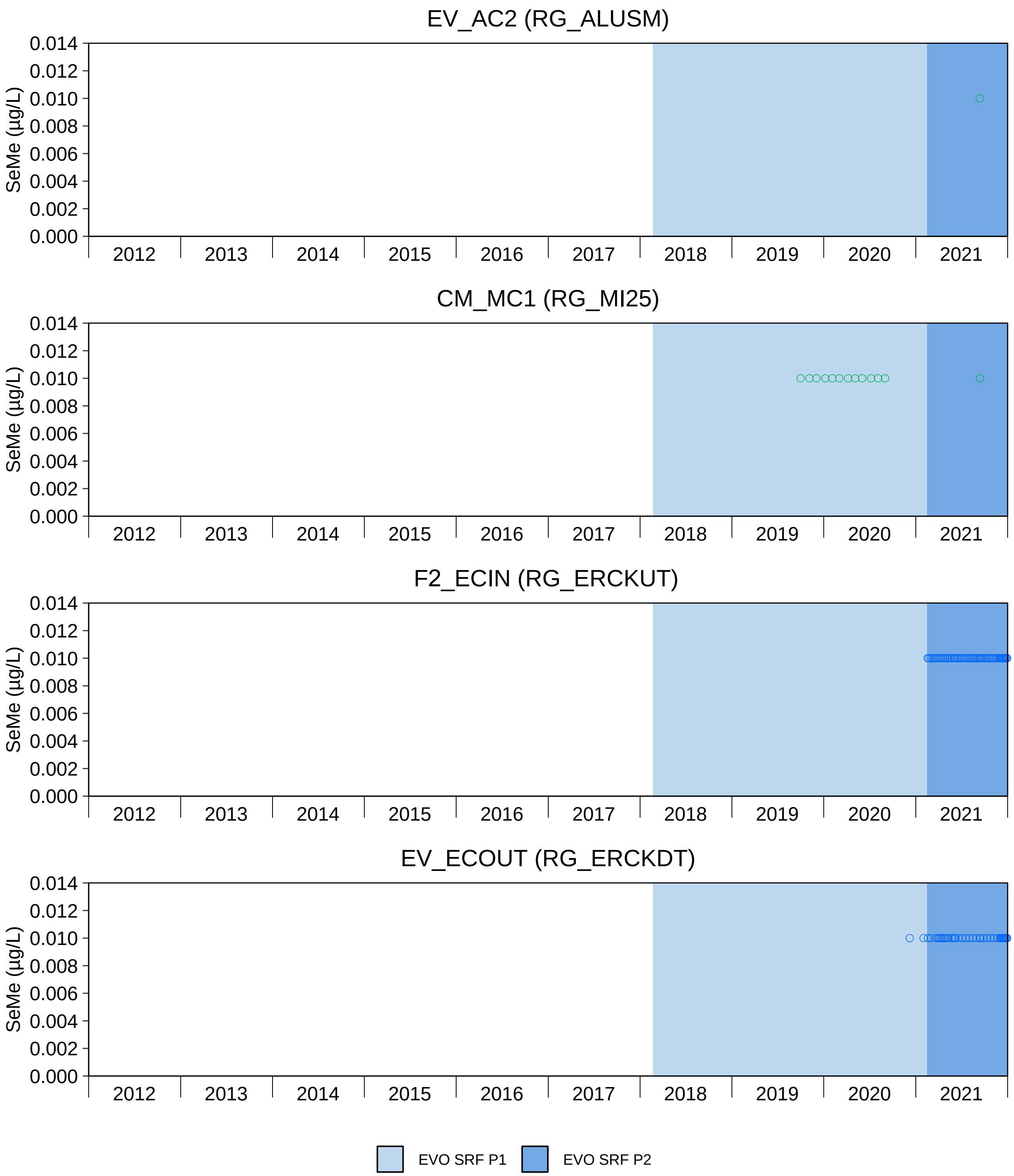

Figure D.14: **Time Series Plots for Selenomethionine from EVO LAEMP Areas, 2012 to 2021**

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

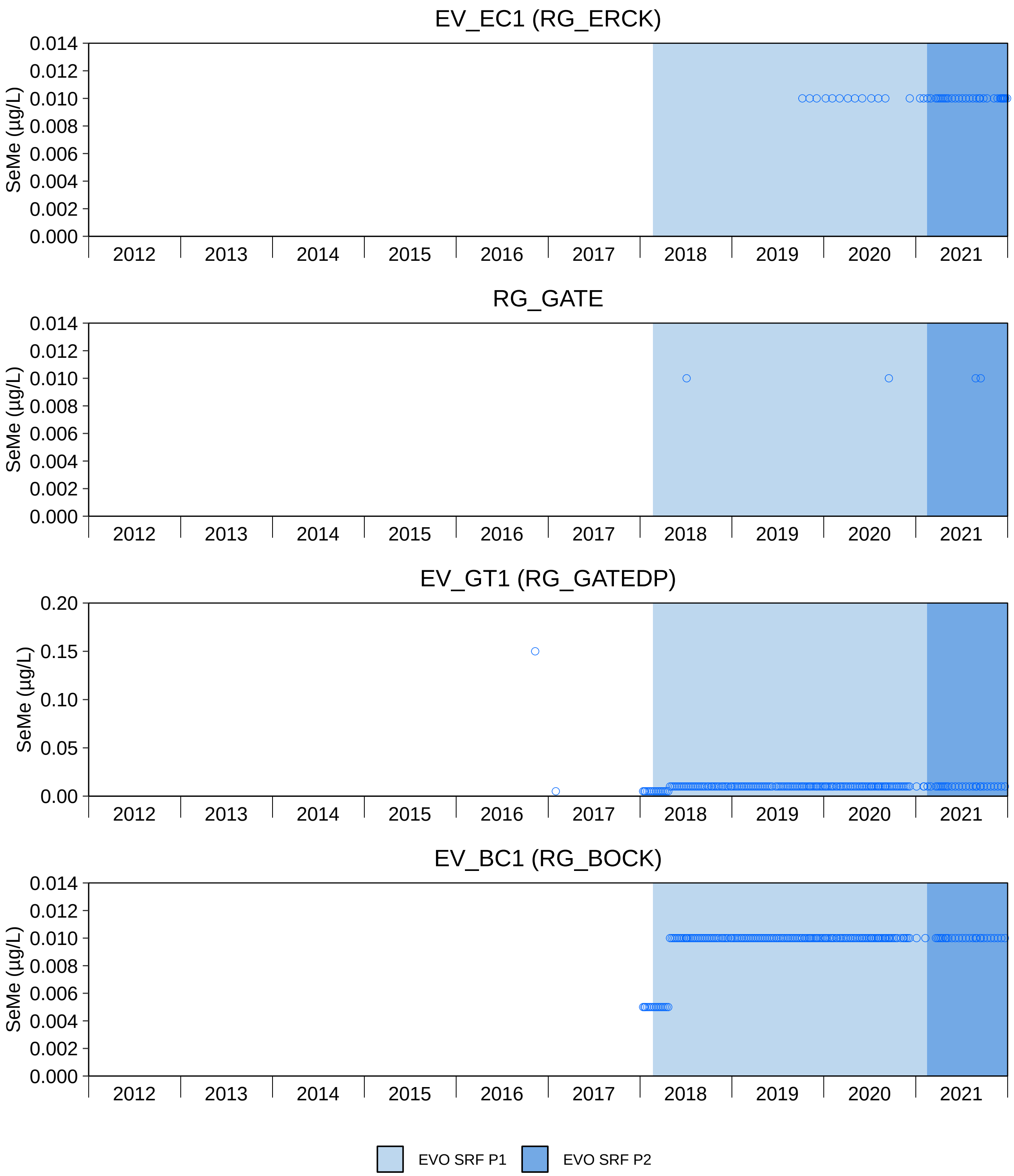

Figure D.14: Time Series Plots for Selenomethionine from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

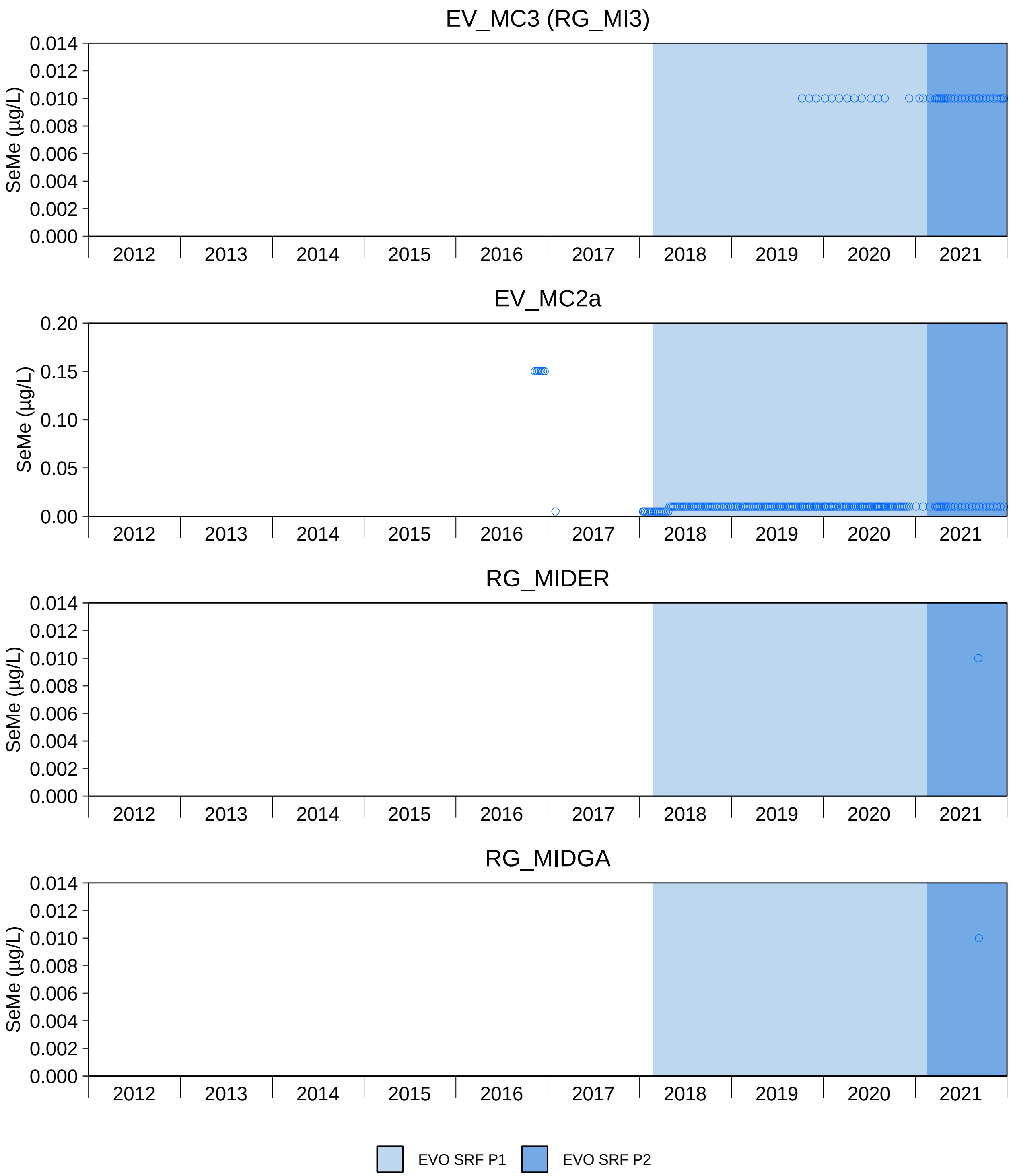

Figure D.14: Time Series Plots for Selenomethionine from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

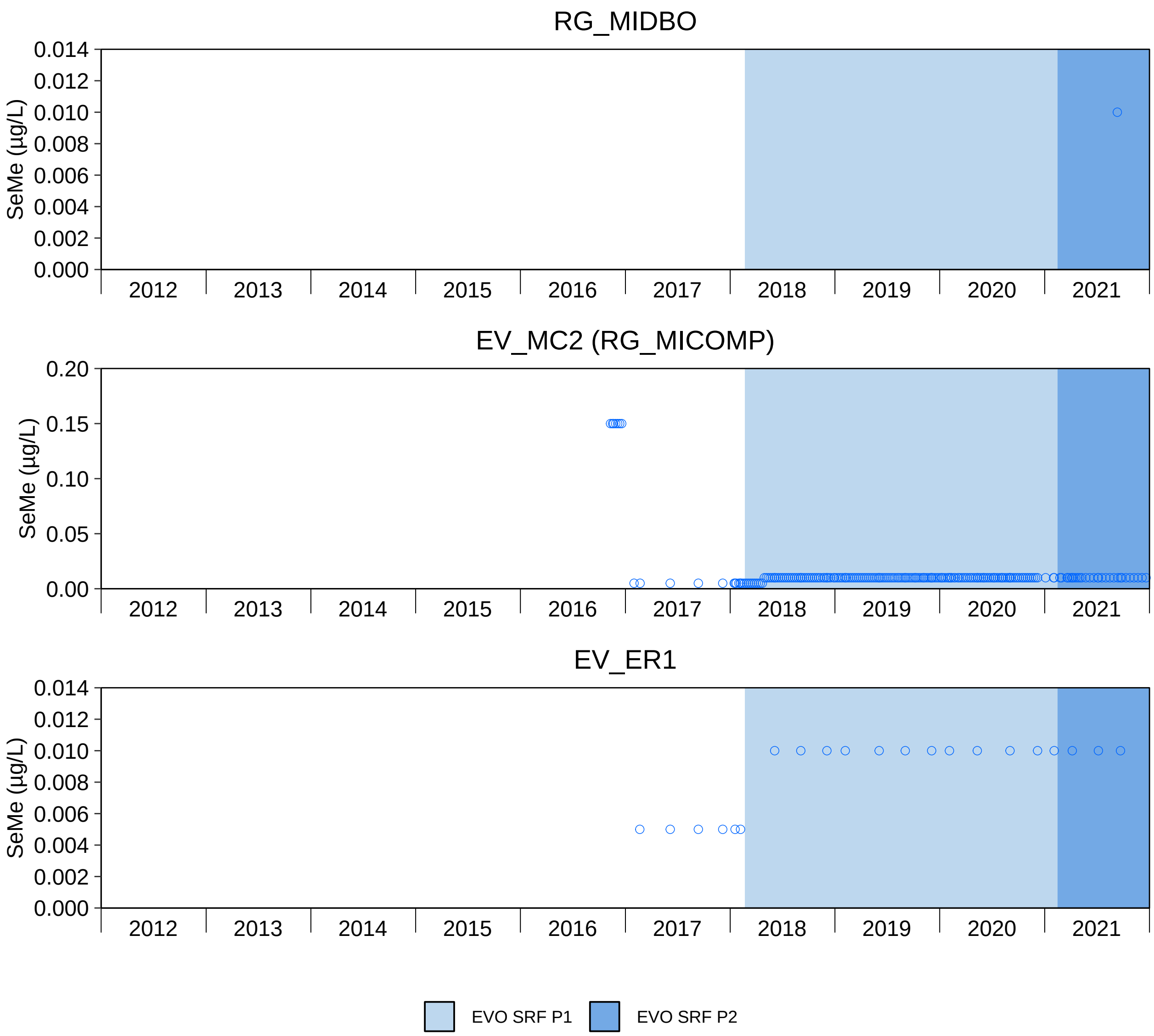

Figure D.14: Time Series Plots for Selenomethionine from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

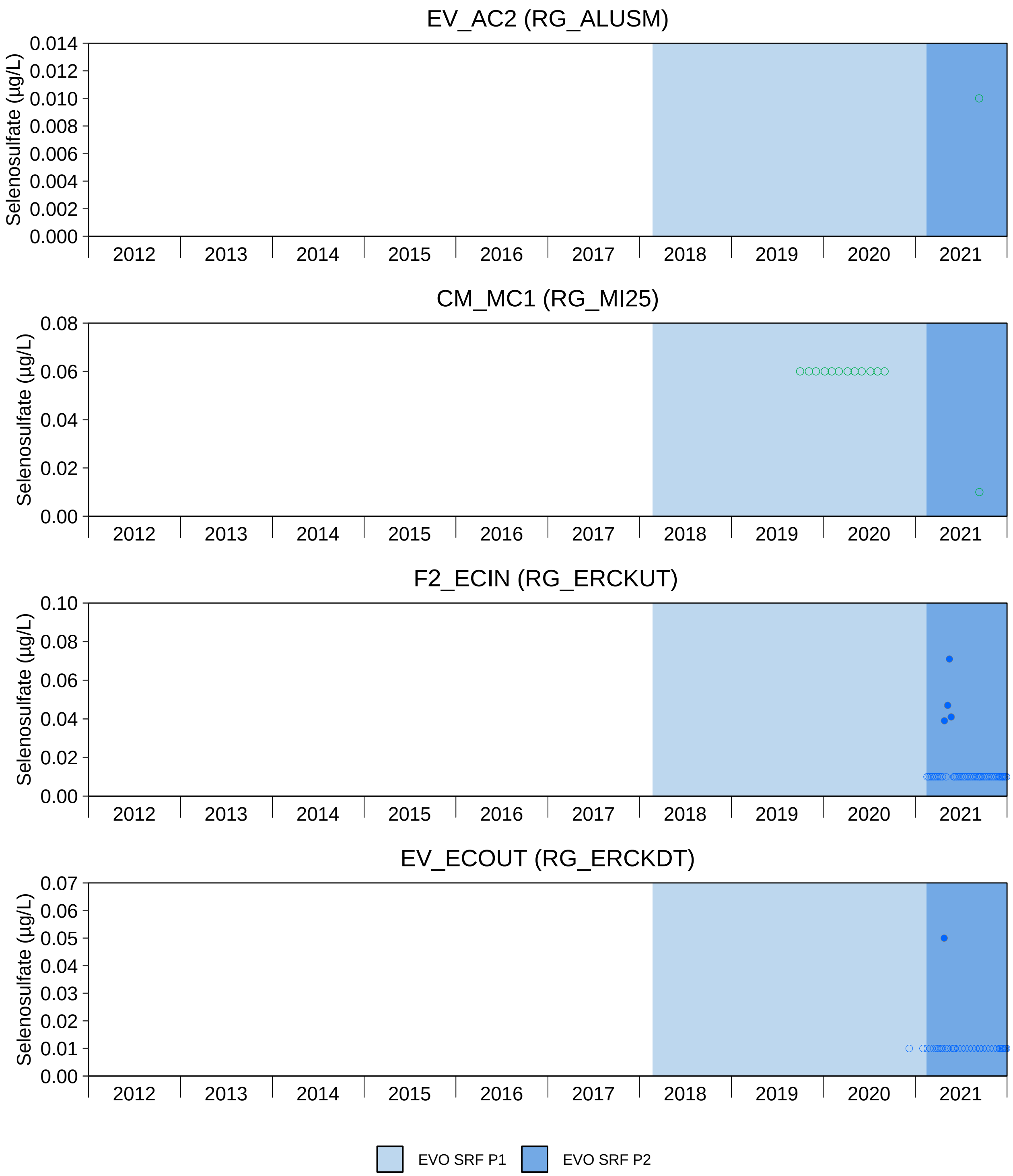

Figure D.15: Time Series Plots for Selenosulfate from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

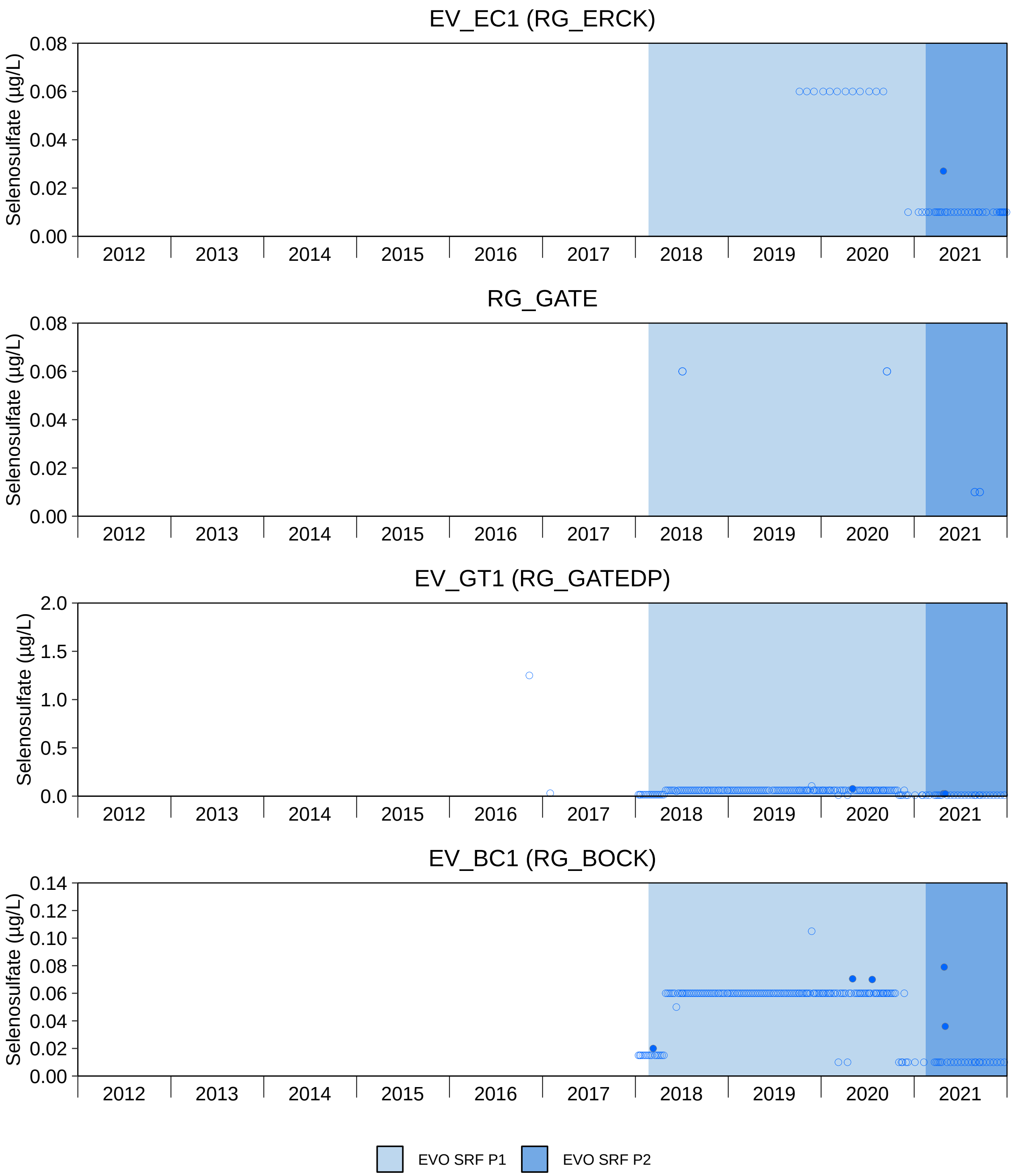

Figure D.15: Time Series Plots for Selenosulfate from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

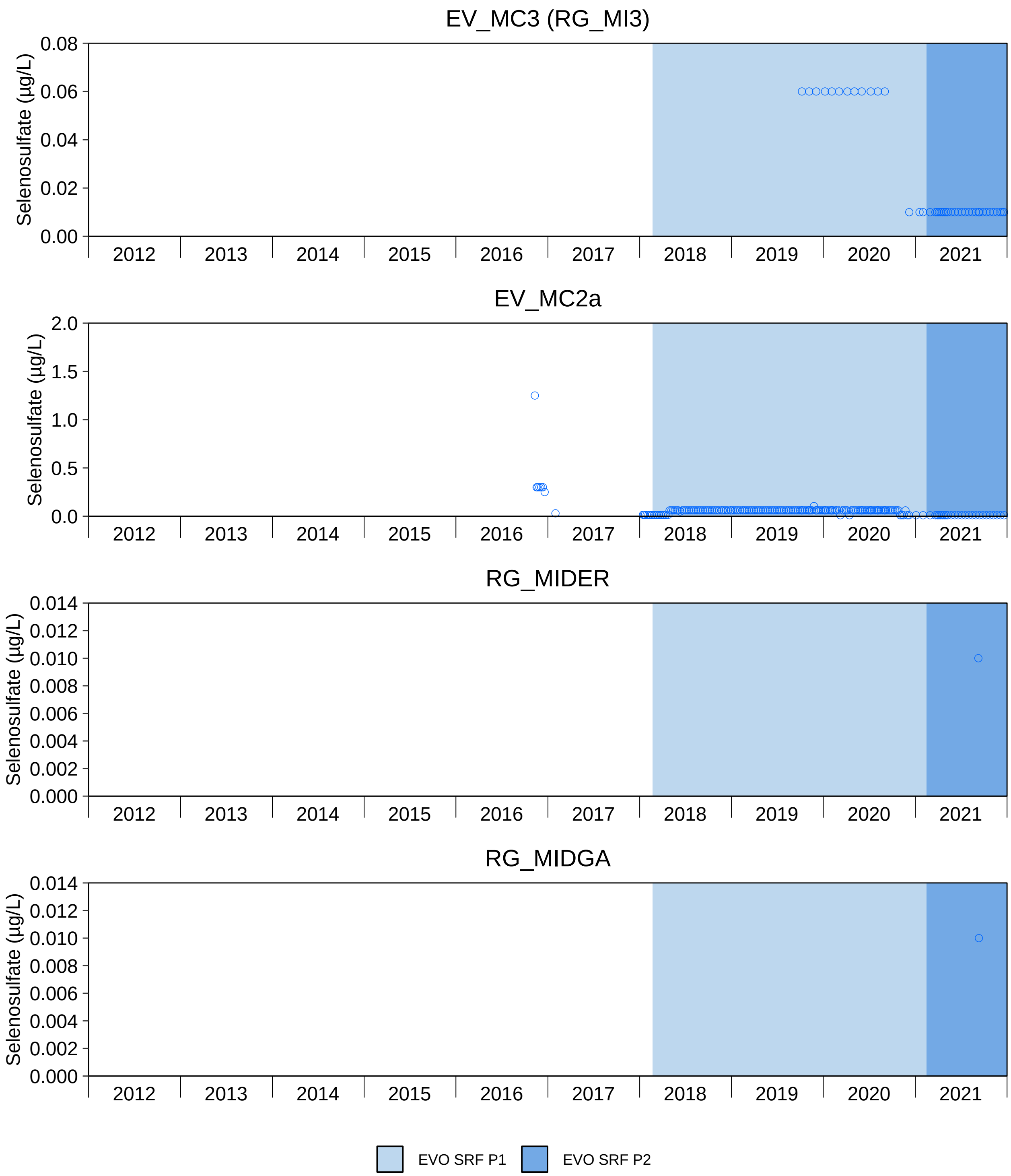

Figure D.15: **Time Series Plots for Selenosulfate from EVO LAEMP Areas, 2012 to 2021**

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

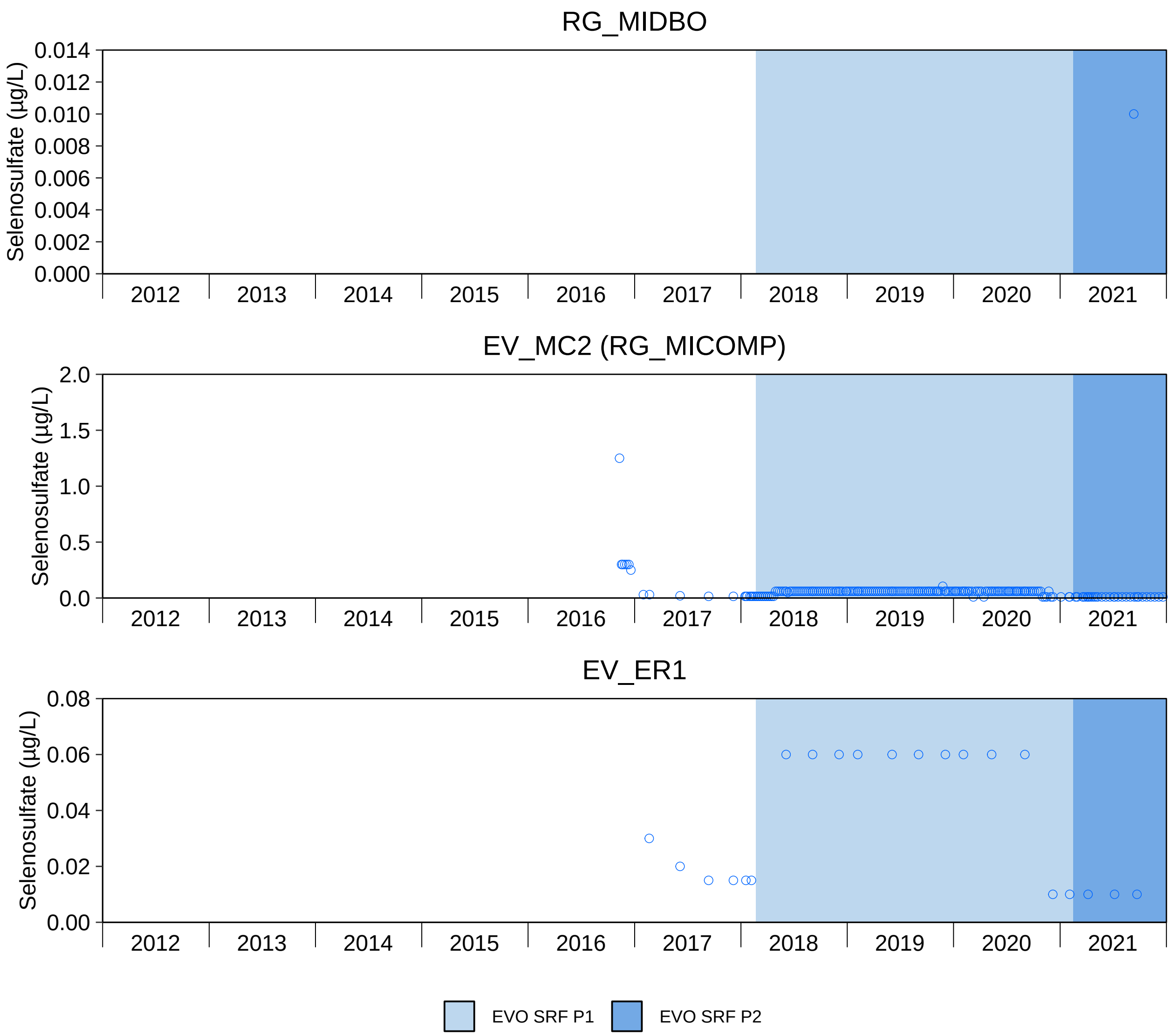

Figure D.15: Time Series Plots for Selenosulfate from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

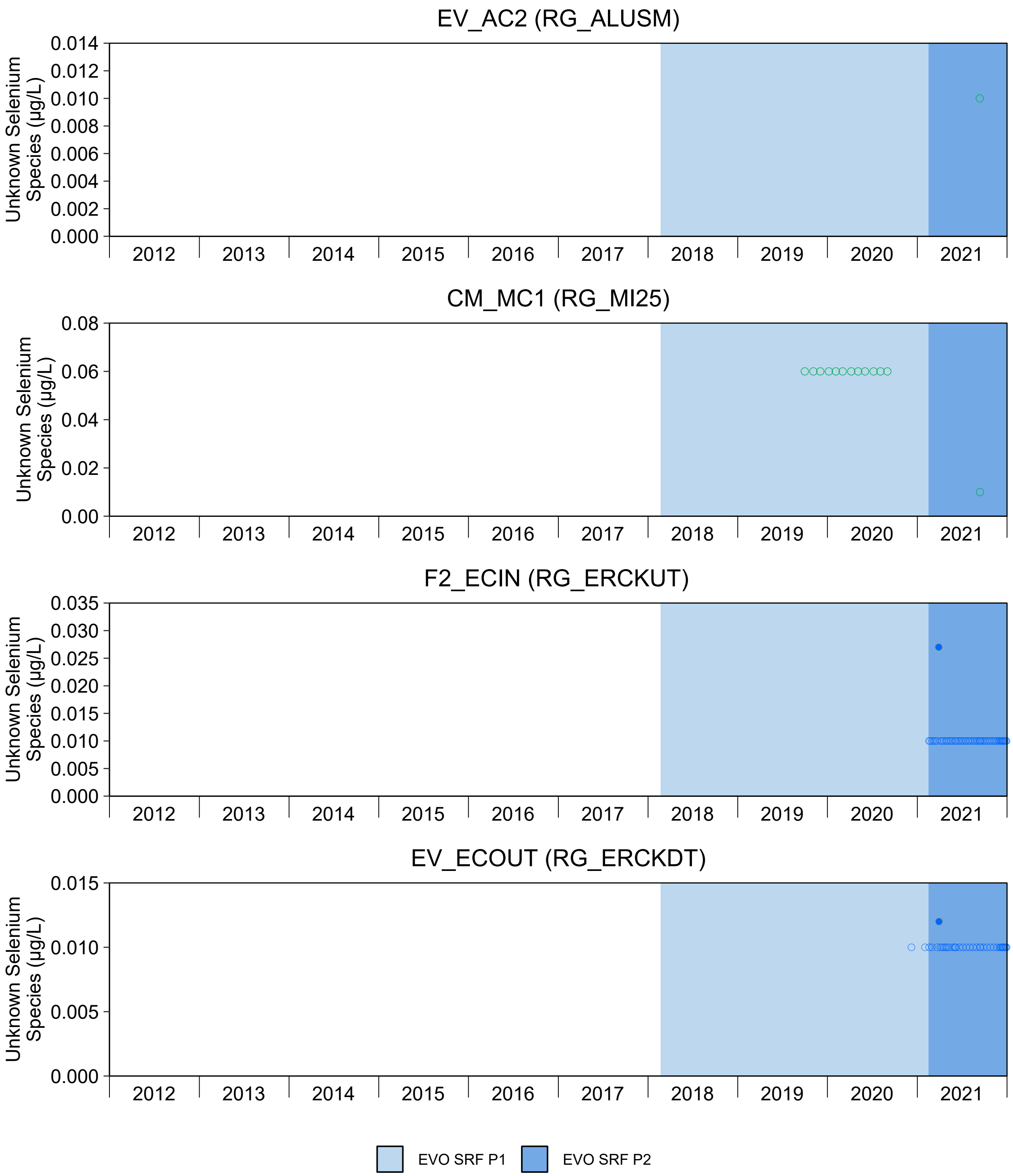

Figure D.16: Time Series Plots for Unknown Selenium Species from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

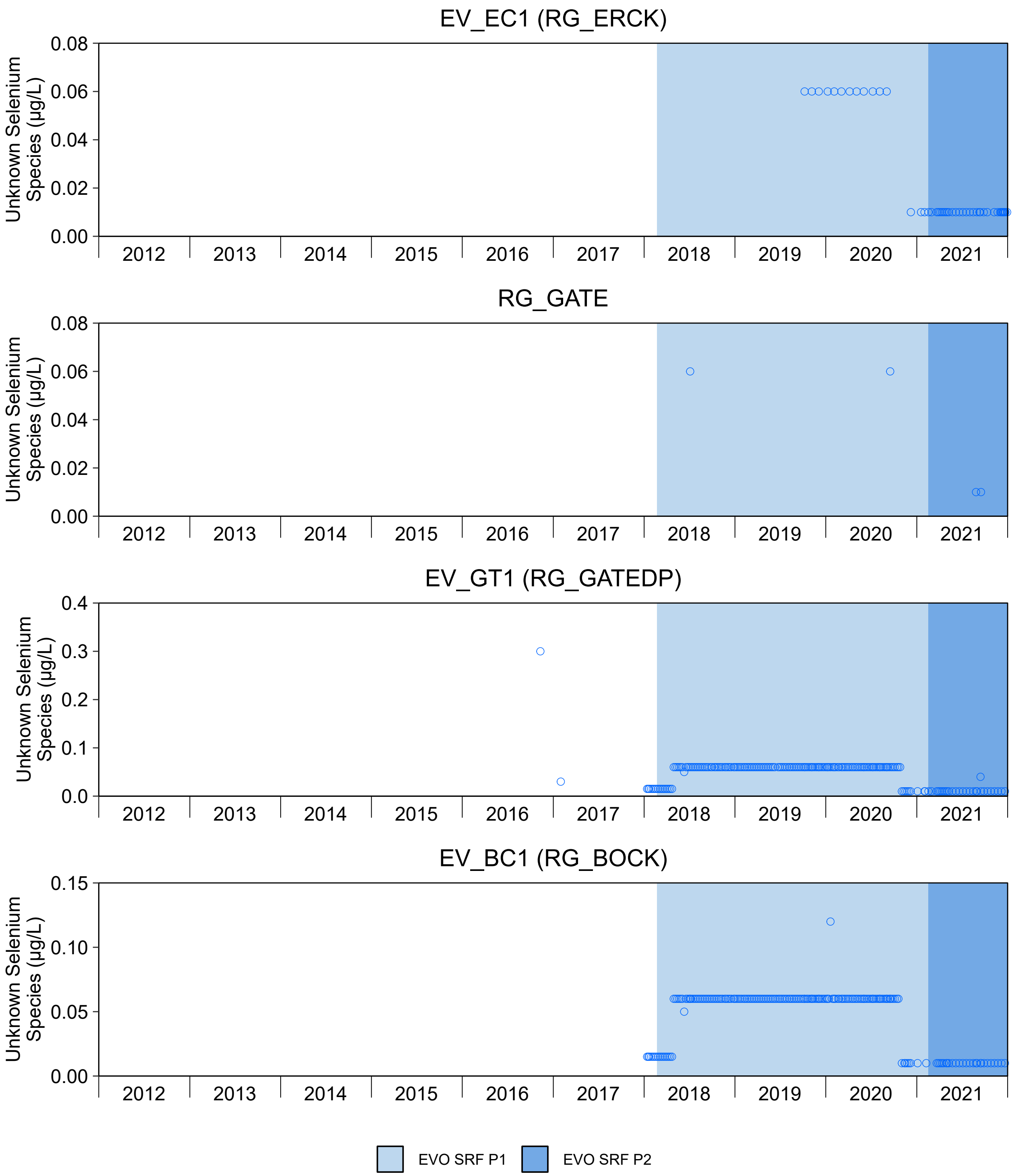

Figure D.16: Time Series Plots for Unknown Selenium Species from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

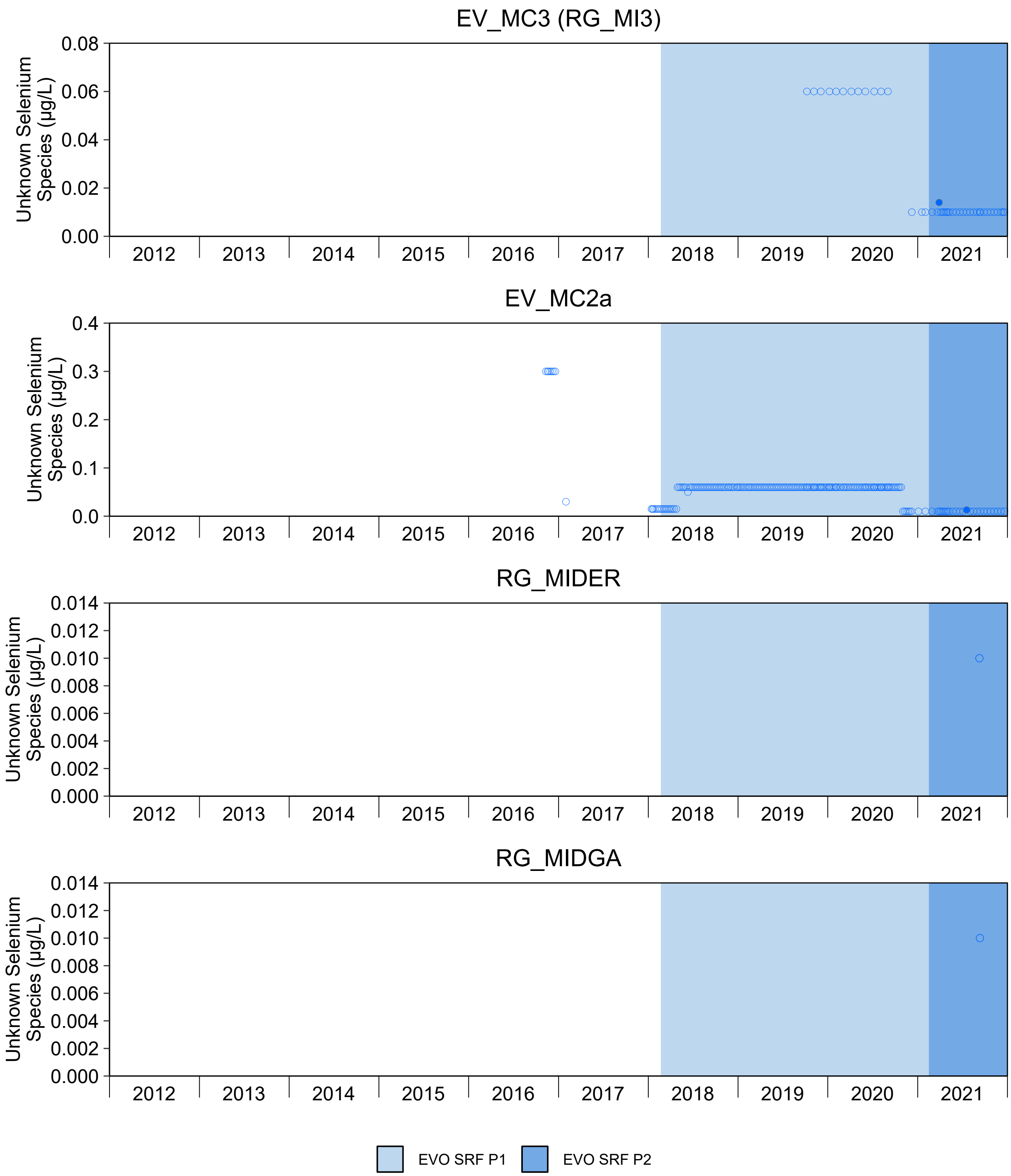

Figure D.16: Time Series Plots for Unknown Selenium Species from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

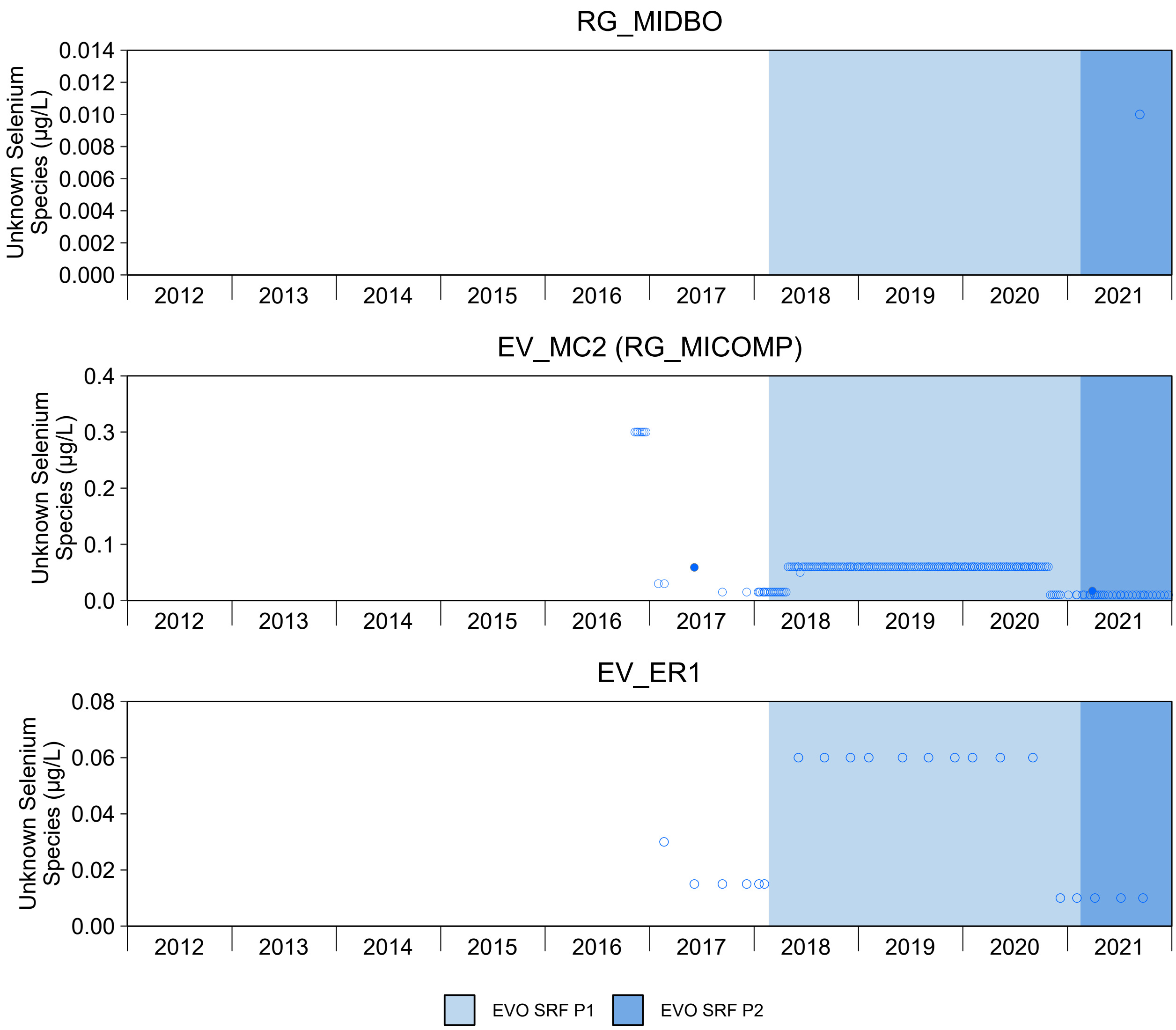

Figure D.16: Time Series Plots for Unknown Selenium Species from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

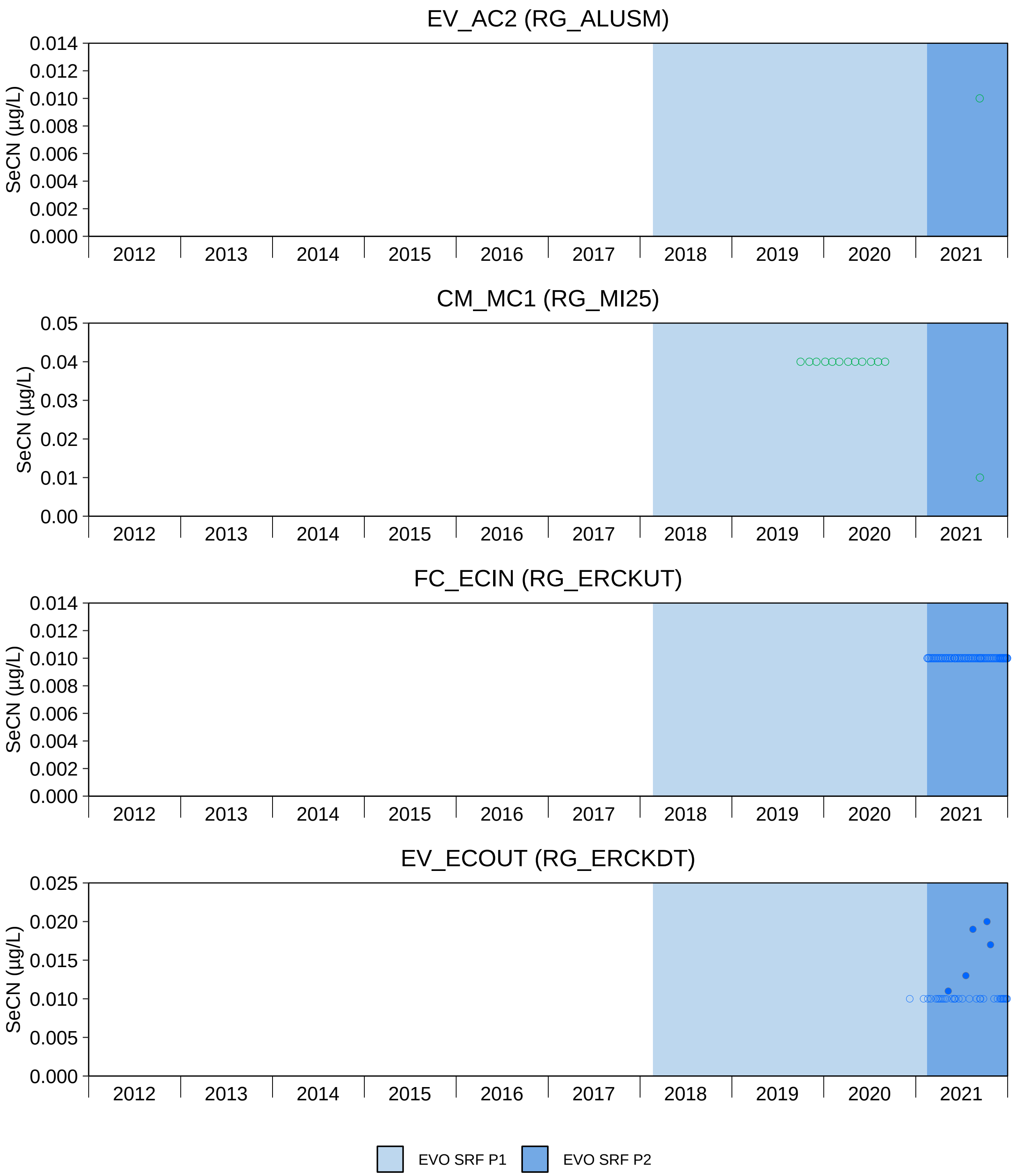

Figure D.17: Time Series Plots for Selenocyanate from EVO LAEMP Areas, 2012 to 2021

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

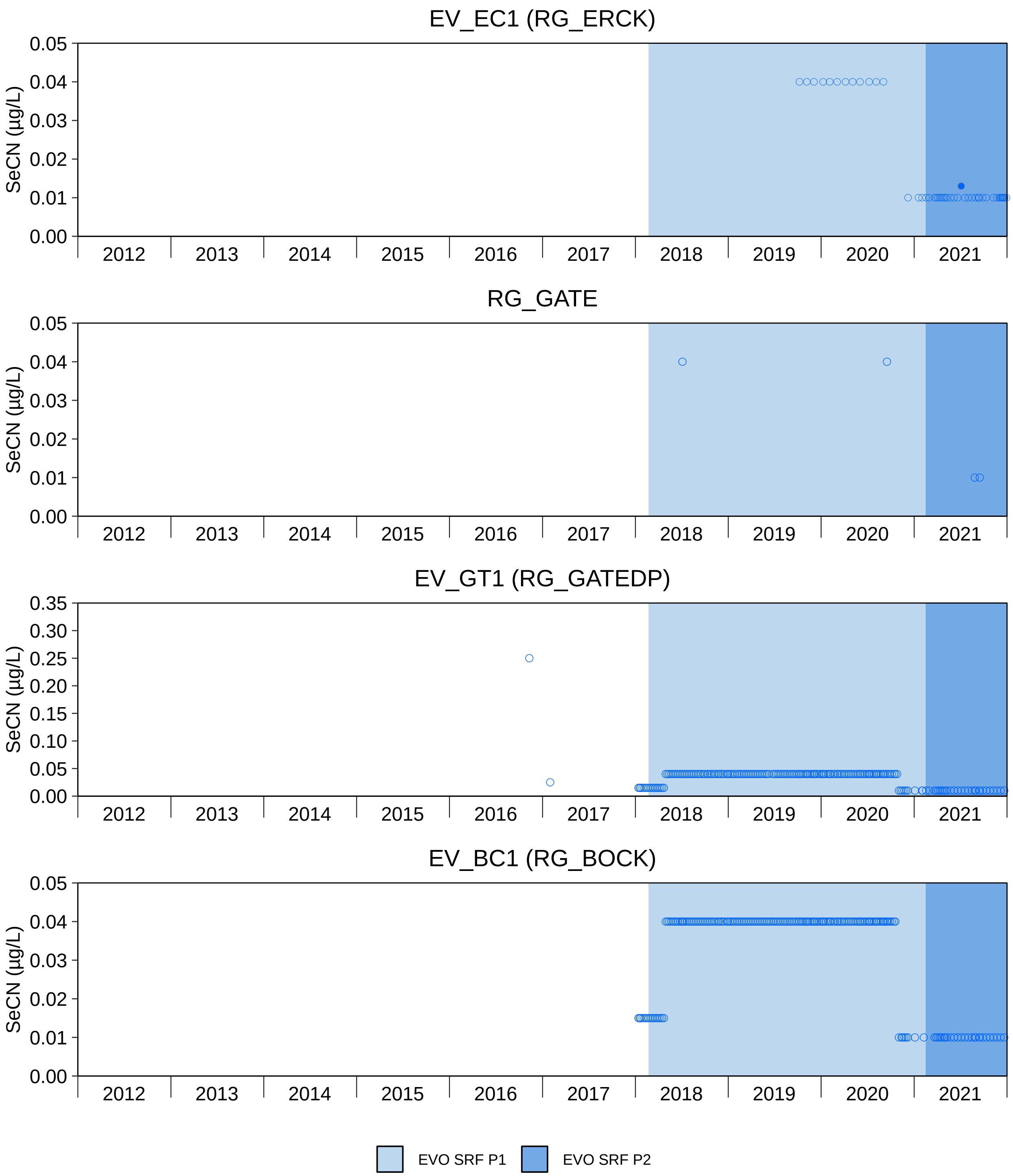

Figure D.17: Time Series Plots for Selenocyanate from EVO LAEMP Areas, 2012 to 2021

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

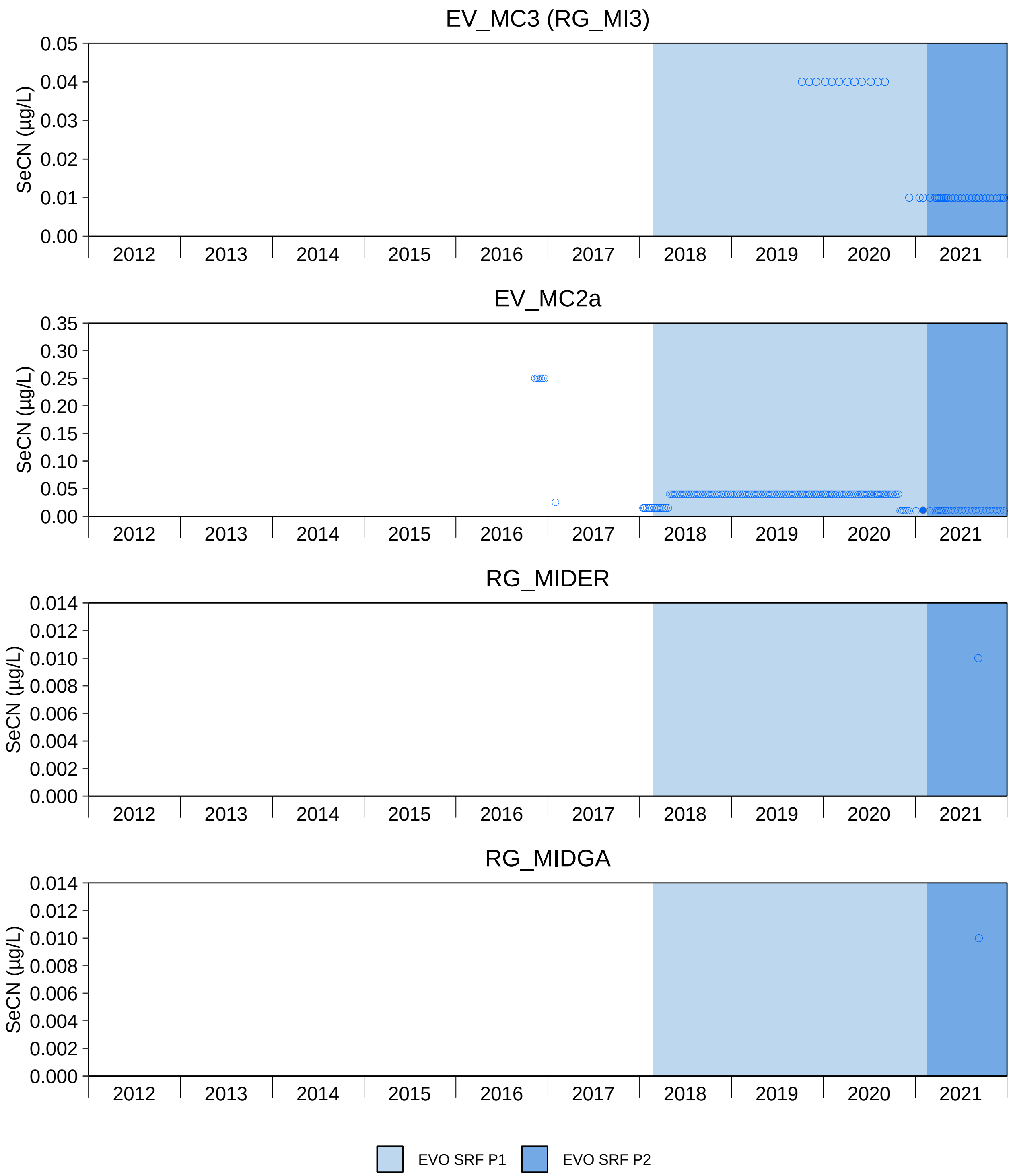

Figure D.17: Time Series Plots for Selenocyanate from EVO LAEMP Areas, 2012 to 2021

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

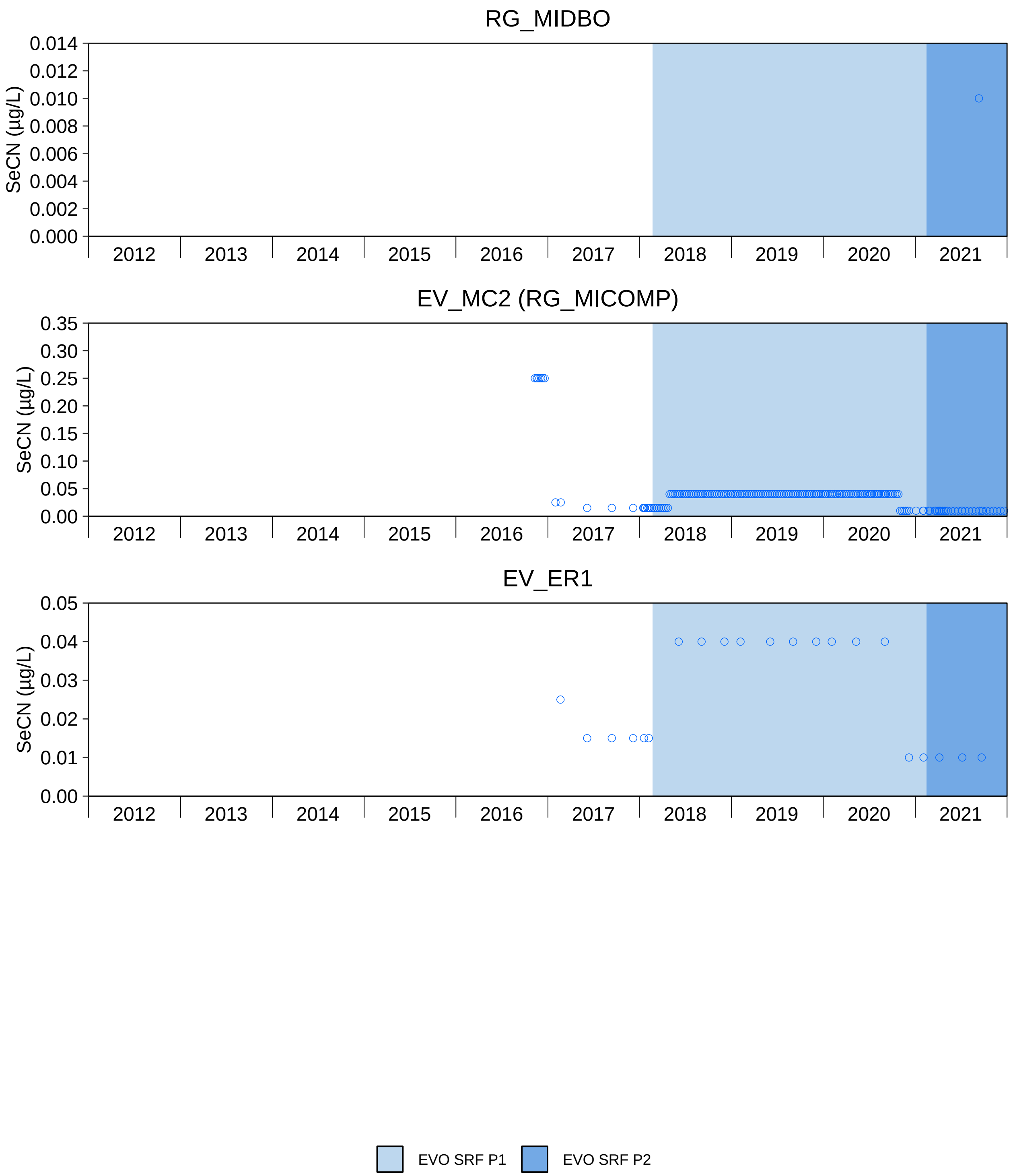

Figure D.17: **Time Series Plots for Selenocyanate from EVO LAEMP Areas, 2012 to 2021**

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

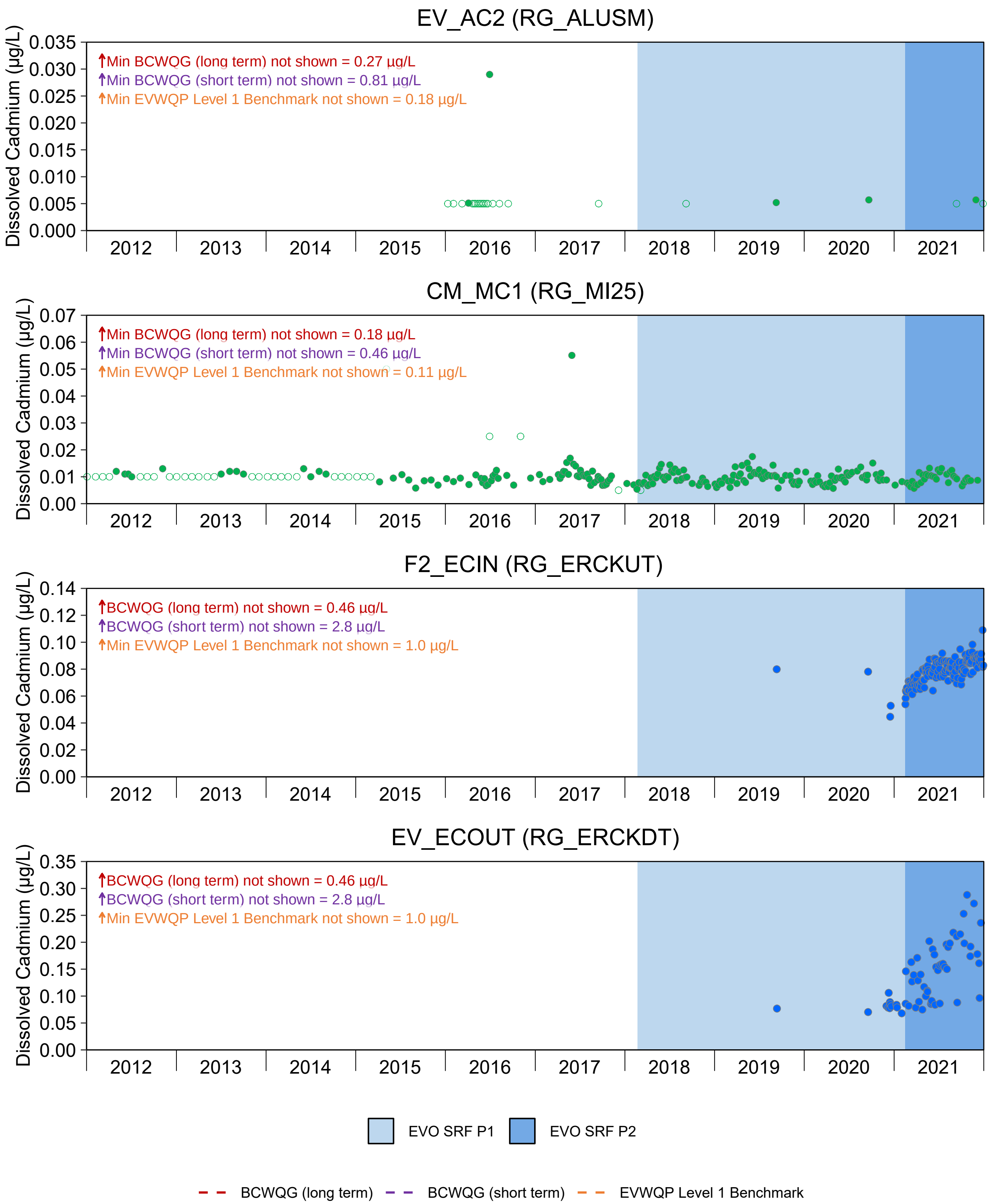

Figure D.18: Time Series Plots for Dissolved Cadmium from EVO LAEMP Areas, 2012 to 2021

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).

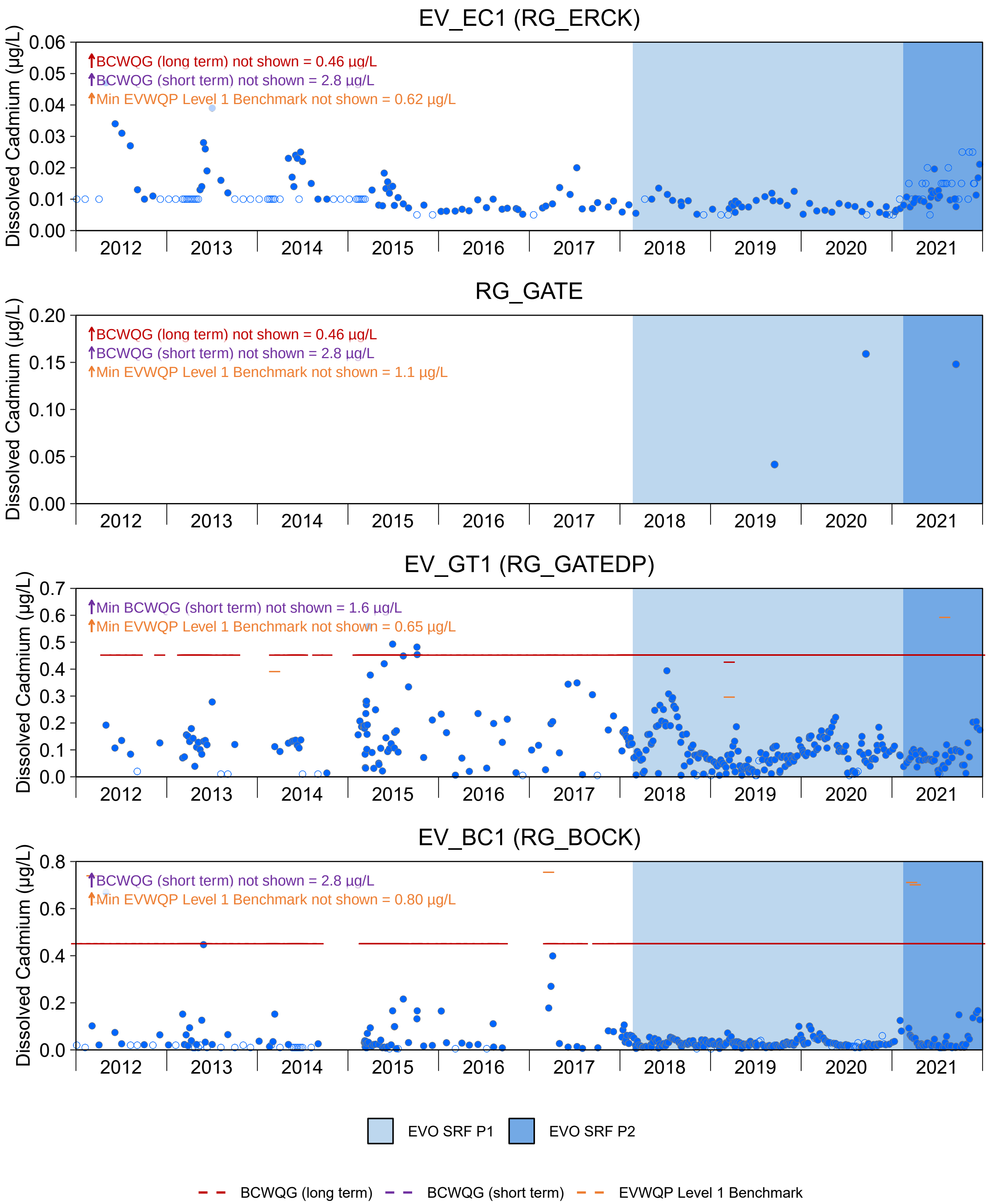

Figure D.18: Time Series Plots for Dissolved Cadmium from EVO LAEMP Areas, 2012 to 2021

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).

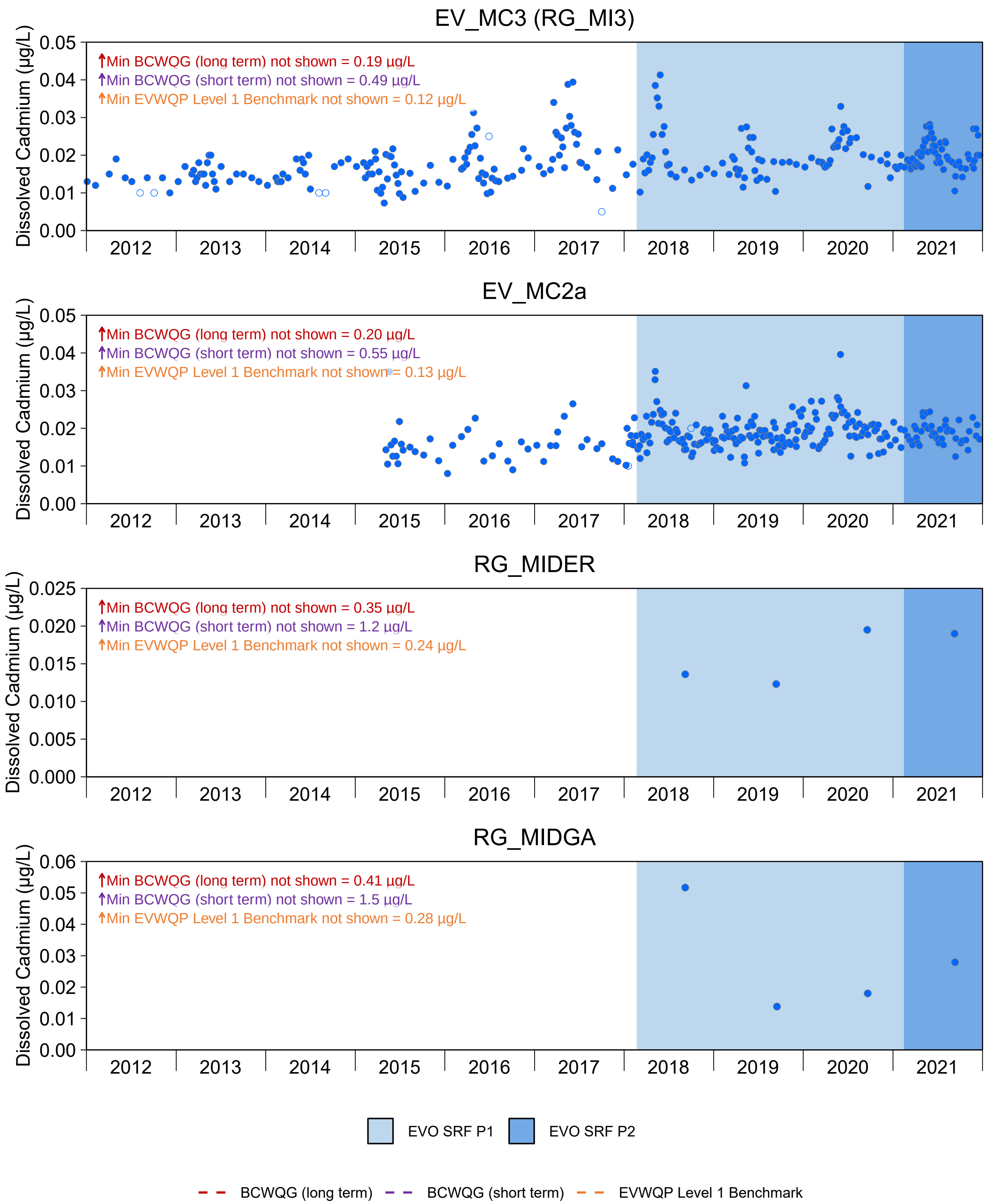

Figure D.18: Time Series Plots for Dissolved Cadmium from EVO LAEMP Areas, 2012 to 2021

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).

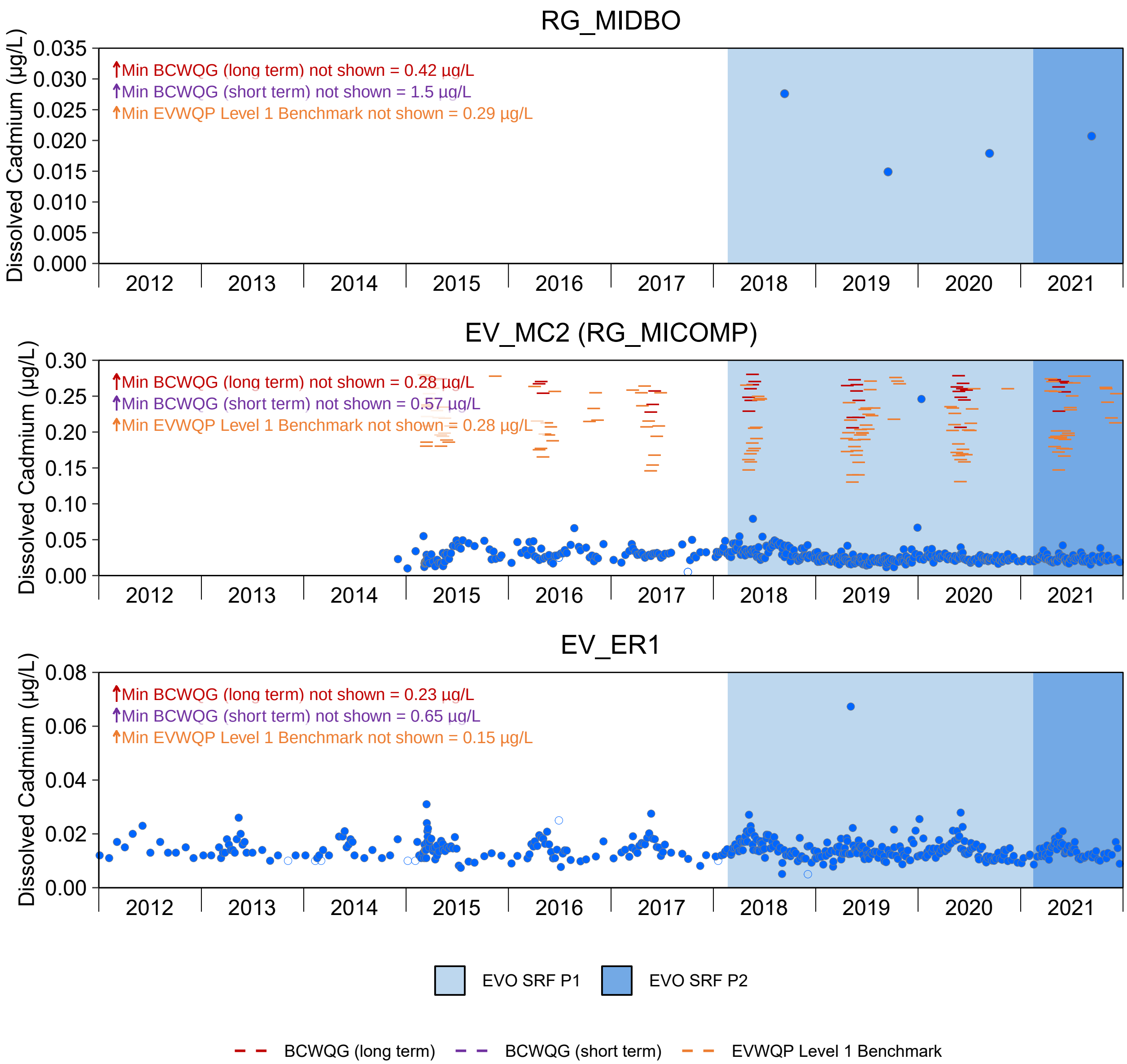

Figure D.18: Time Series Plots for Dissolved Cadmium from EVO LAEMP Areas, 2012 to 2021

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).

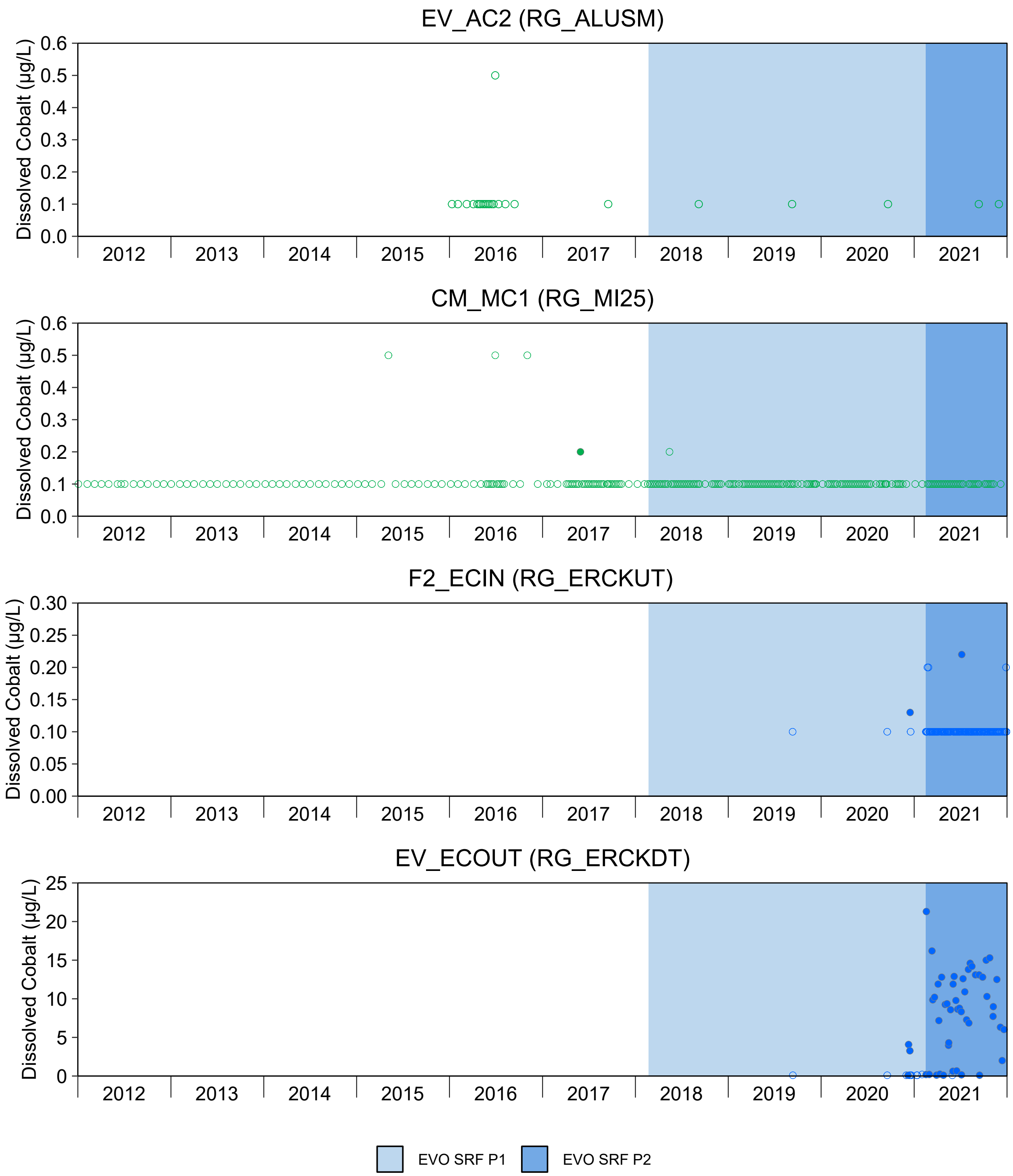

Figure D.19: Time Series Plots for Dissolved Cobalt from EVO LAEMP Areas, 2012 to 2021

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).

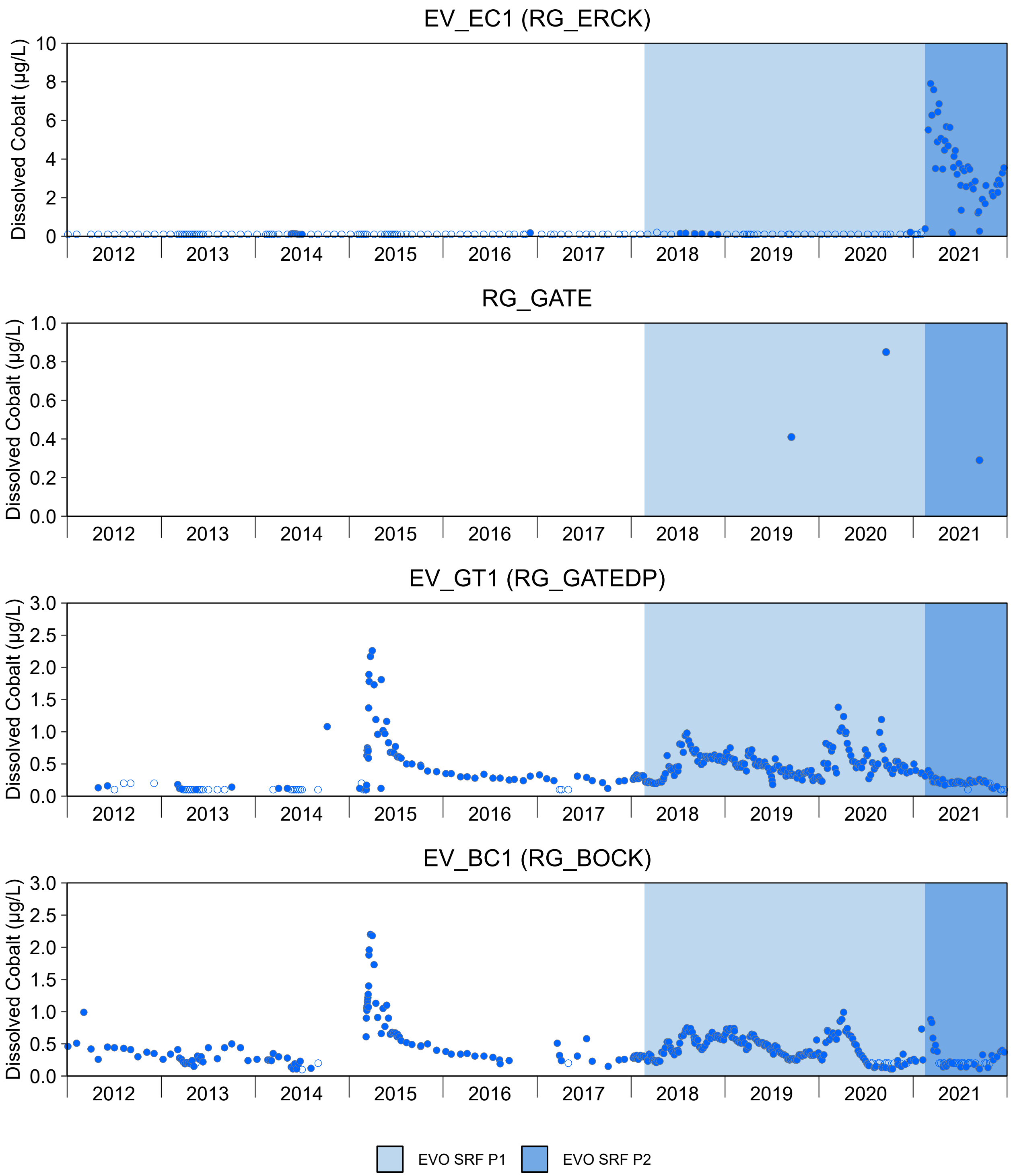

Figure D.19: Time Series Plots for Dissolved Cobalt from EVO LAEMP Areas, 2012 to 2021

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).

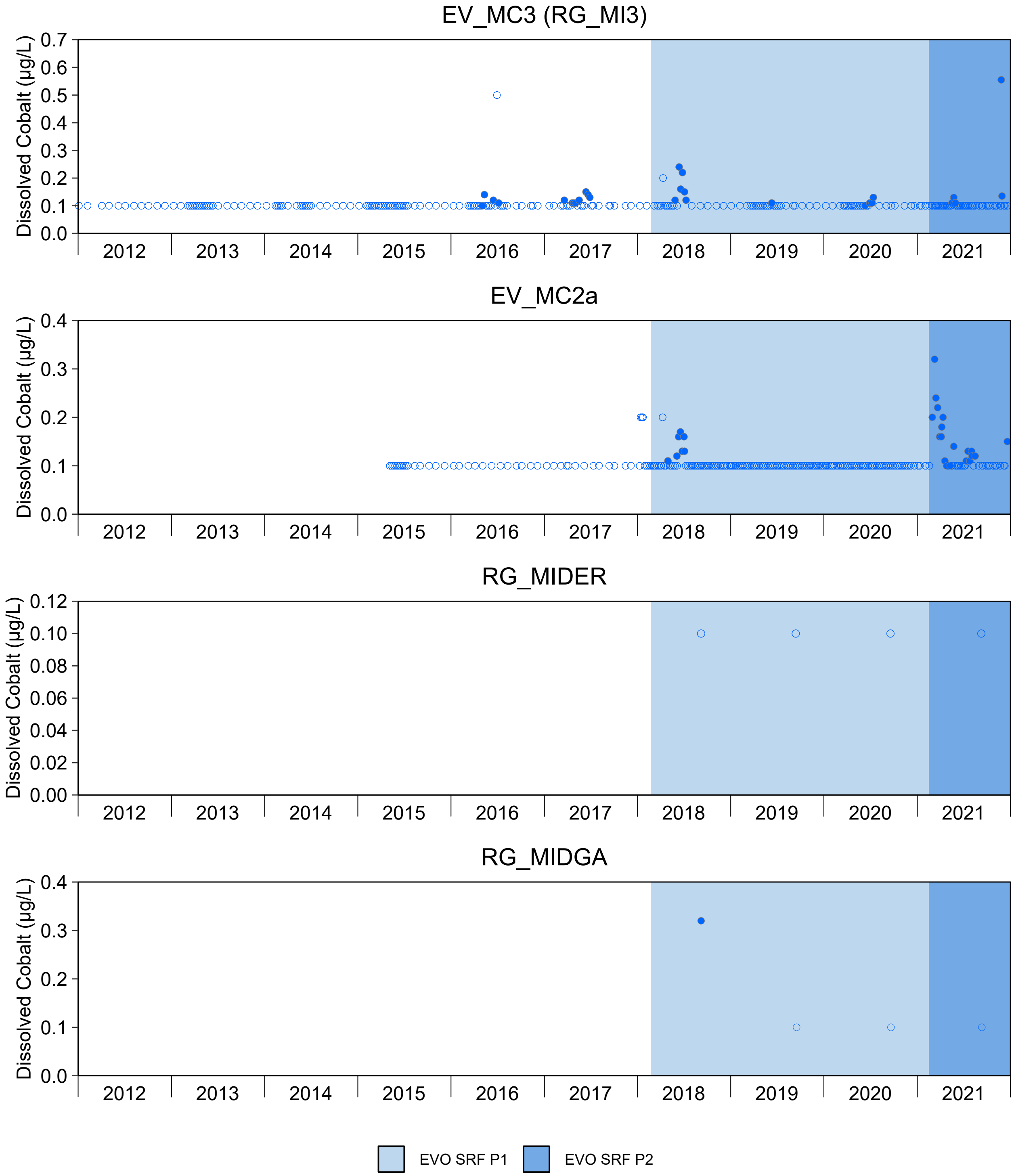

Figure D.19: Time Series Plots for Dissolved Cobalt from EVO LAEMP Areas, 2012 to 2021

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).

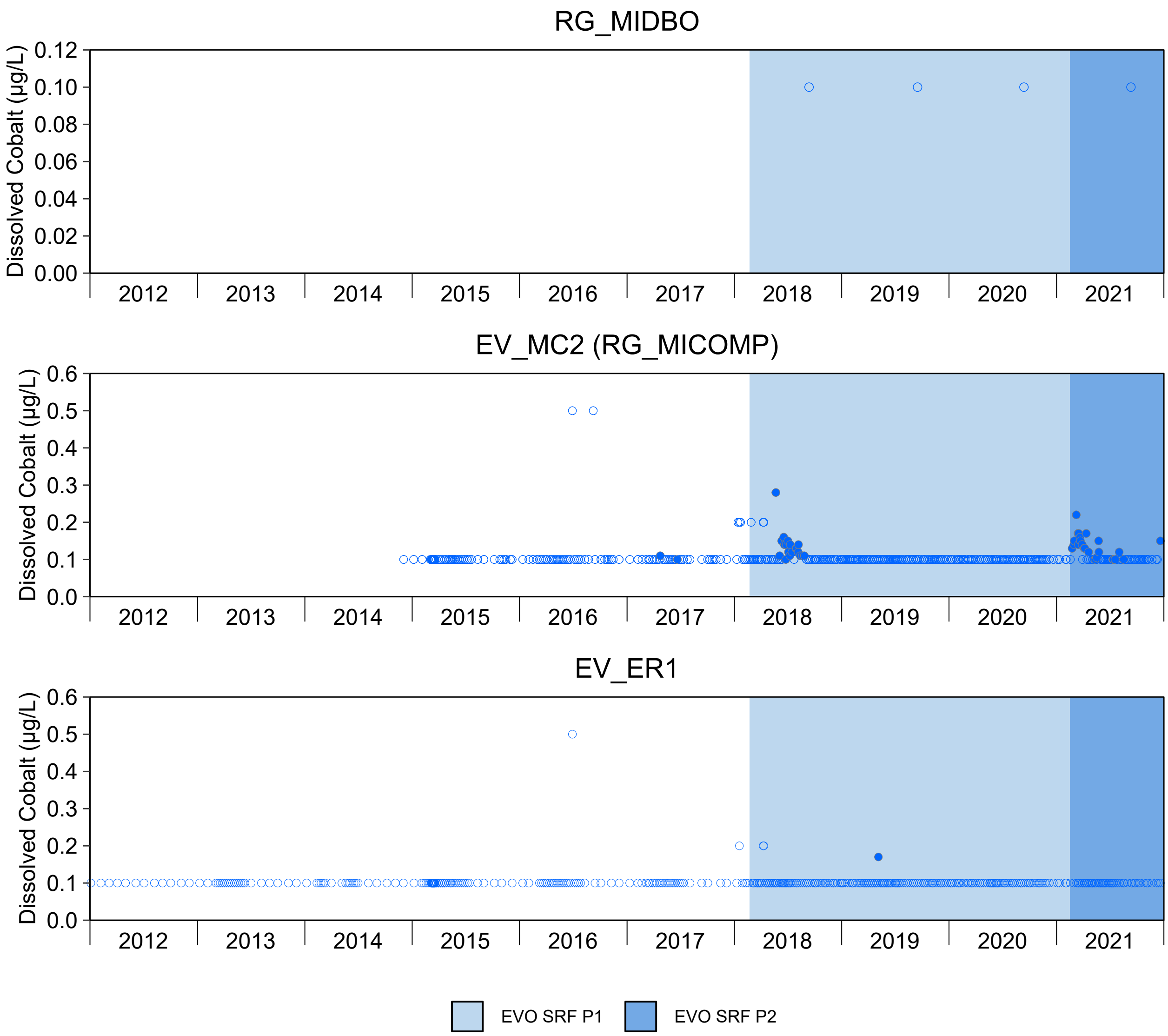

Figure D.19: Time Series Plots for Dissolved Cobalt from EVO LAEMP Areas, 2012 to 2021

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).

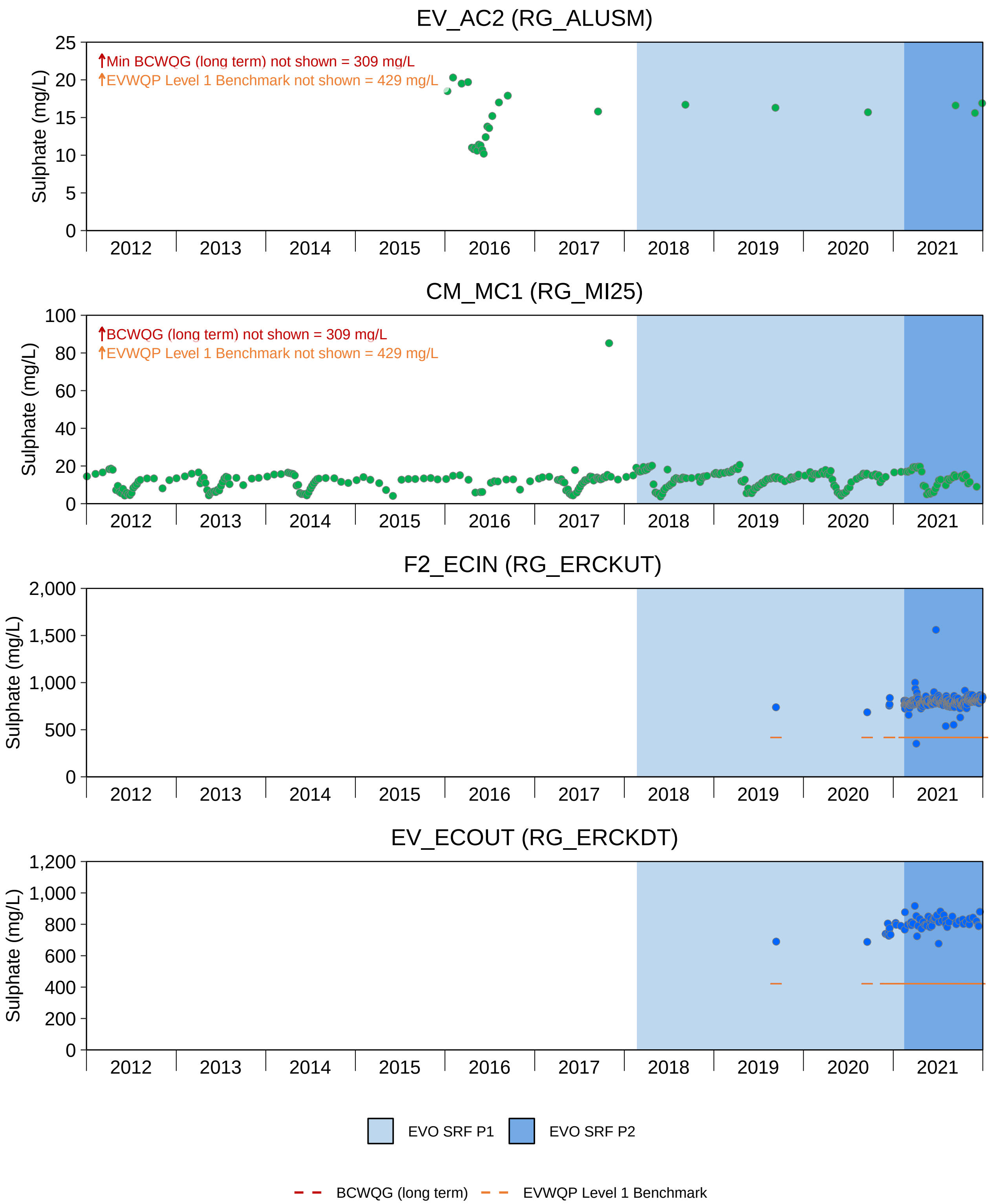

Figure D.20: Time Series Plots for Sulphate from EVO LAEMP Areas, 2012 to 2021

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).

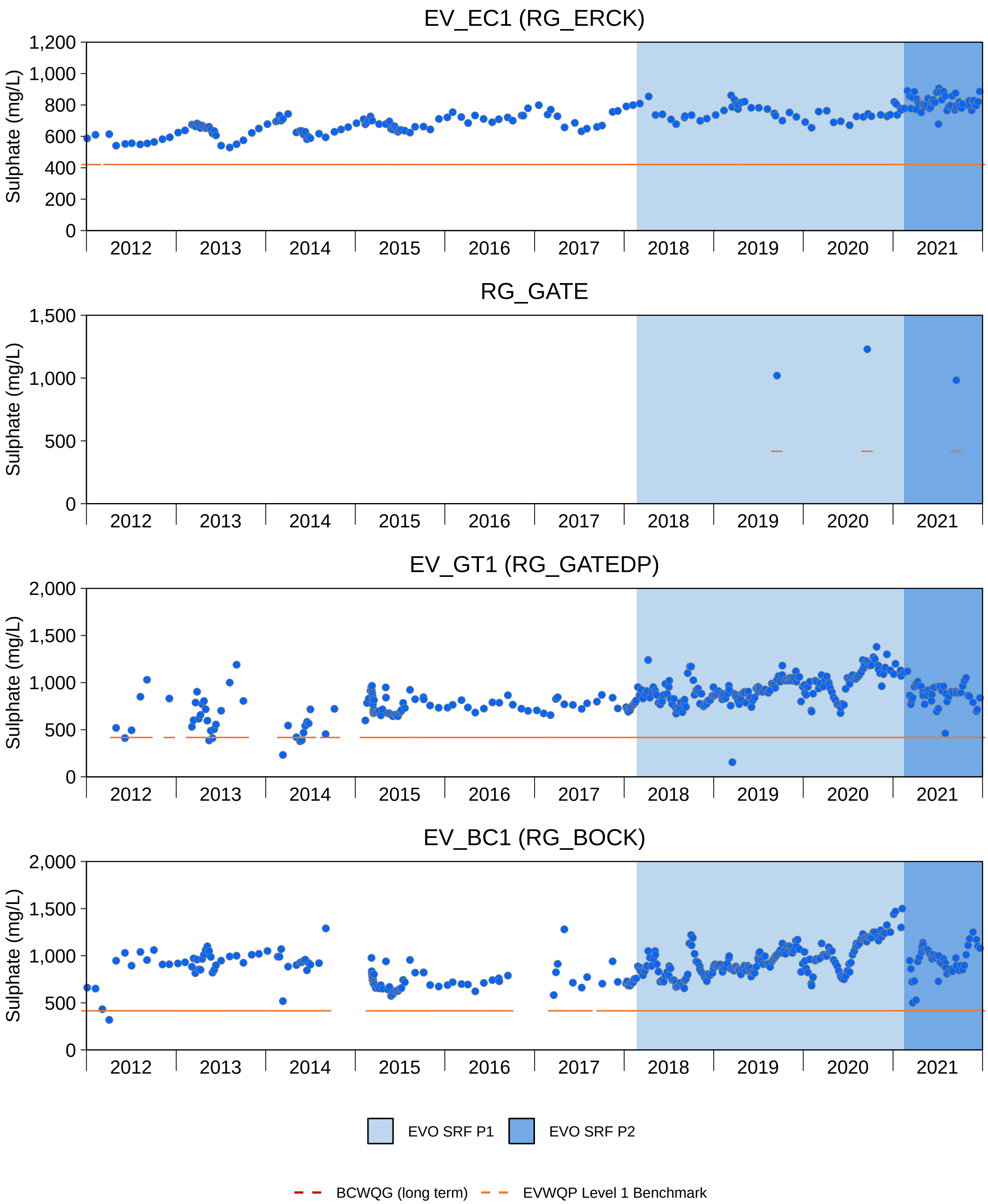

Figure D.20: Time Series Plots for Sulphate from EVO LAEMP Areas, 2012 to 2021

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).

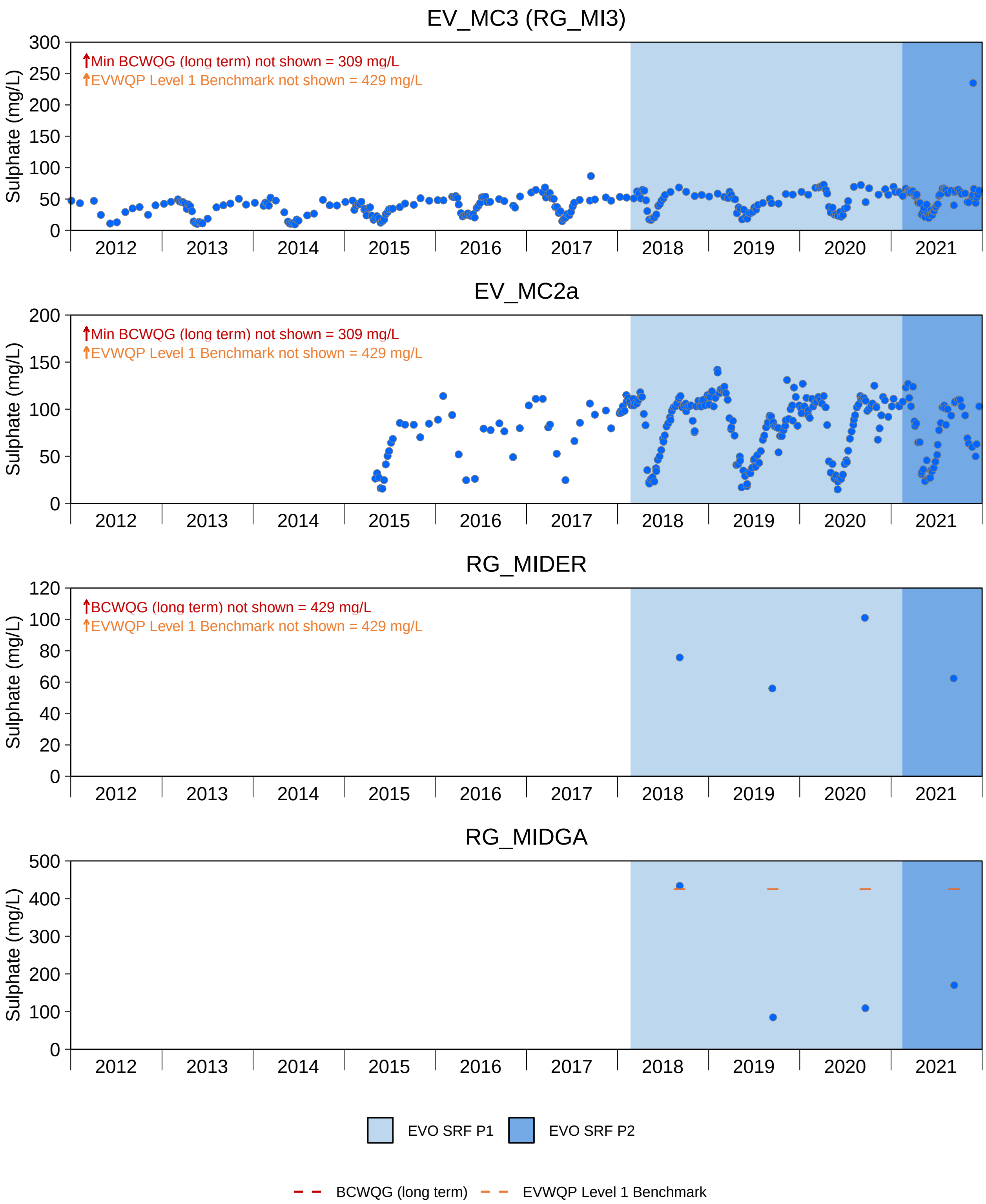

Figure D.20: Time Series Plots for Sulphate from EVO LAEMP Areas, 2012 to 2021

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).

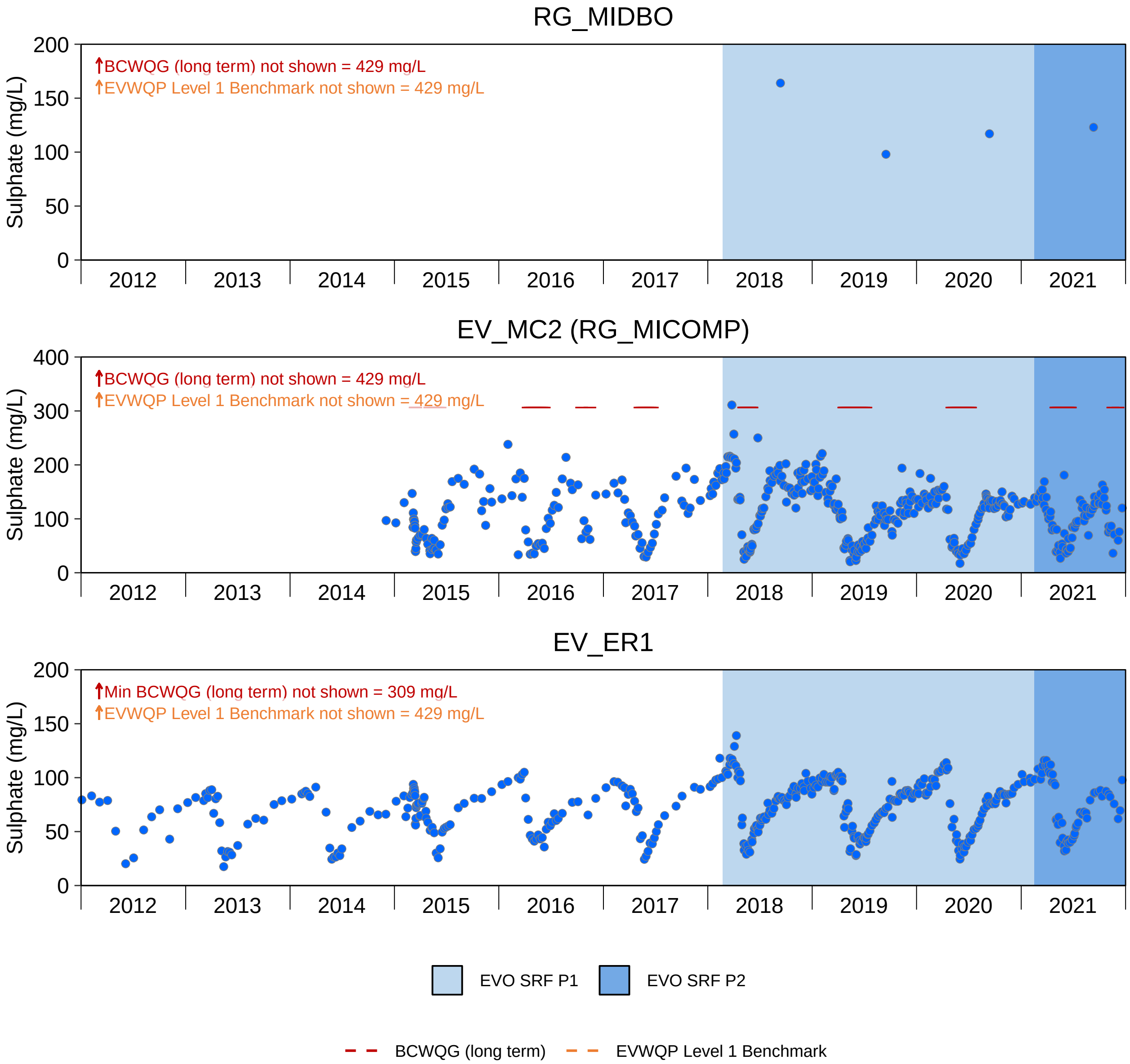

Figure D.20: Time Series Plots for Sulphate from EVO LAEMP Areas, 2012 to 2021

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).

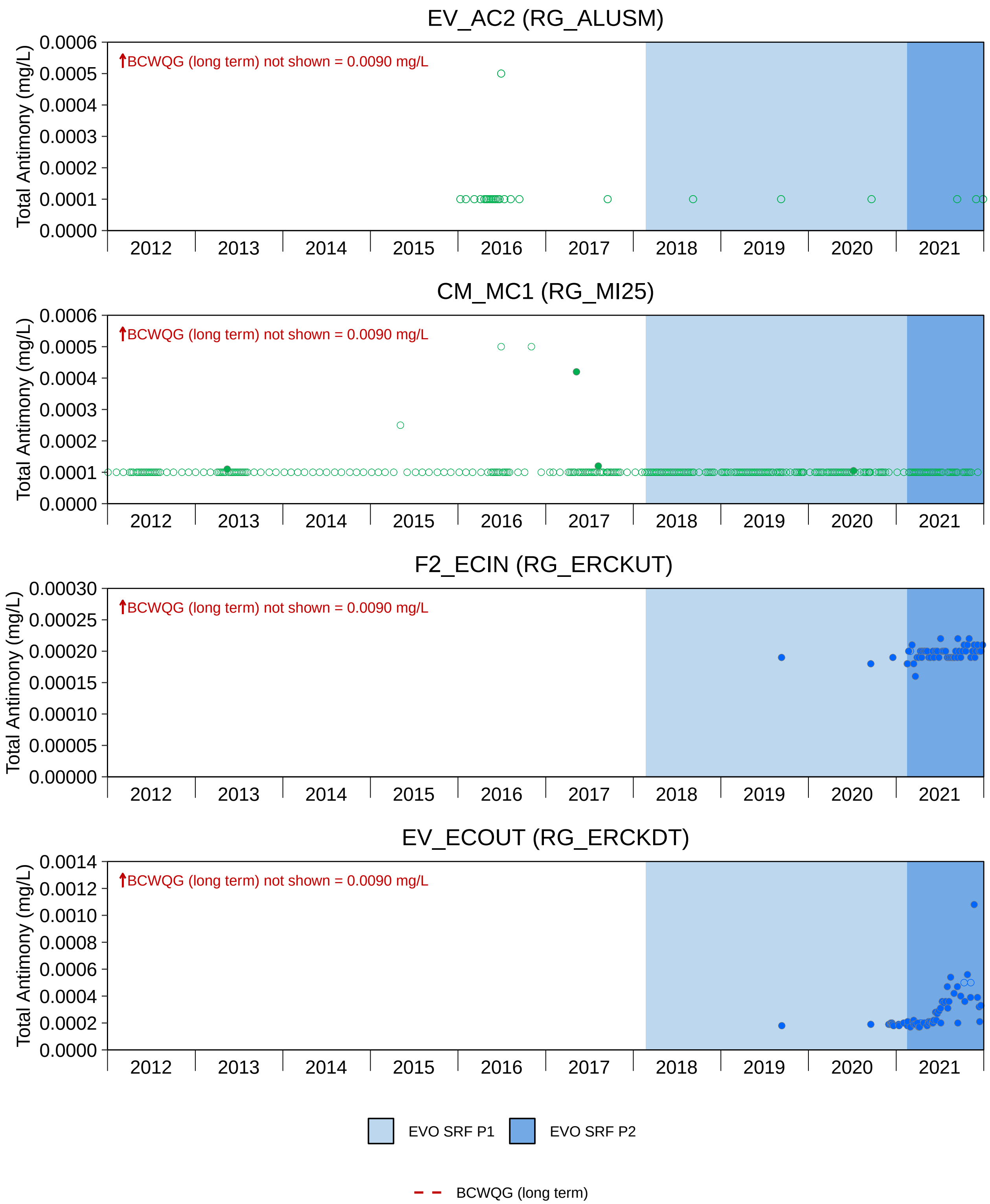

Figure D.21: Time Series Plots for Total Antimony from EVO LAEMP Areas, 2012 to 2021

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).

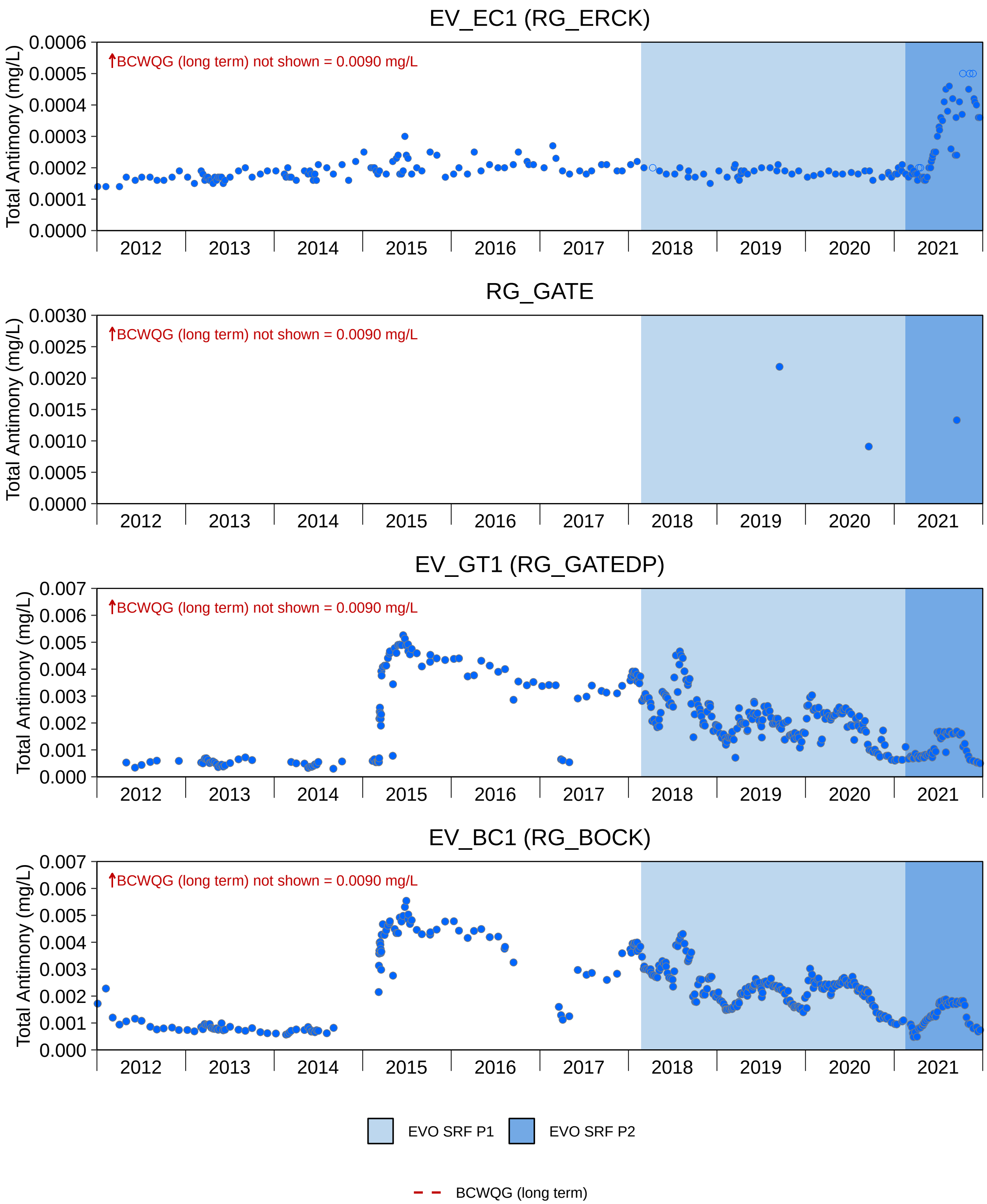

Figure D.21: Time Series Plots for Total Antimony from EVO LAEMP Areas, 2012 to 2021

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).

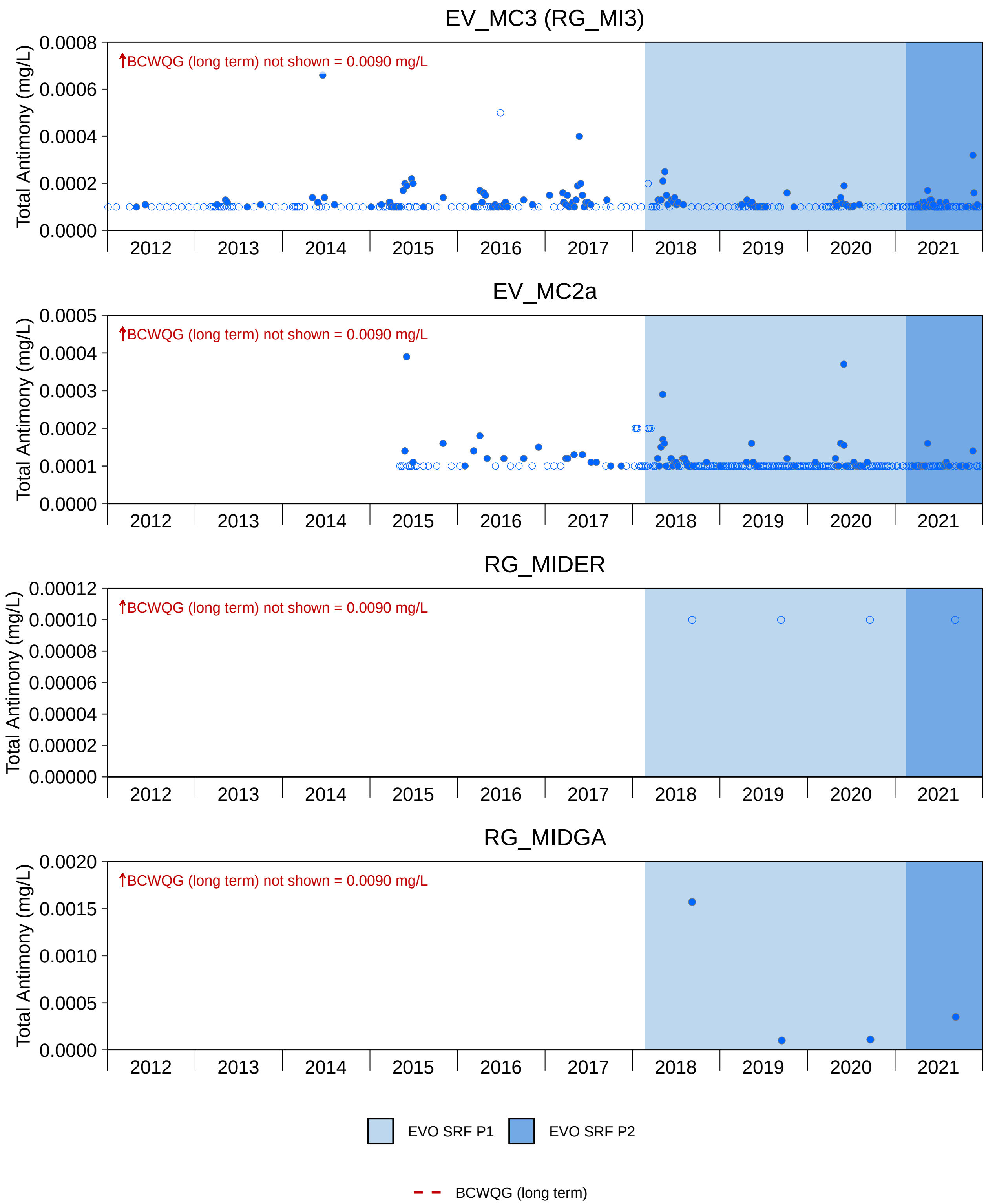

Figure D.21: Time Series Plots for Total Antimony from EVO LAEMP Areas, 2012 to 2021

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).

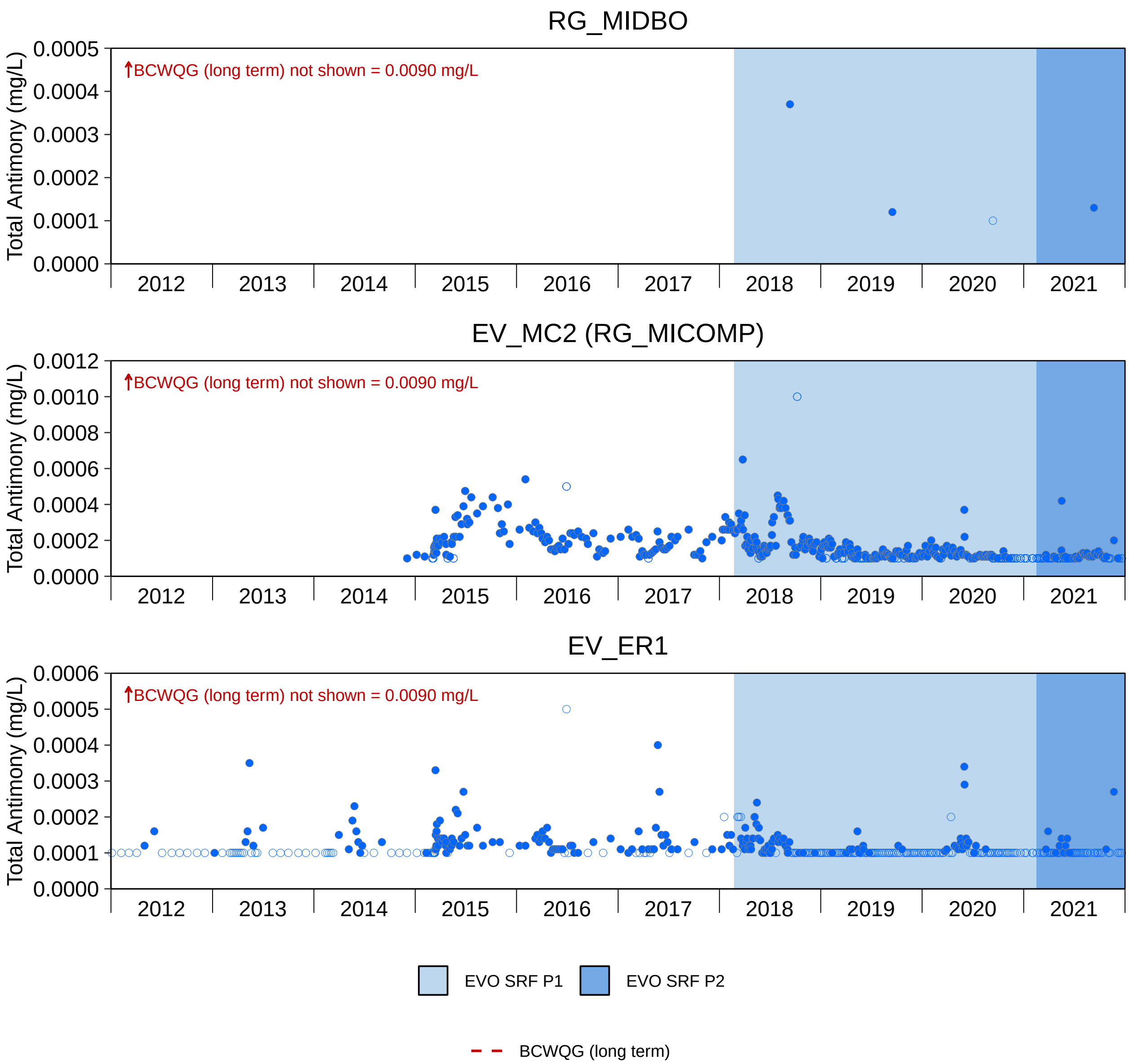

Figure D.21: Time Series Plots for Total Antimony from EVO LAEMP Areas, 2012 to 2021

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).

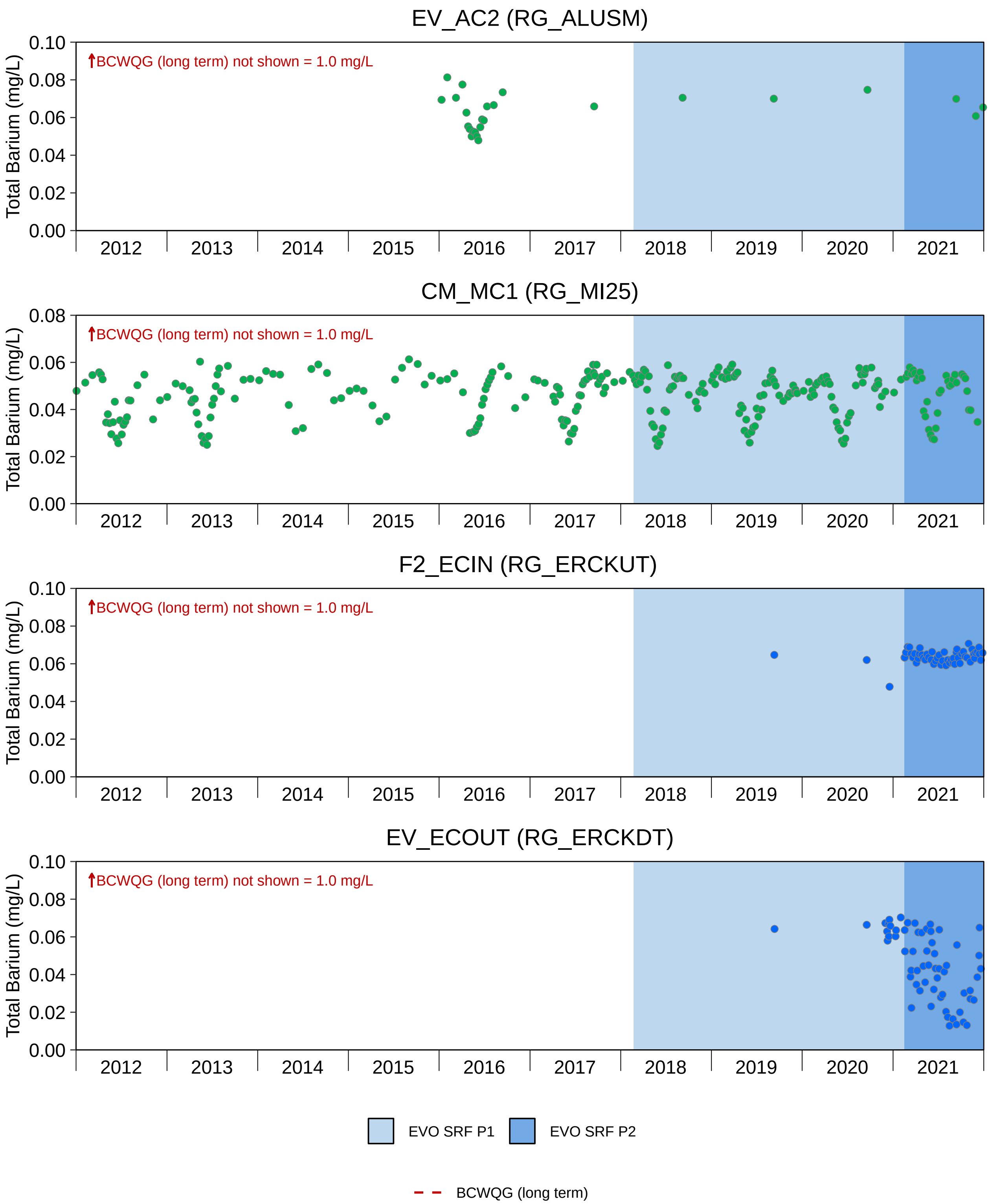

Figure D.22: Time Series Plots for Total Barium from EVO LAEMP Areas, 2012 to 2021

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).

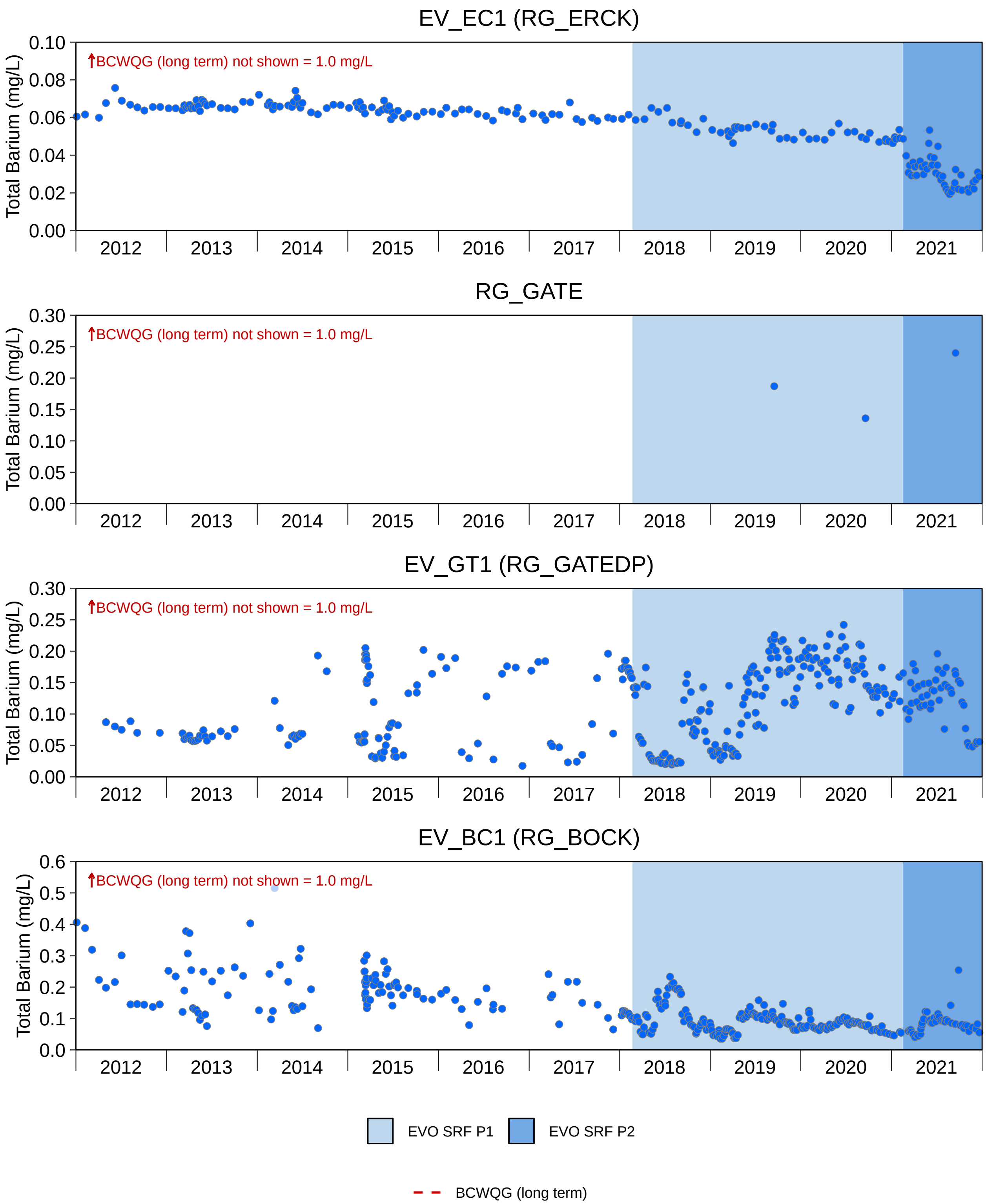

Figure D.22: Time Series Plots for Total Barium from EVO LAEMP Areas, 2012 to 2021

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).

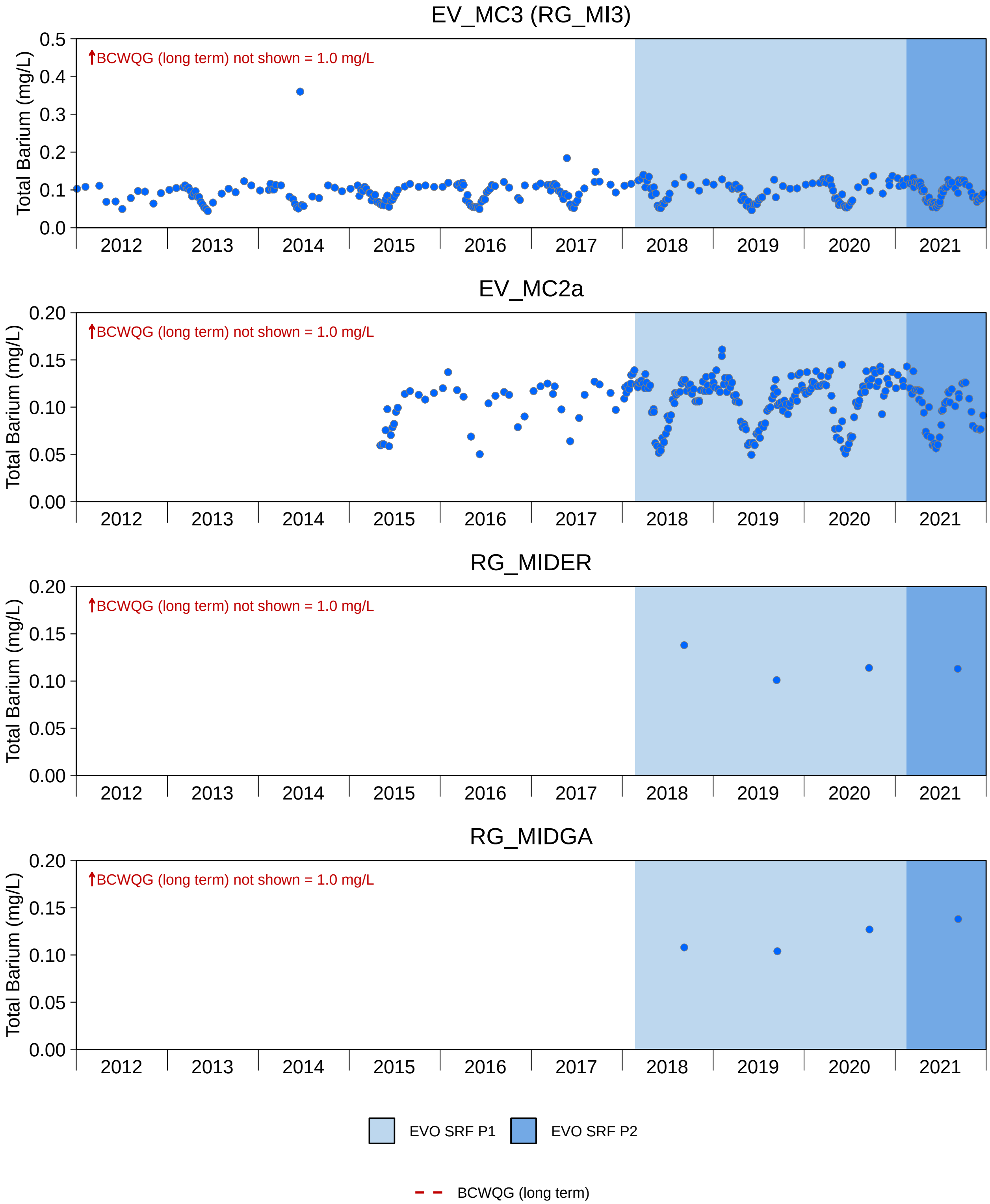

Figure D.22: Time Series Plots for Total Barium from EVO LAEMP Areas, 2012 to 2021

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).

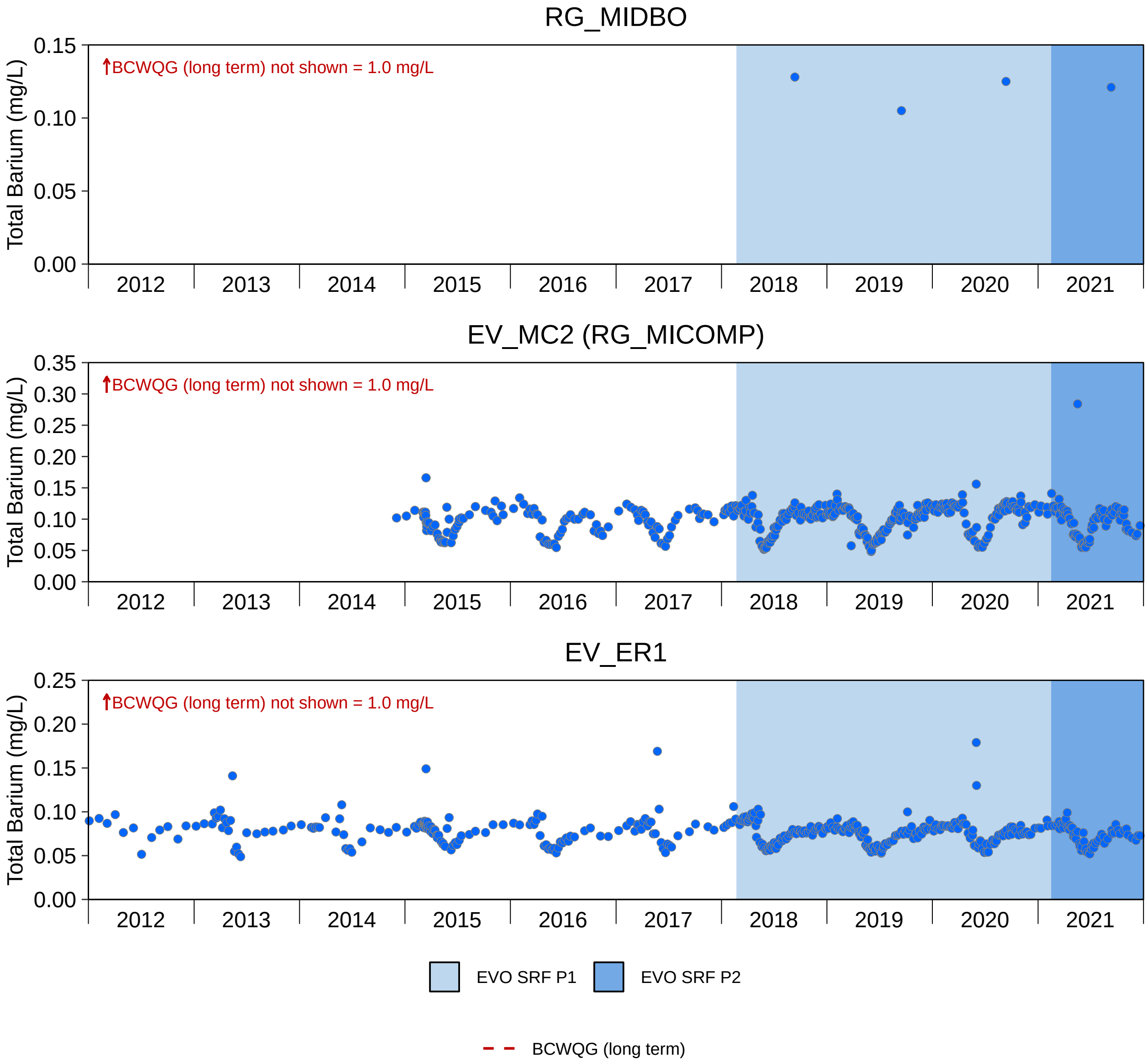

Figure D.22: Time Series Plots for Total Barium from EVO LAEMP Areas, 2012 to 2021

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).

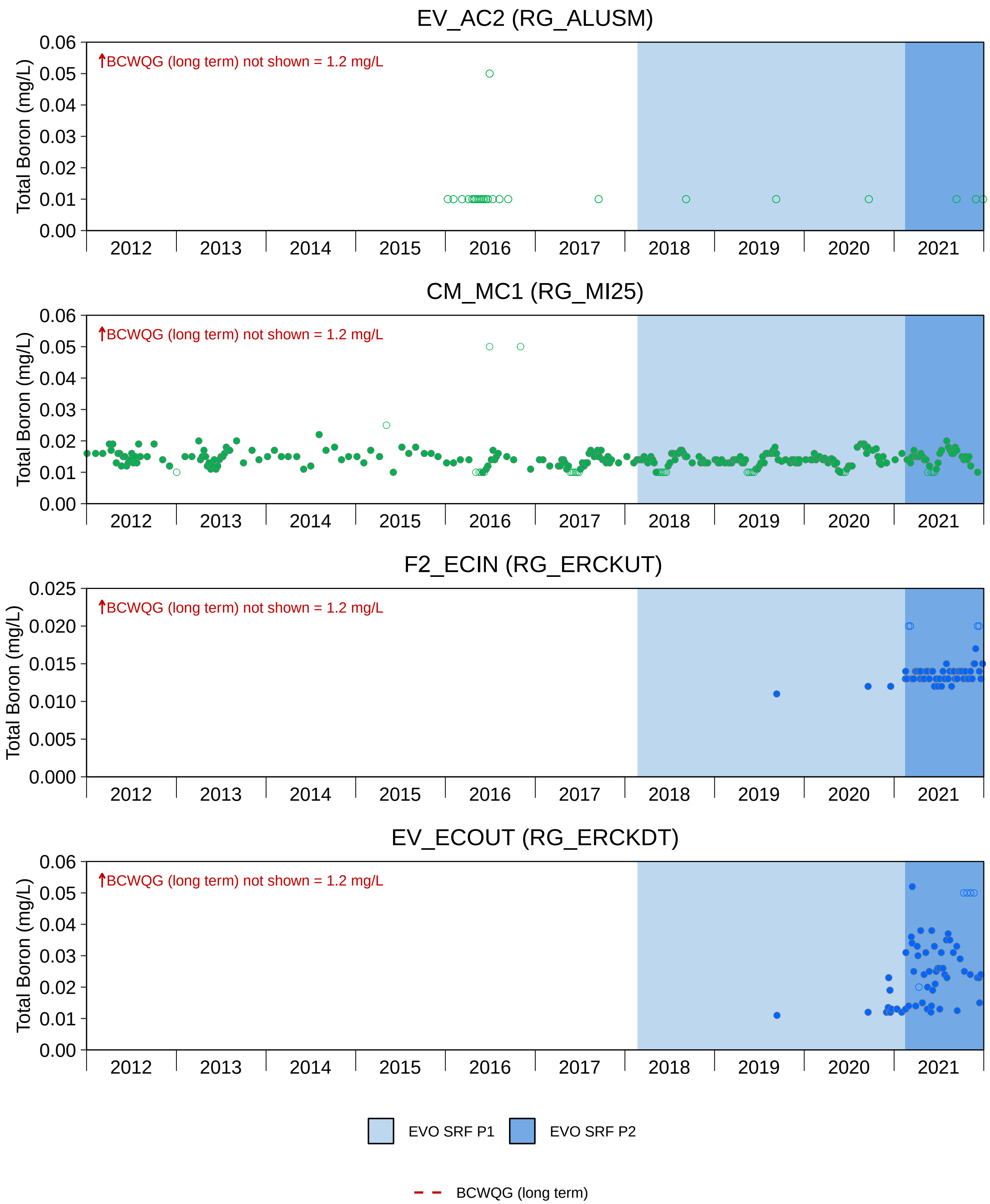

Figure D.23: Time Series Plots for Total Boron from EVO LAEMP Areas, 2012 to 2021

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).

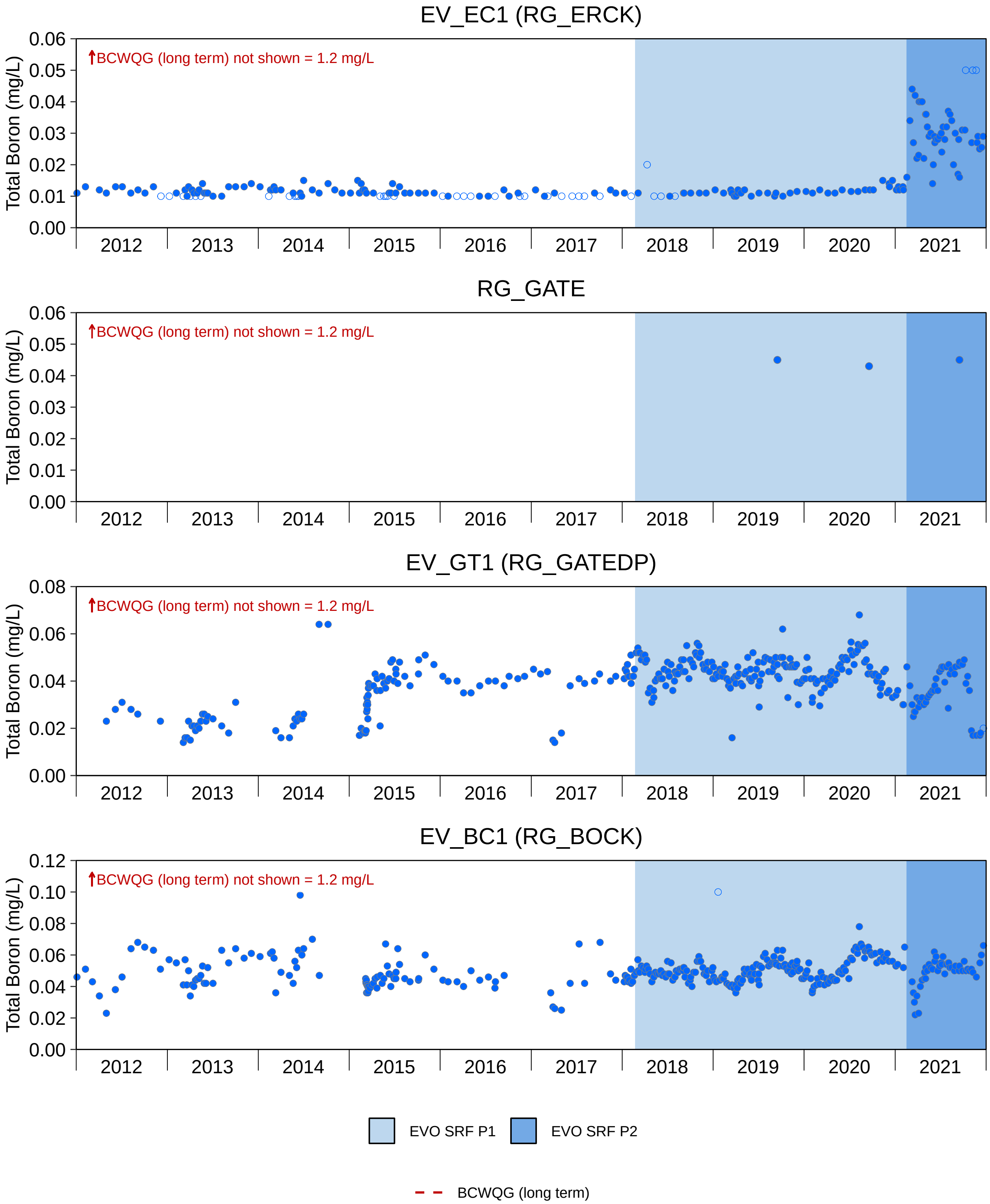

Figure D.23: Time Series Plots for Total Boron from EVO LAEMP Areas, 2012 to 2021

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).

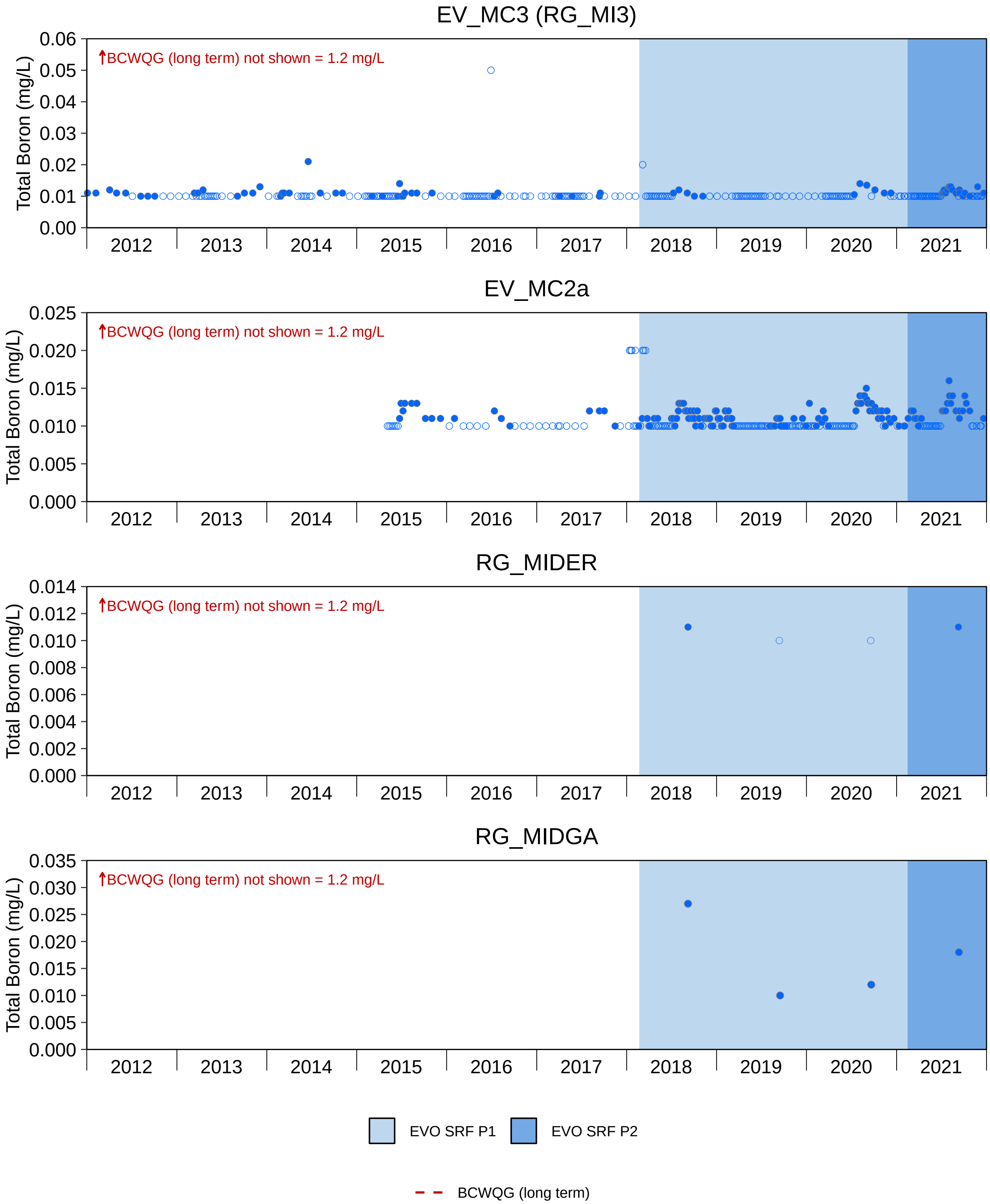

Figure D.23: Time Series Plots for Total Boron from EVO LAEMP Areas, 2012 to 2021

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).

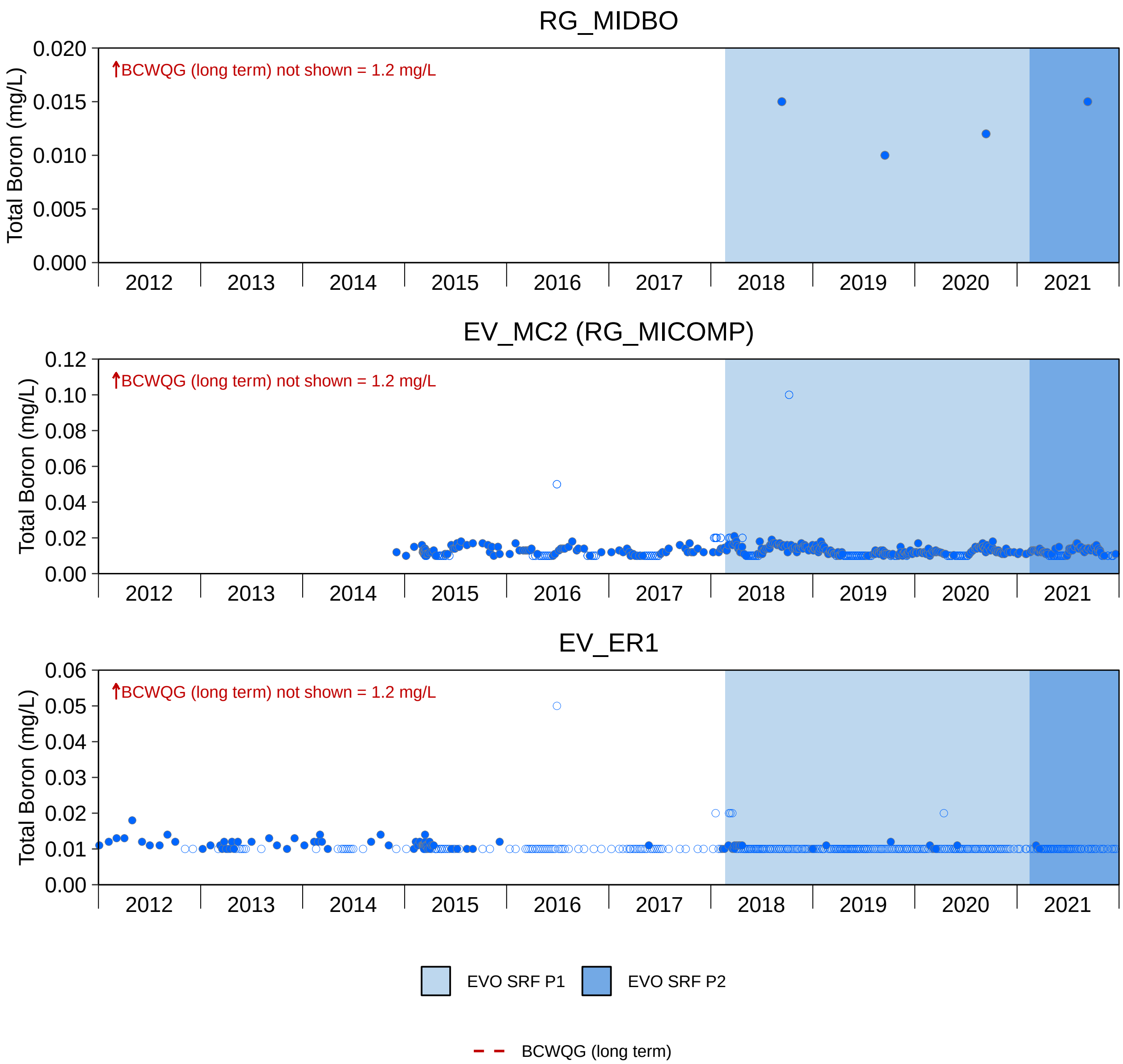

Figure D.23: Time Series Plots for Total Boron from EVO LAEMP Areas, 2012 to 2021

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).

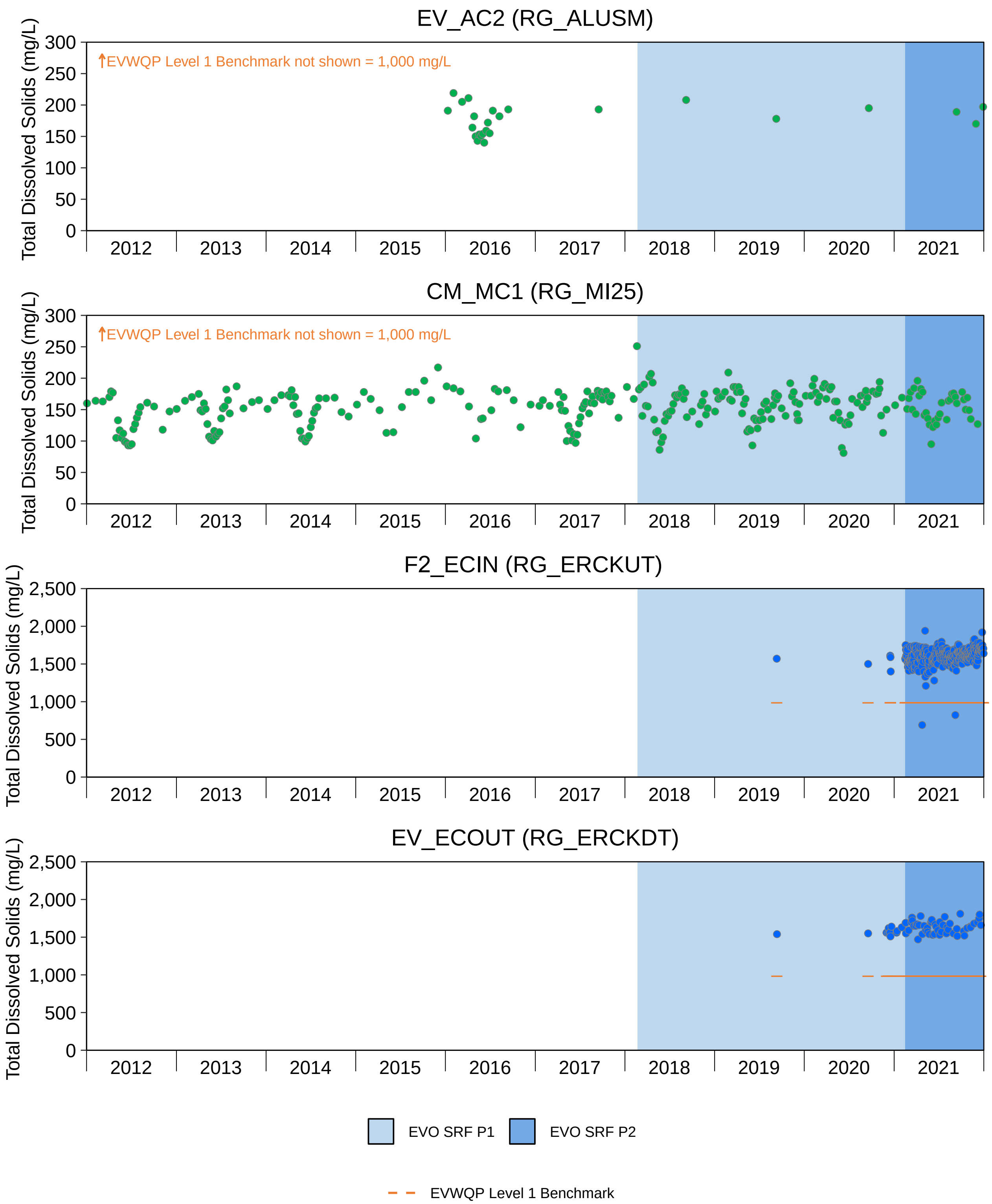

Figure D.24: Time Series Plots for Total Dissolved Solids from EVO LAEMP Areas, 2012 to 2021

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).

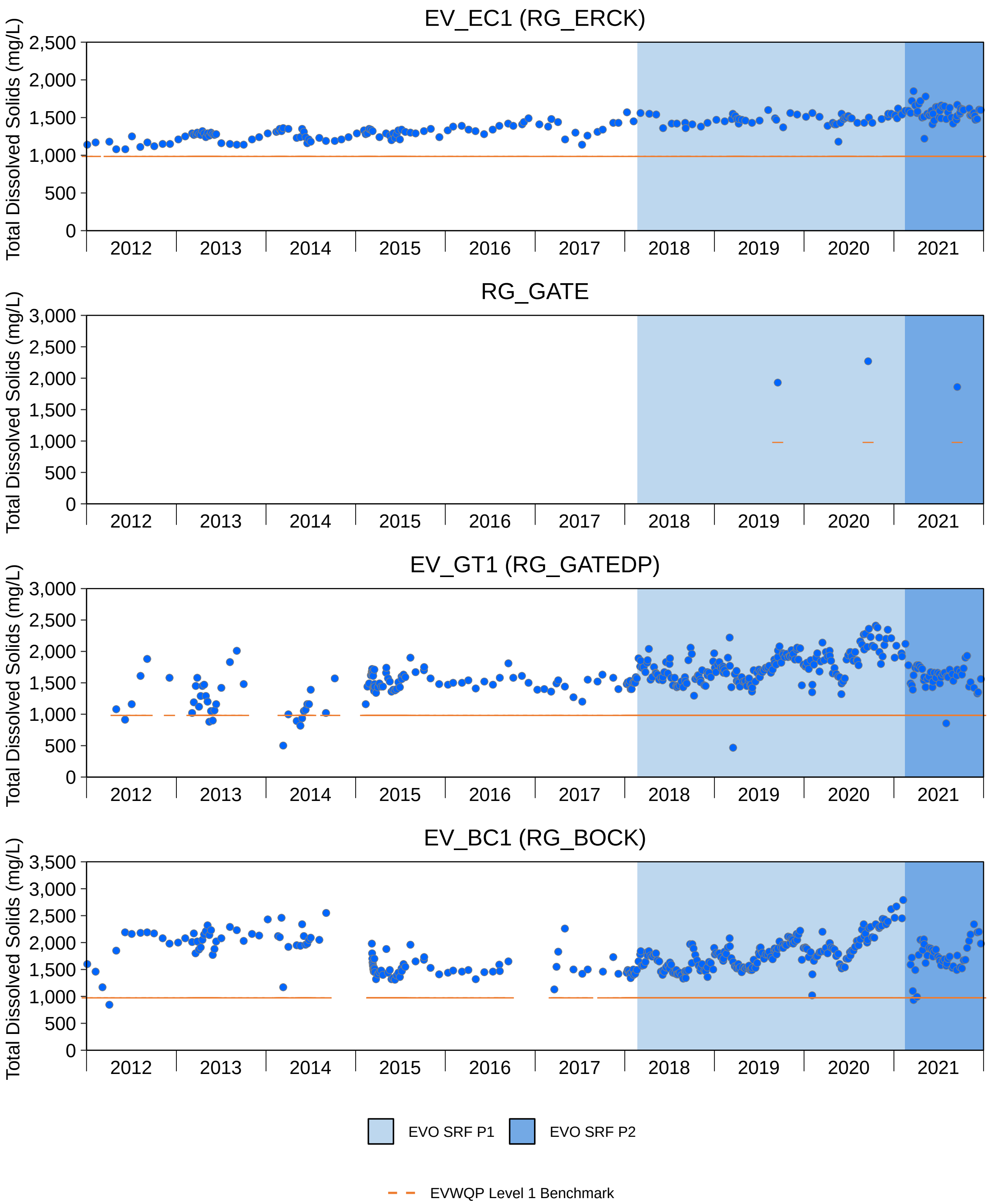

Figure D.24: Time Series Plots for Total Dissolved Solids from EVO LAEMP Areas, 2012 to 2021

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).

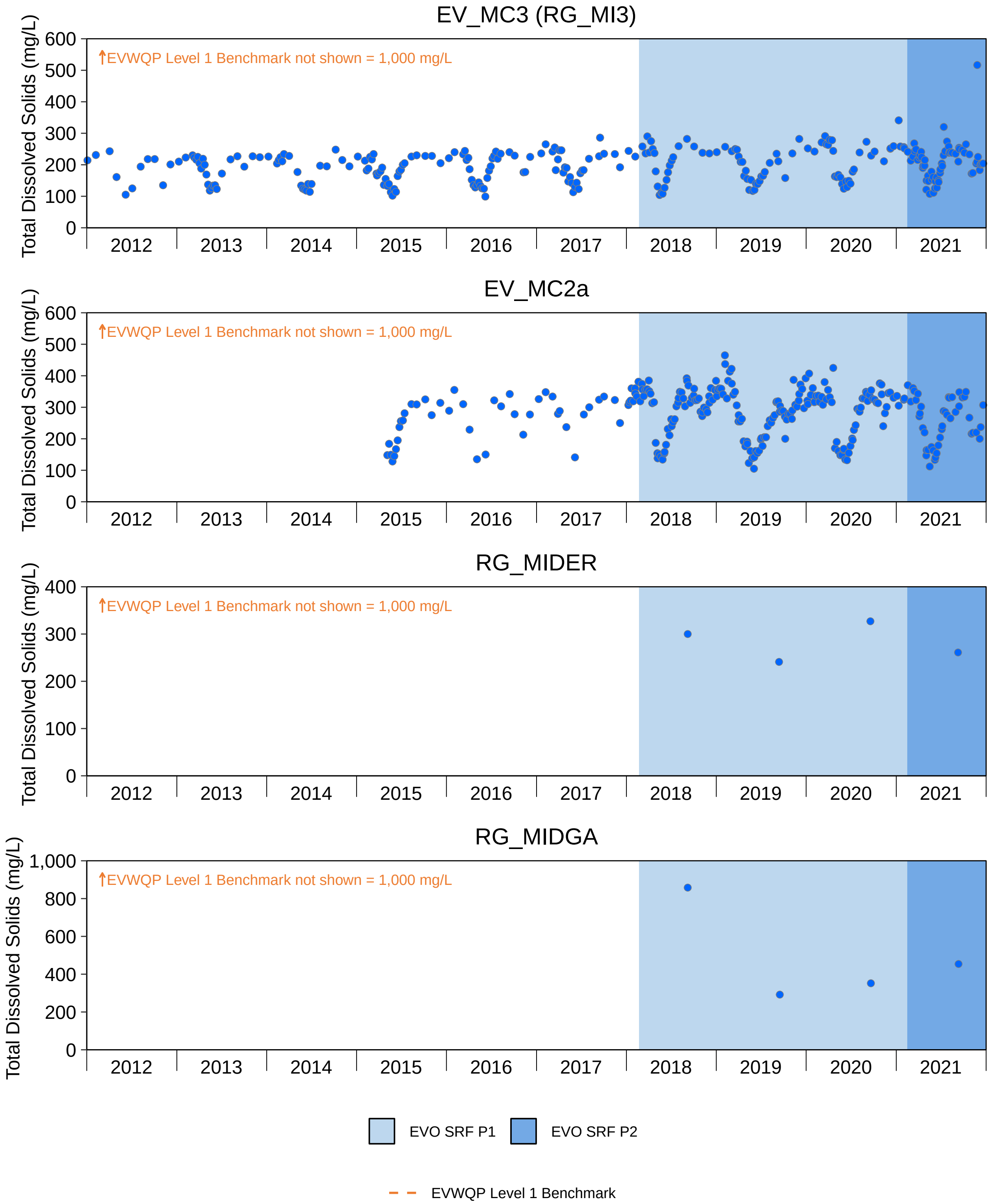

Figure D.24: Time Series Plots for Total Dissolved Solids from EVO LAEMP Areas, 2012 to 2021

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).

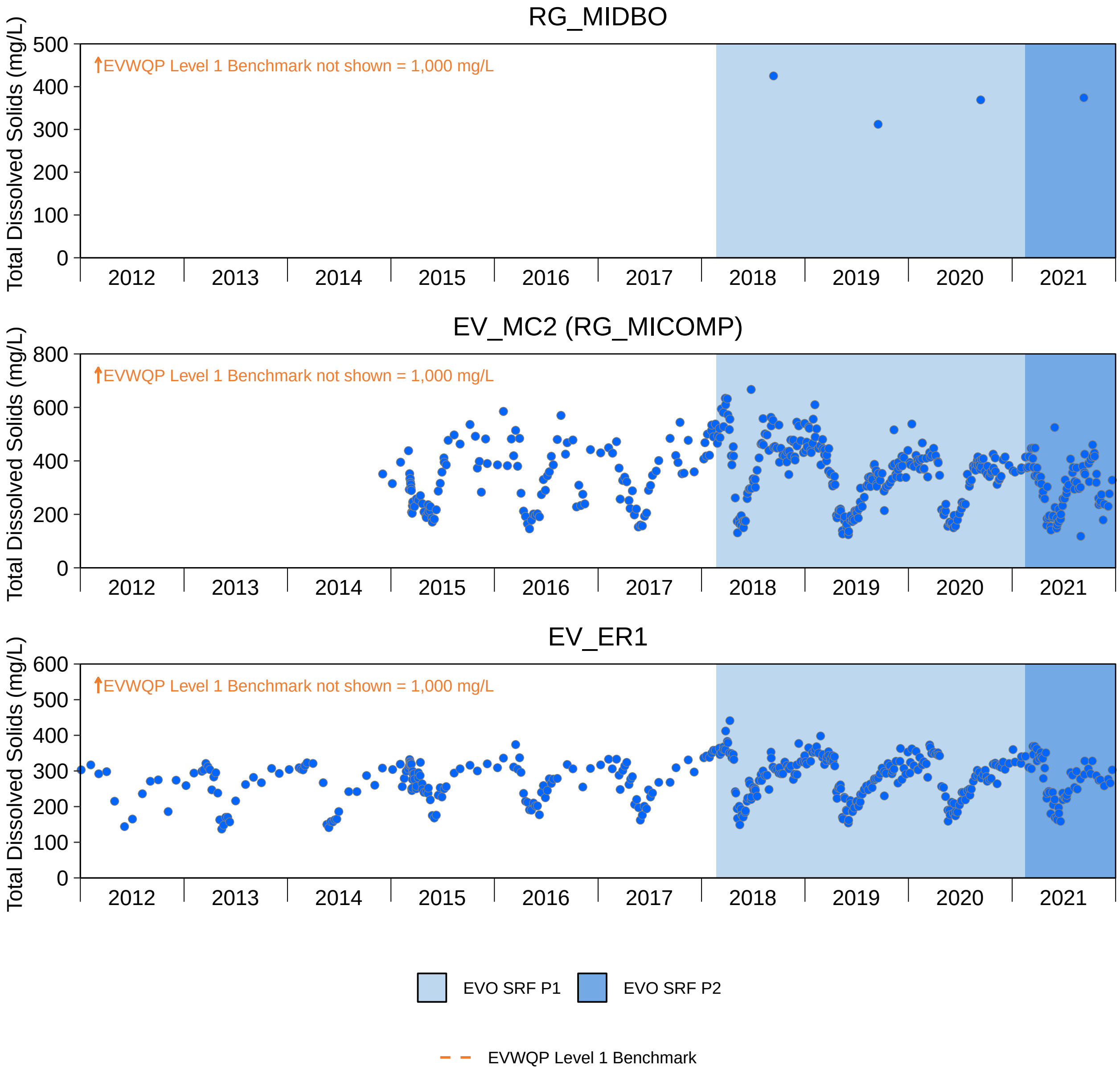

Figure D.24: Time Series Plots for Total Dissolved Solids from EVO LAEMP Areas, 2012 to 2021

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).

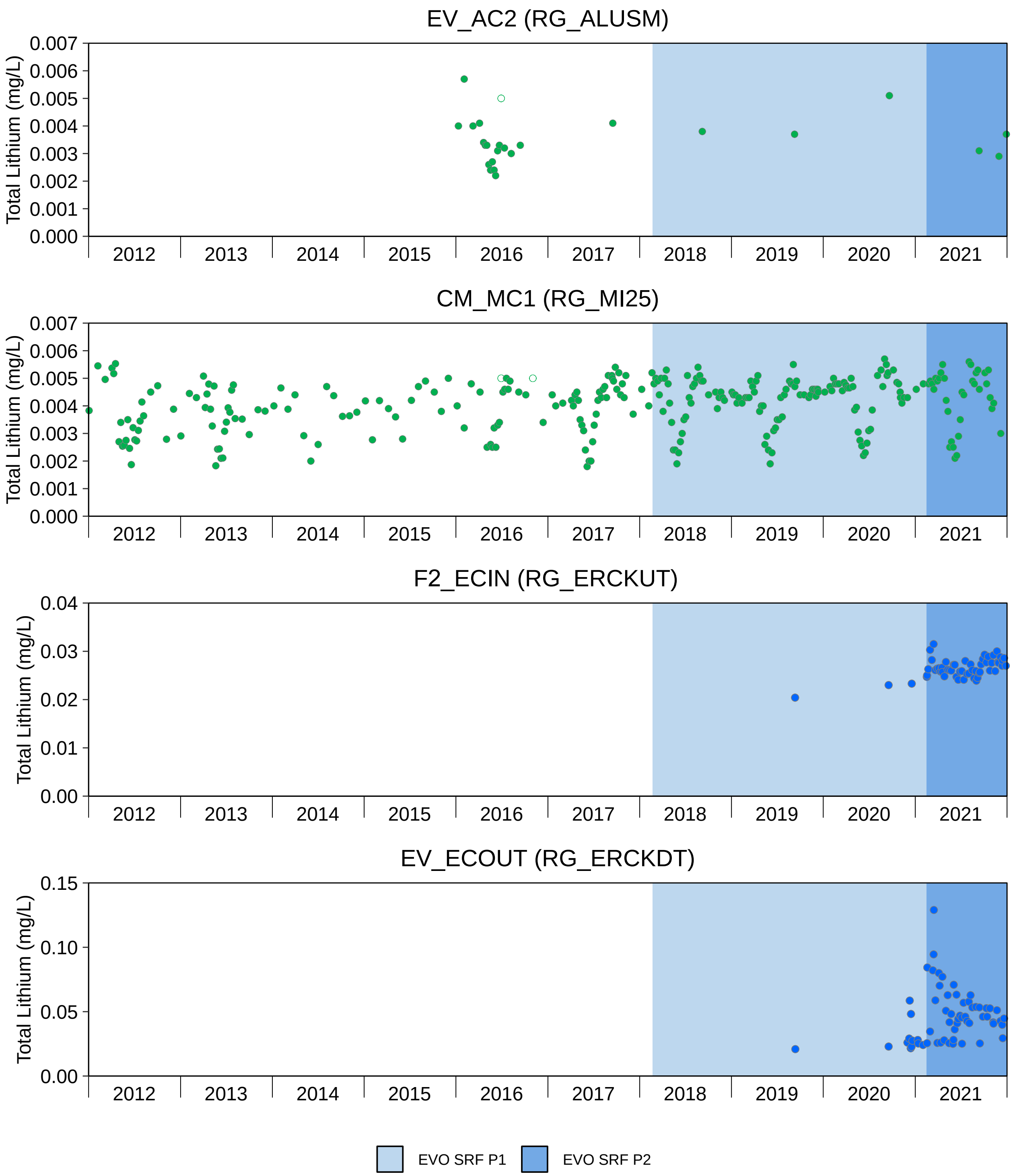

Figure D.25: Time Series Plots for Total Lithium from EVO LAEMP Areas, 2012 to 2021

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).

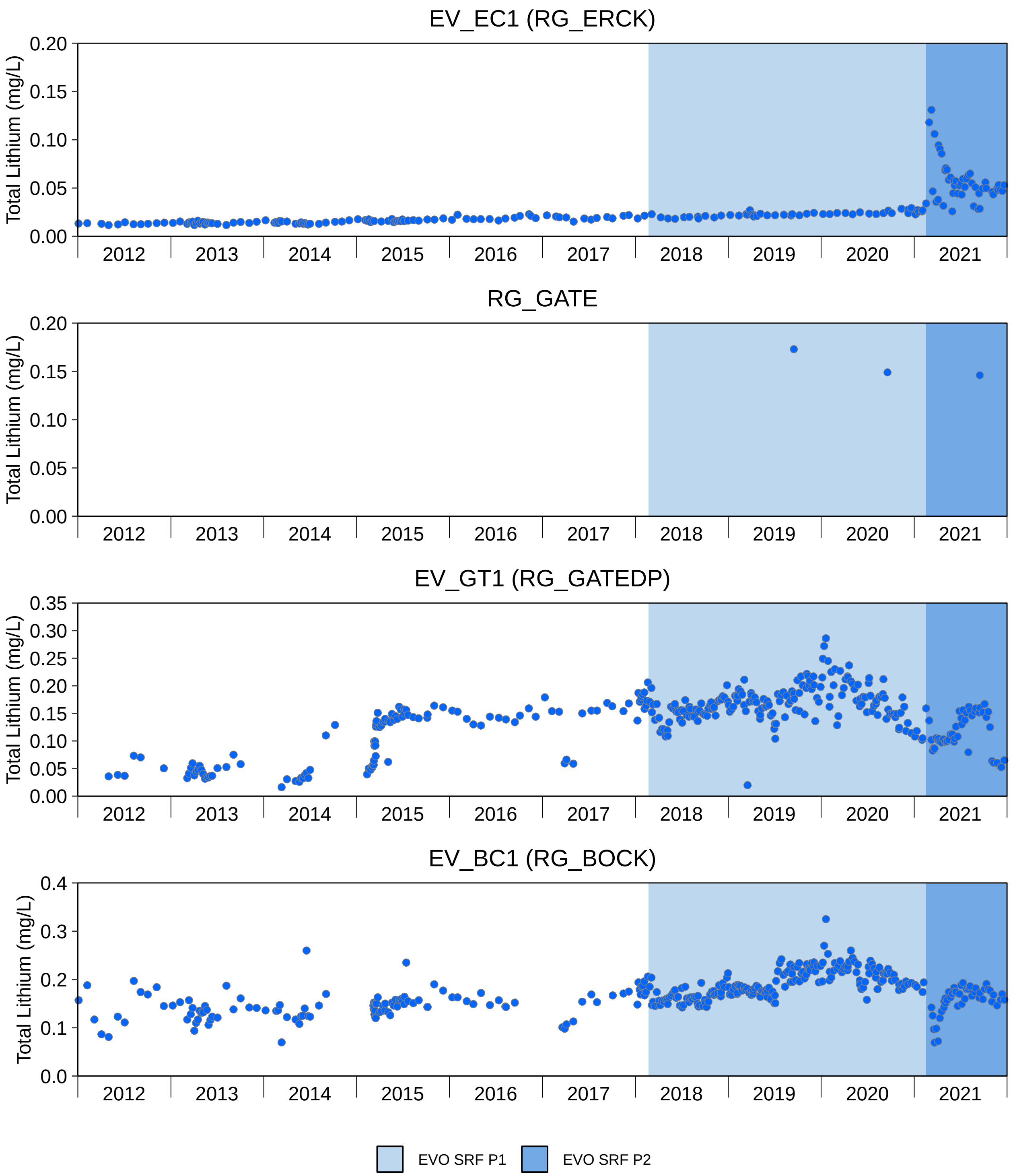

Figure D.25: Time Series Plots for Total Lithium from EVO LAEMP Areas, 2012 to 2021

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).

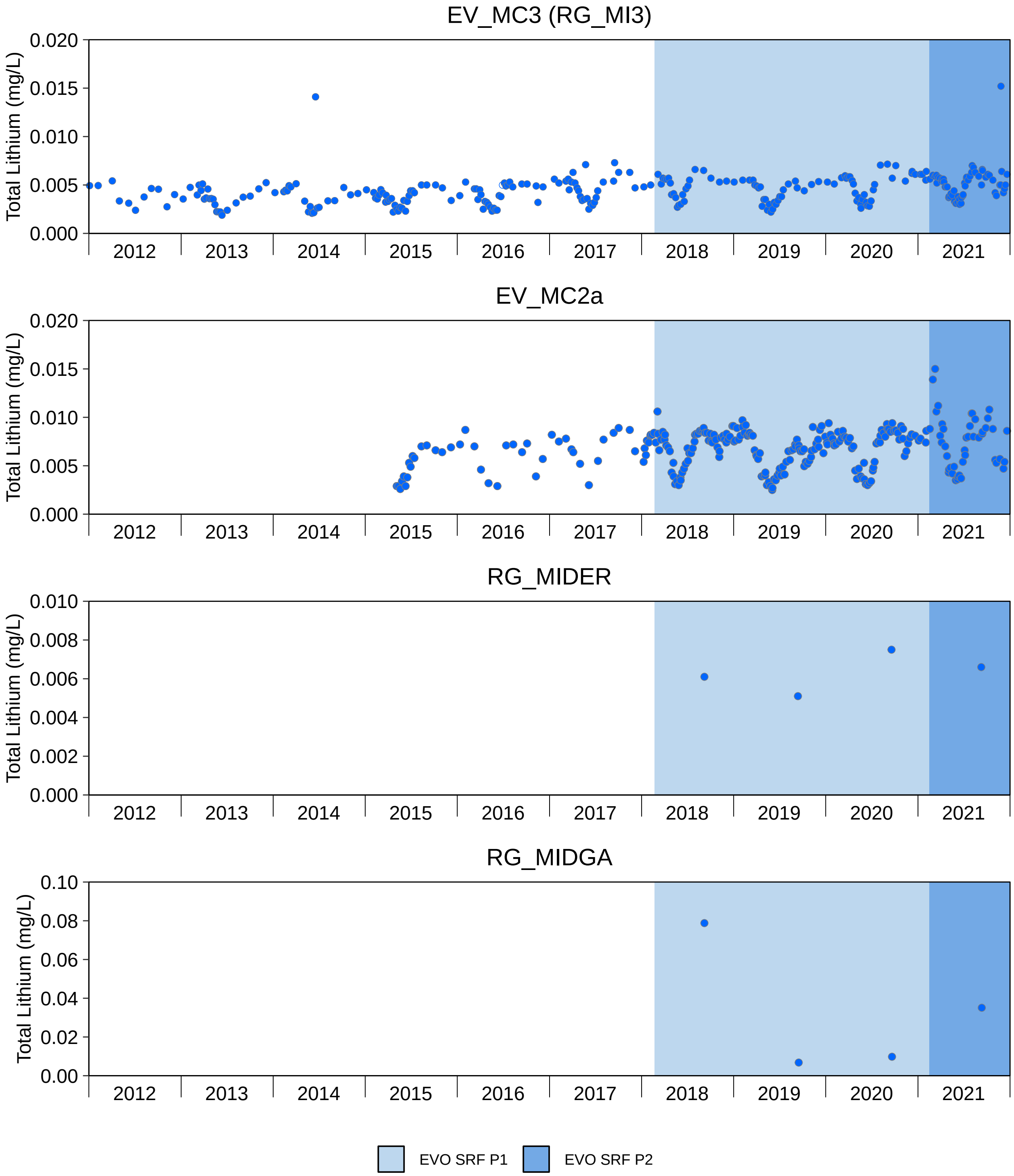

Figure D.25: Time Series Plots for Total Lithium from EVO LAEMP Areas, 2012 to 2021

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).

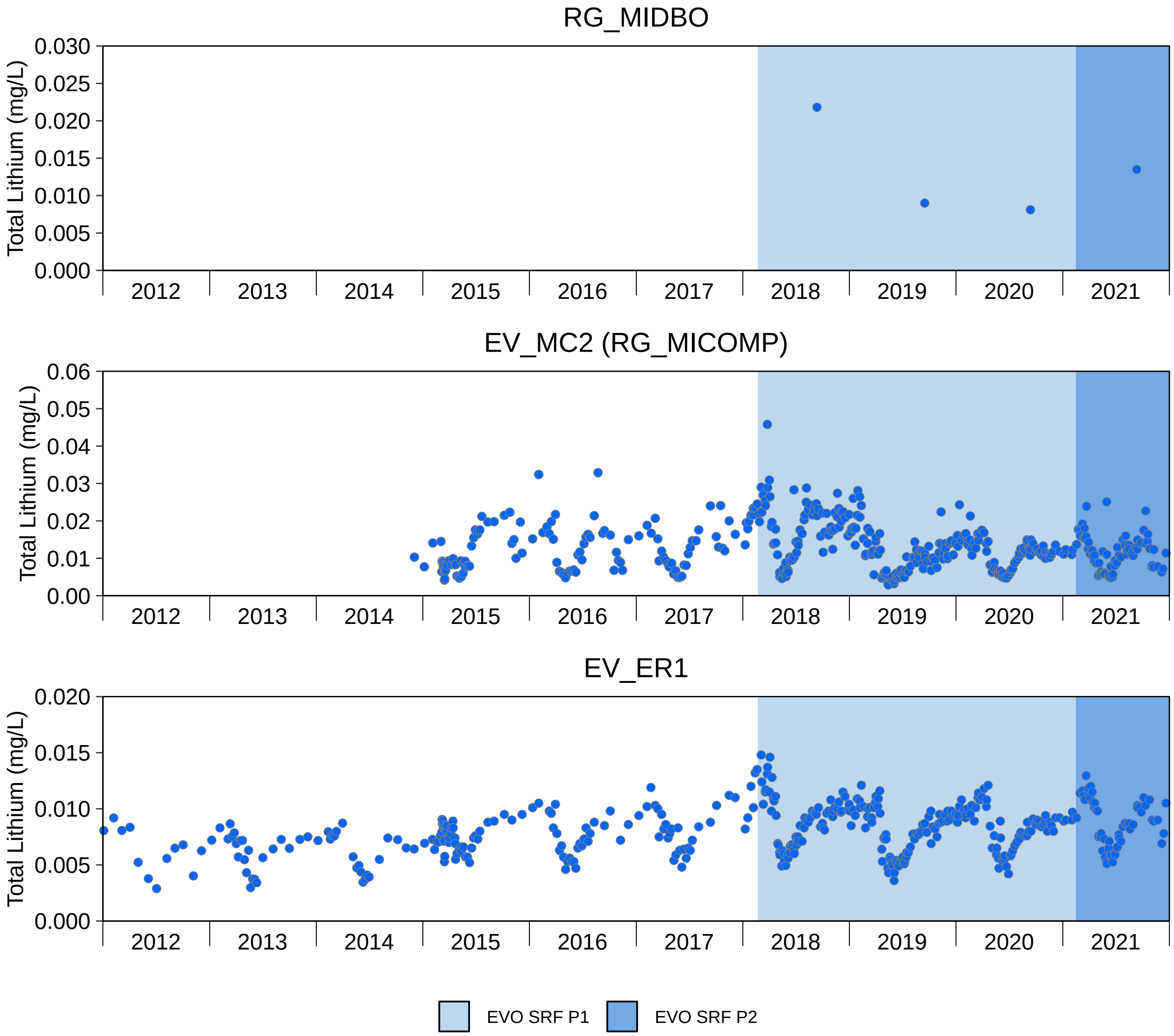

Figure D.25: Time Series Plots for Total Lithium from EVO LAEMP Areas, 2012 to 2021

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).

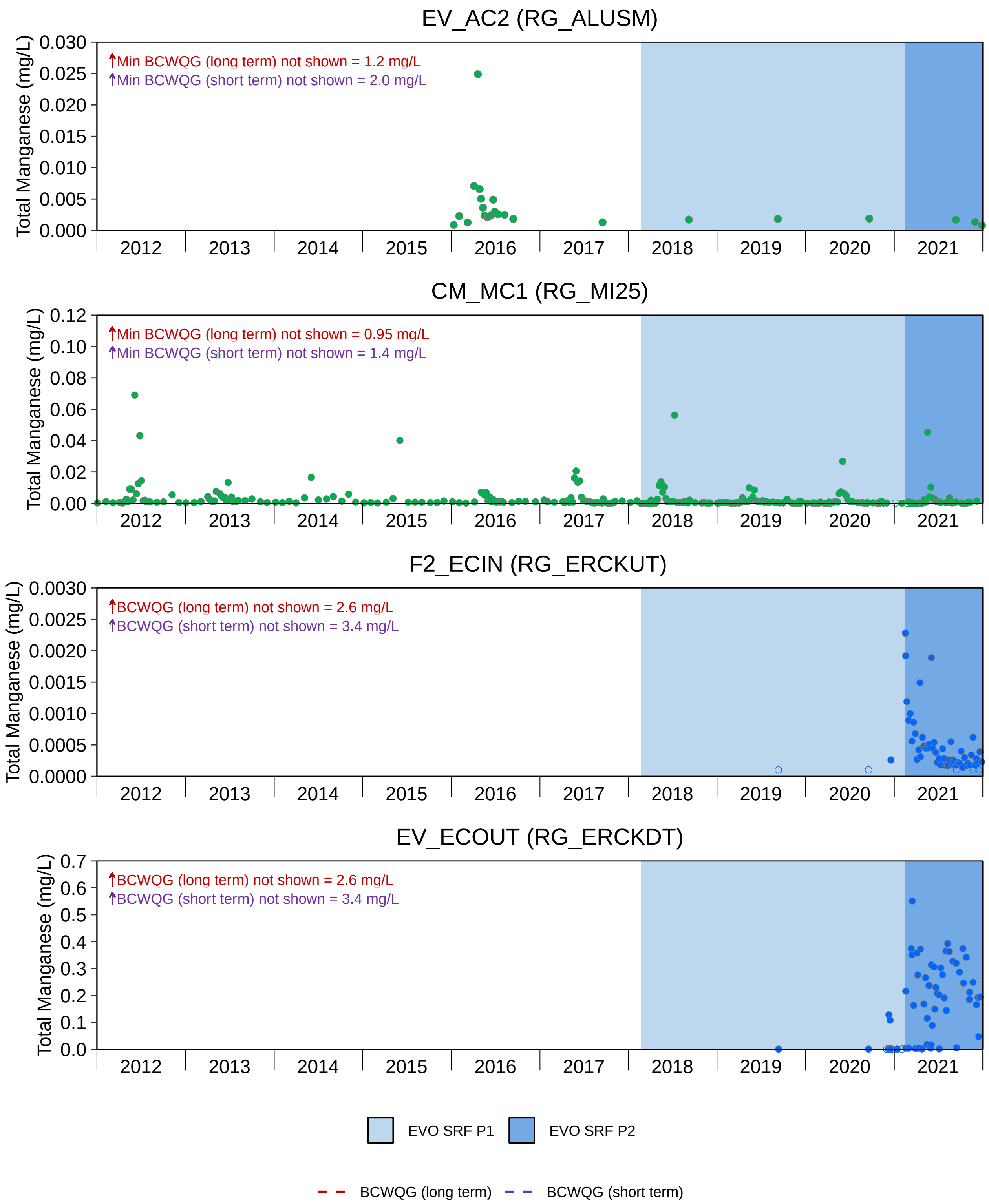

Figure D.26: Time Series Plots for Total Manganese from EVO LAEMP Areas, 2012 to 2021

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).

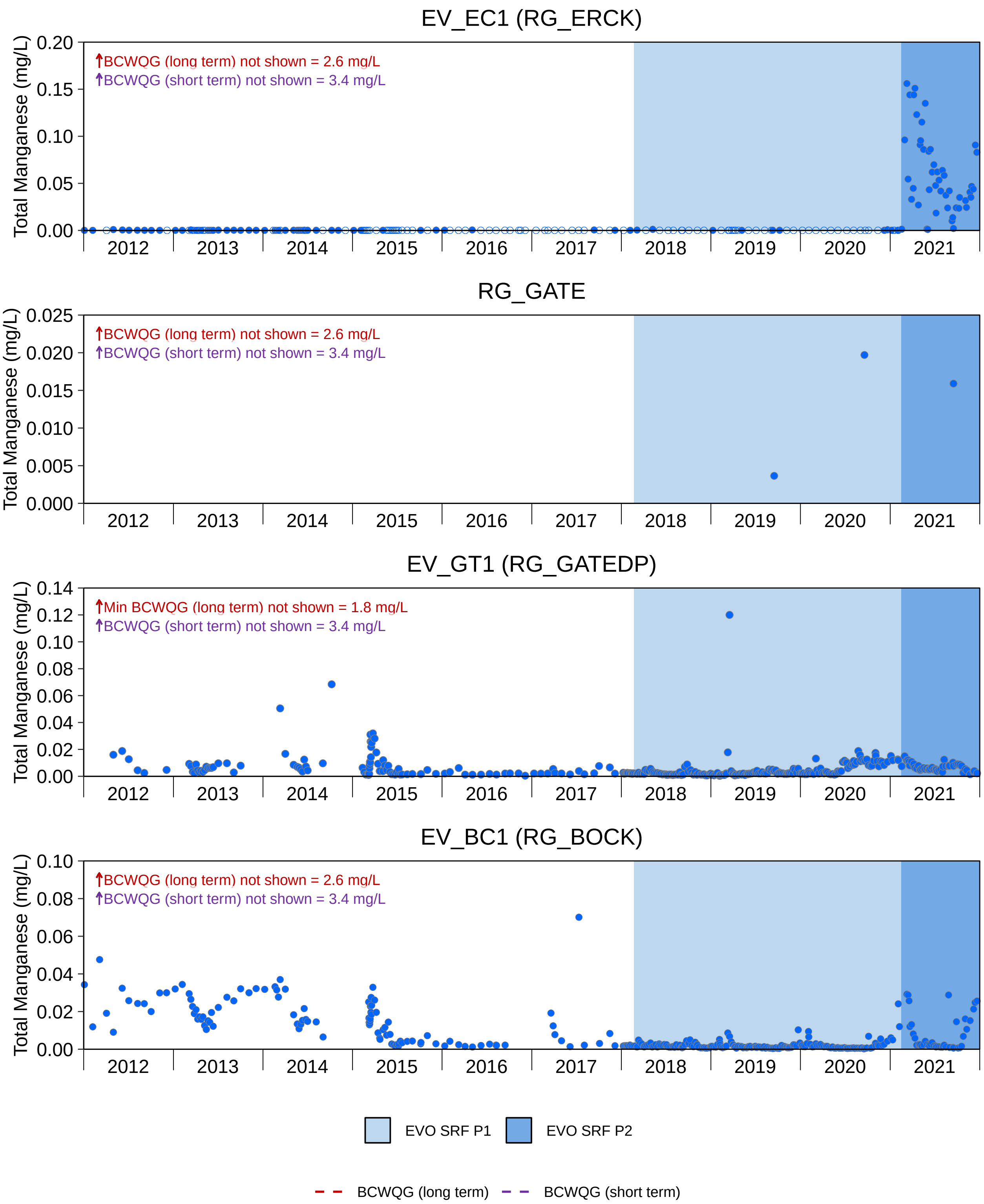

Figure D.26: Time Series Plots for Total Manganese from EVO LAEMP Areas, 2012 to 2021

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).

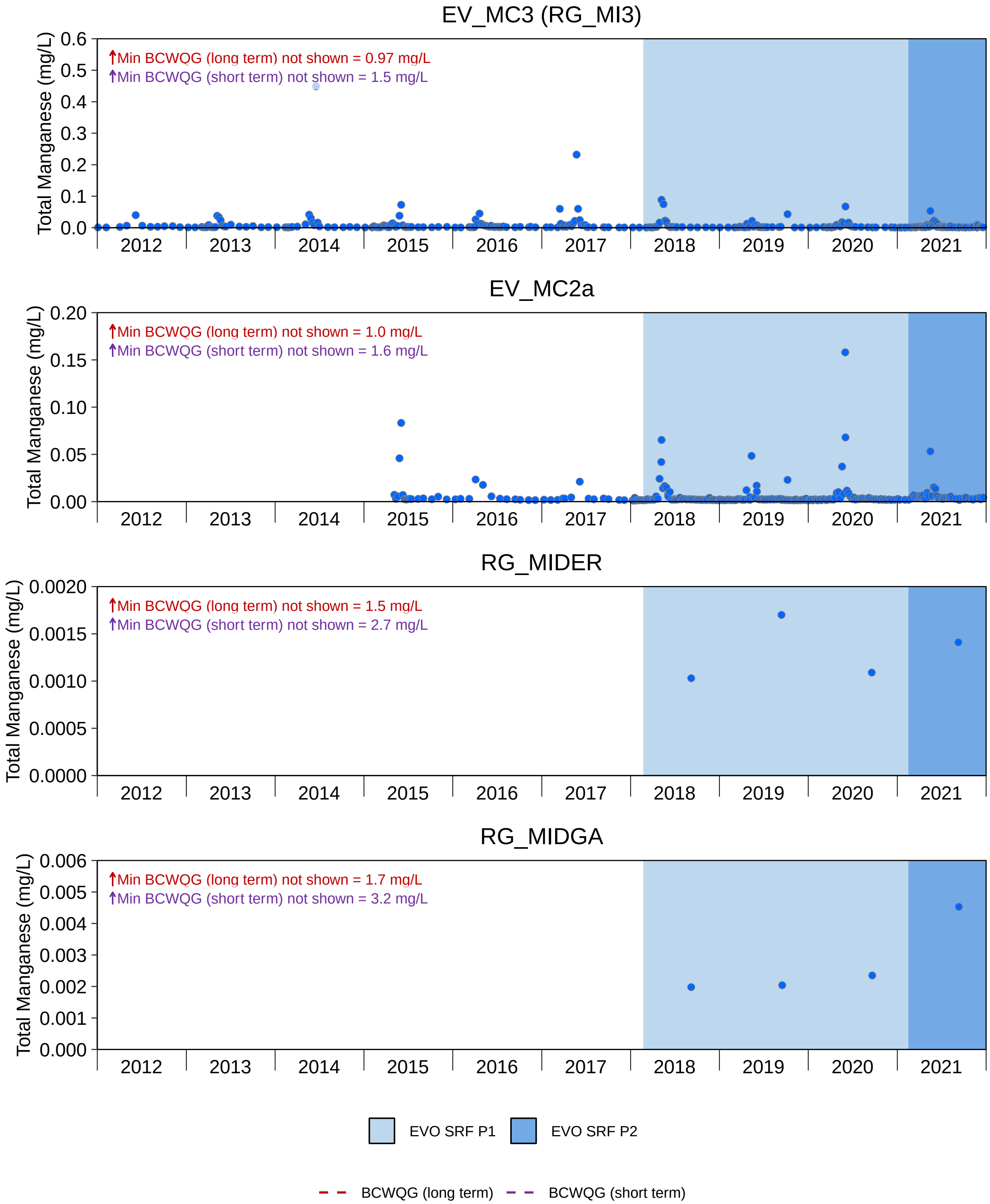

Figure D.26: Time Series Plots for Total Manganese from EVO LAEMP Areas, 2012 to 2021

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).

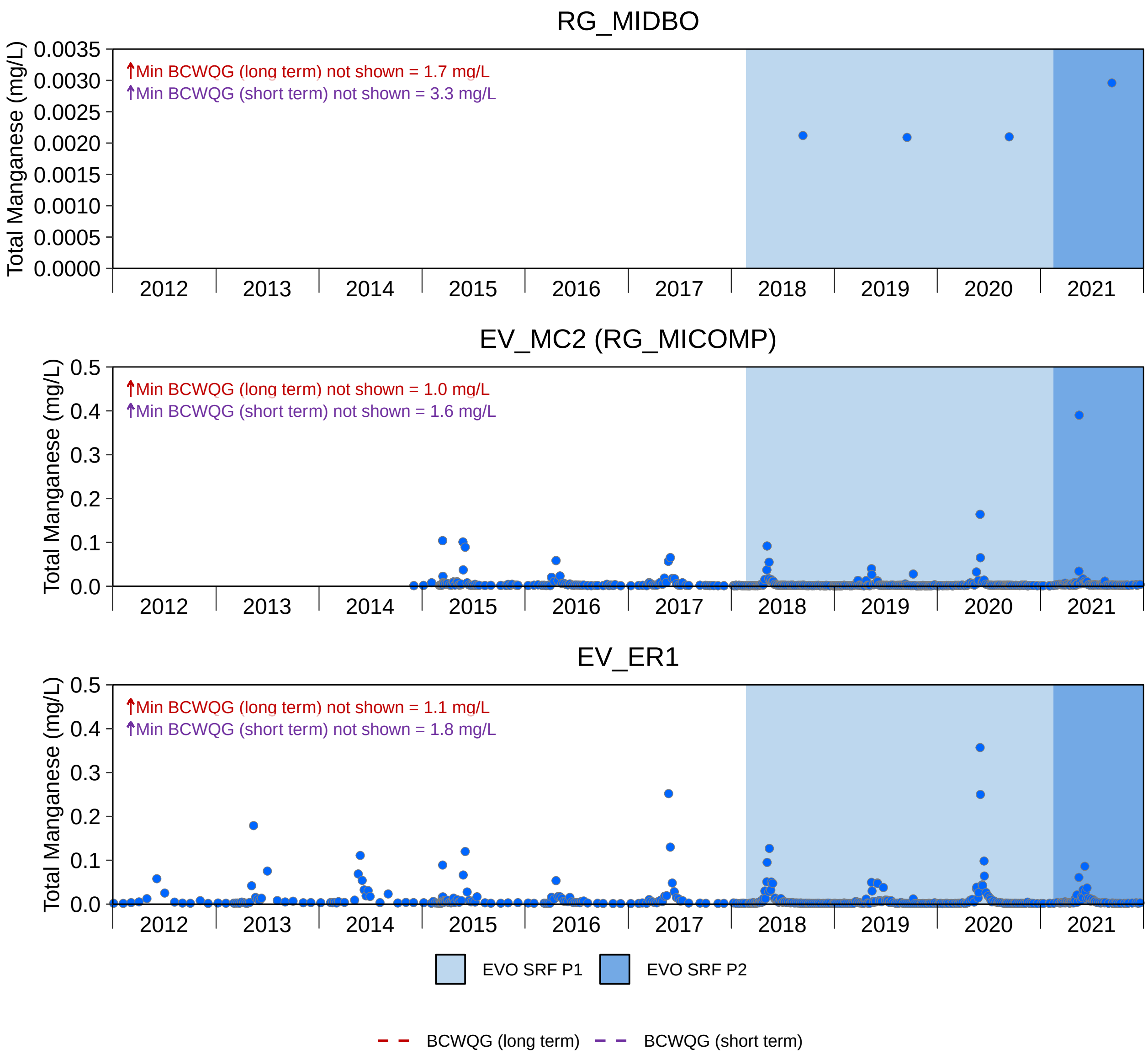

Figure D.26: Time Series Plots for Total Manganese from EVO LAEMP Areas, 2012 to 2021

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).

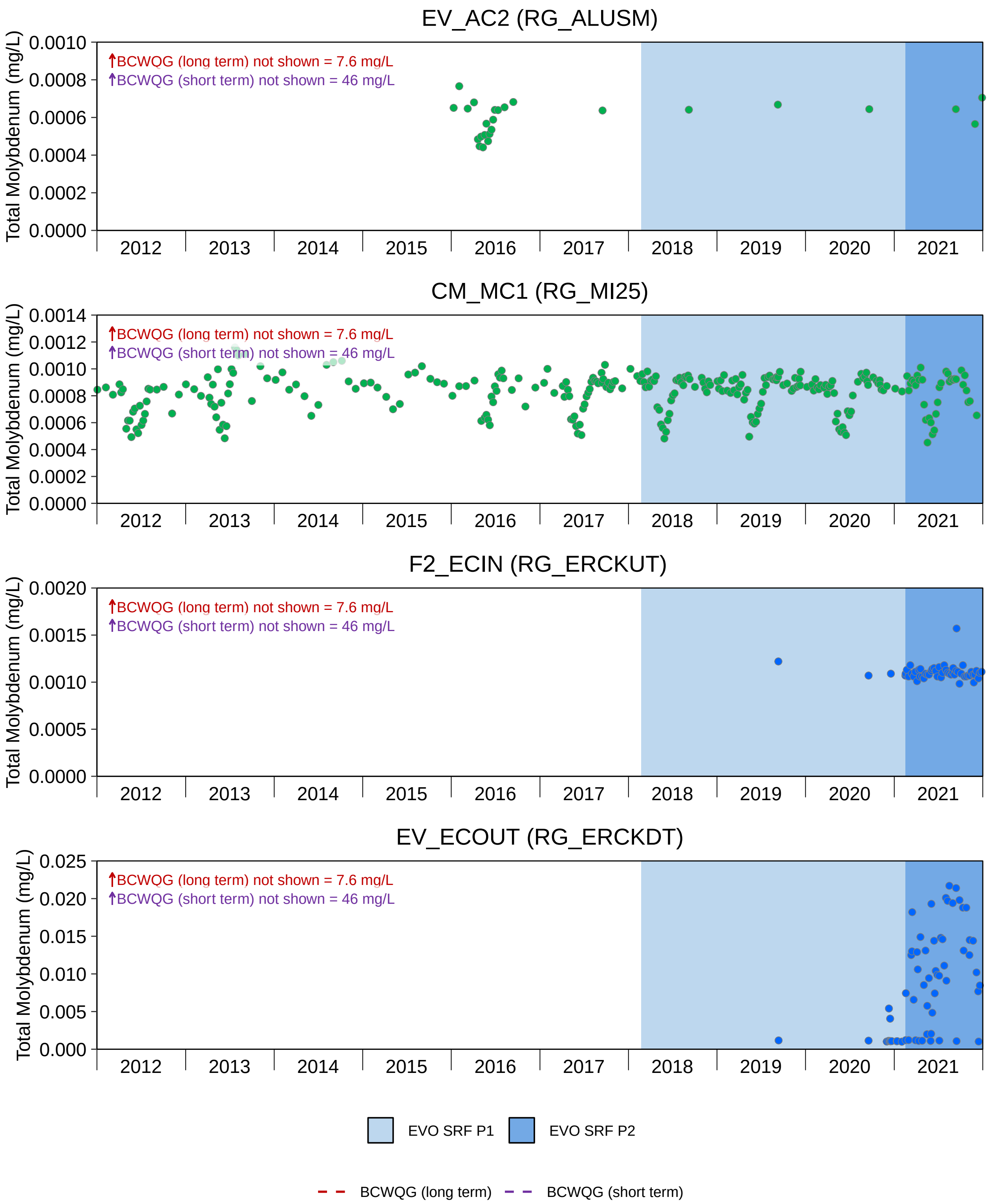

Figure D.27: Time Series Plots for Total Molybdenum from EVO LAEMP Areas, 2012 to 2021

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).

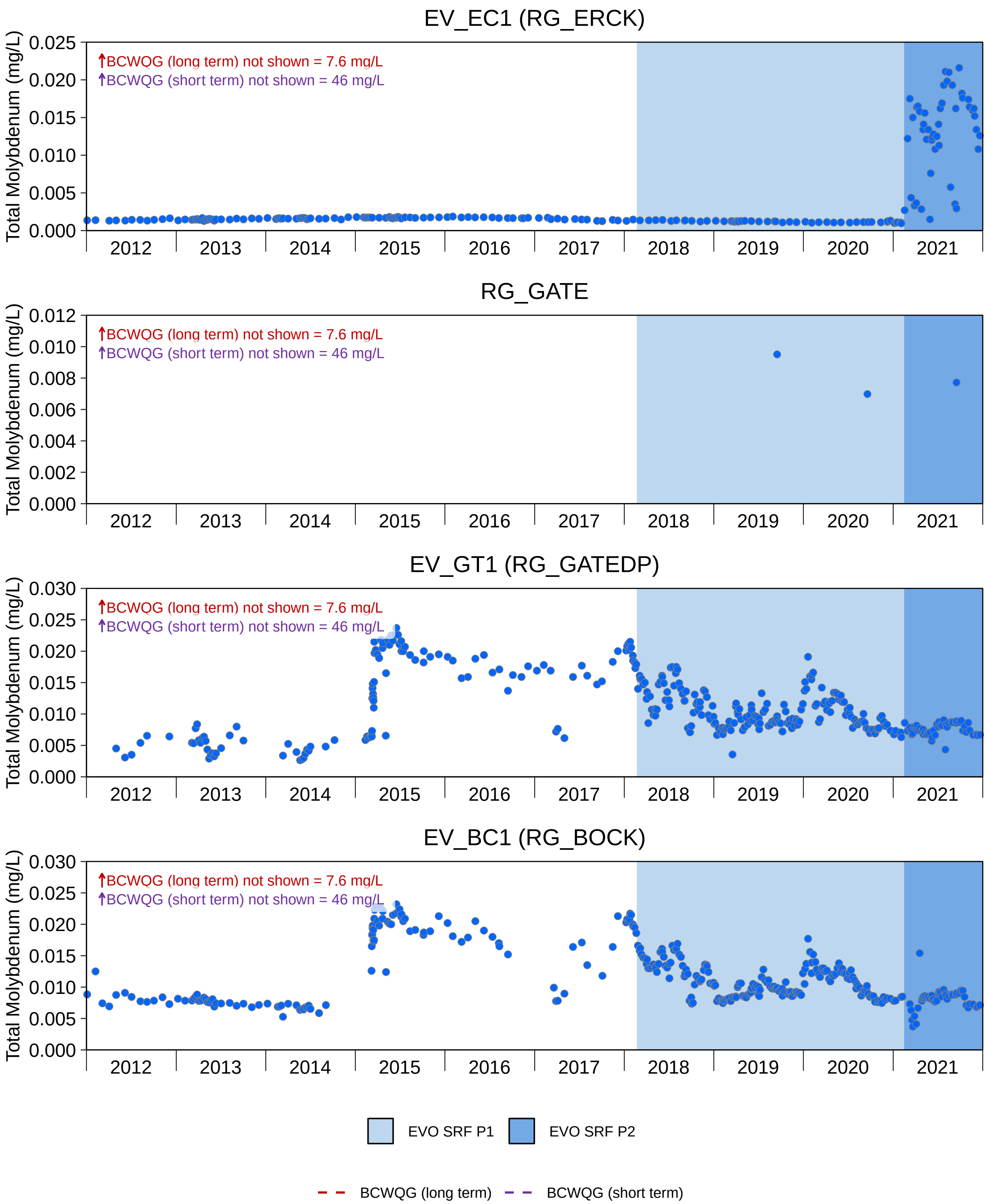

Figure D.27: Time Series Plots for Total Molybdenum from EVO LAEMP Areas, 2012 to 2021

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).

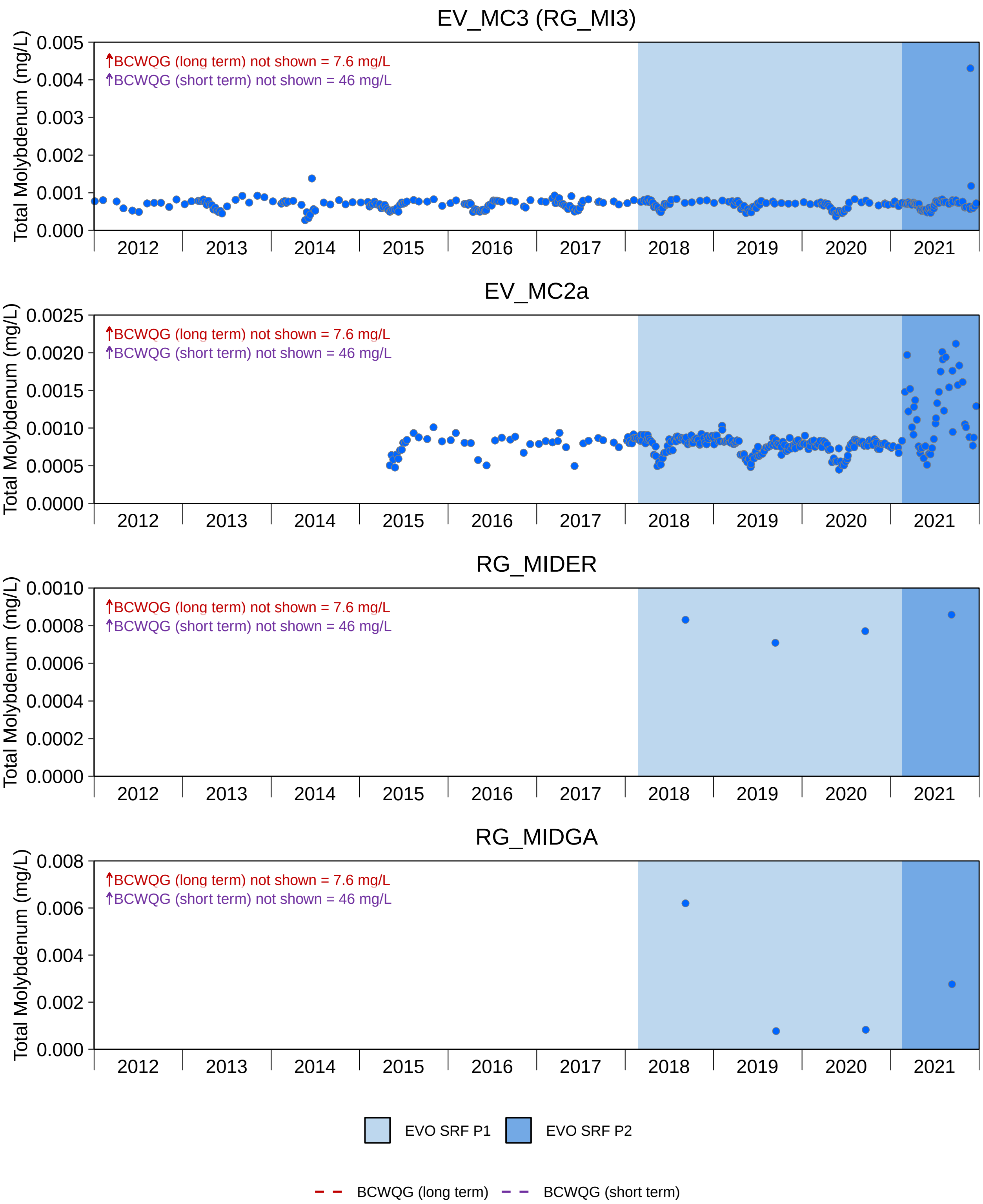

Figure D.27: Time Series Plots for Total Molybdenum from EVO LAEMP Areas, 2012 to 2021

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).

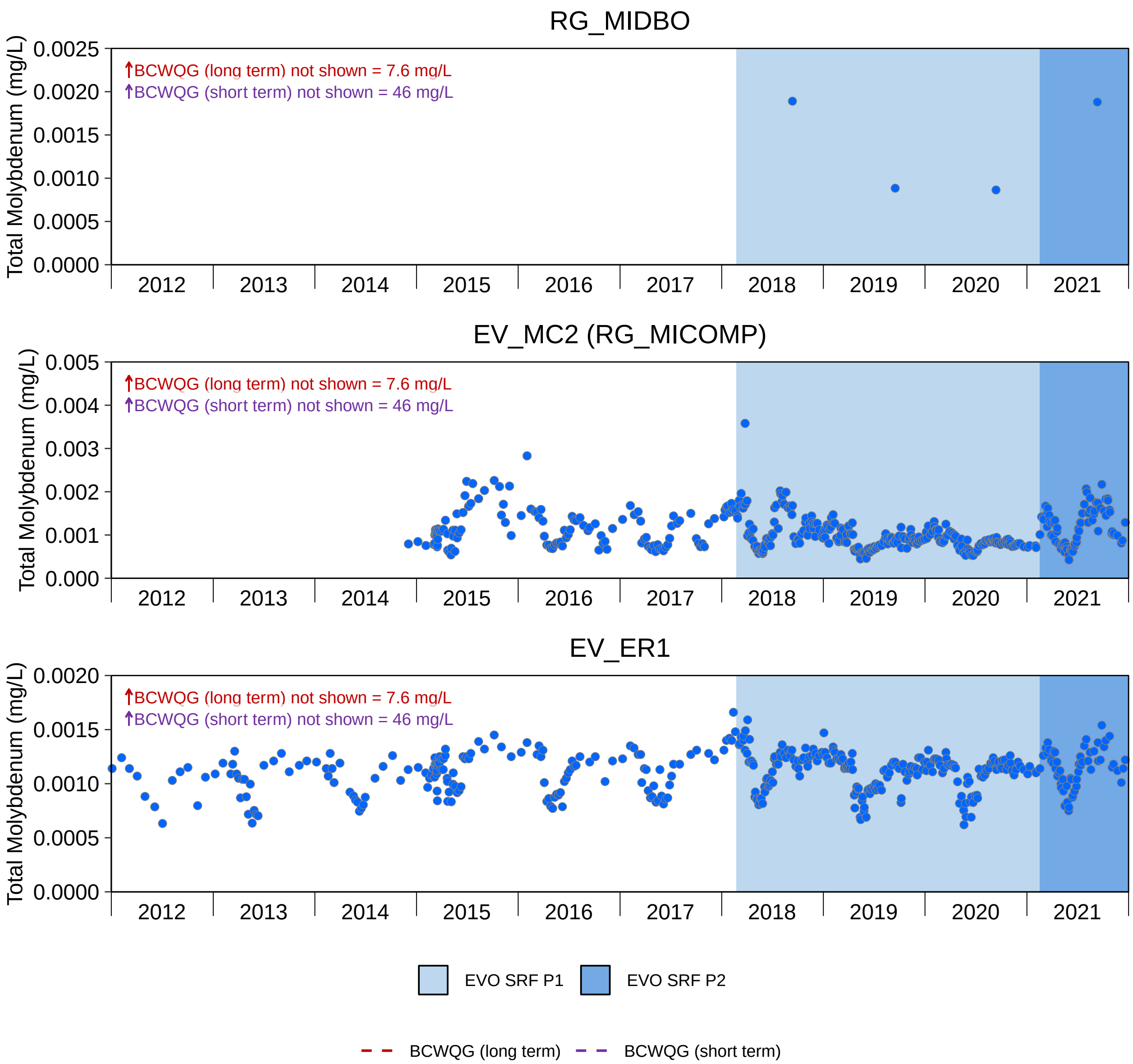

Figure D.27: Time Series Plots for Total Molybdenum from EVO LAEMP Areas, 2012 to 2021

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).

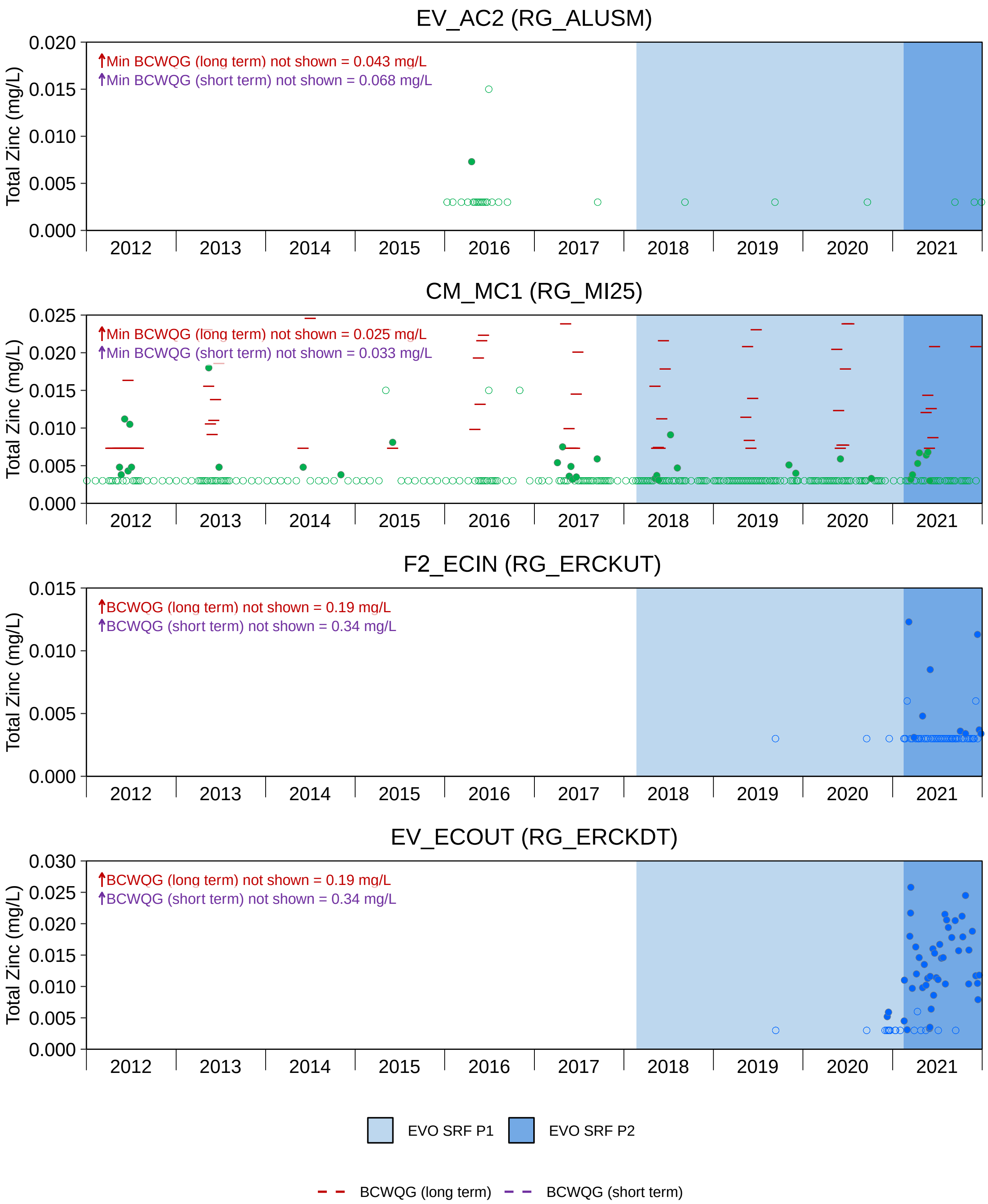

Figure D.28: Time Series Plots for Total Zinc from EVO LAEMP Areas, 2012 to 2021

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).

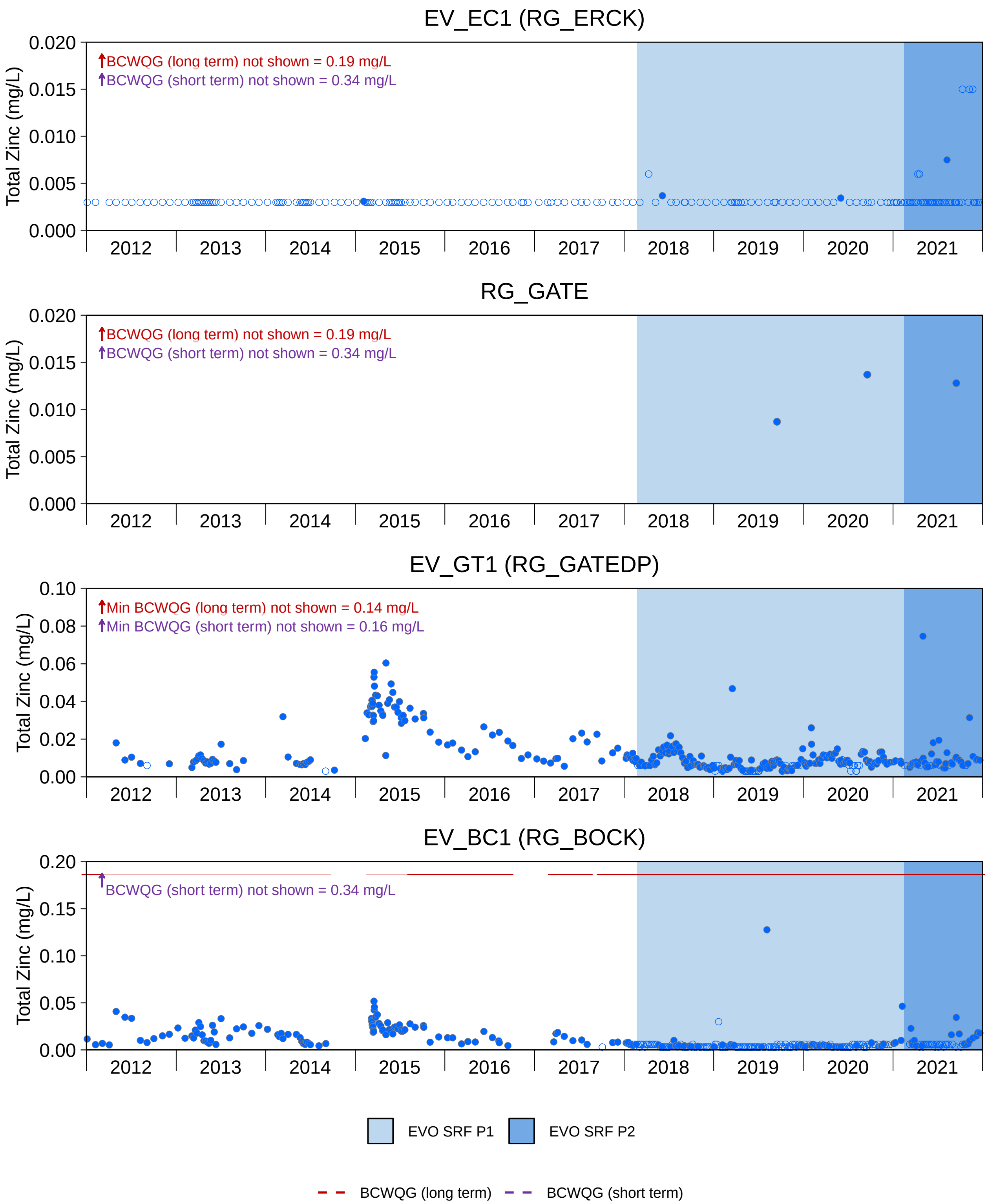

Figure D.28: Time Series Plots for Total Zinc from EVO LAEMP Areas, 2012 to 2021

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).

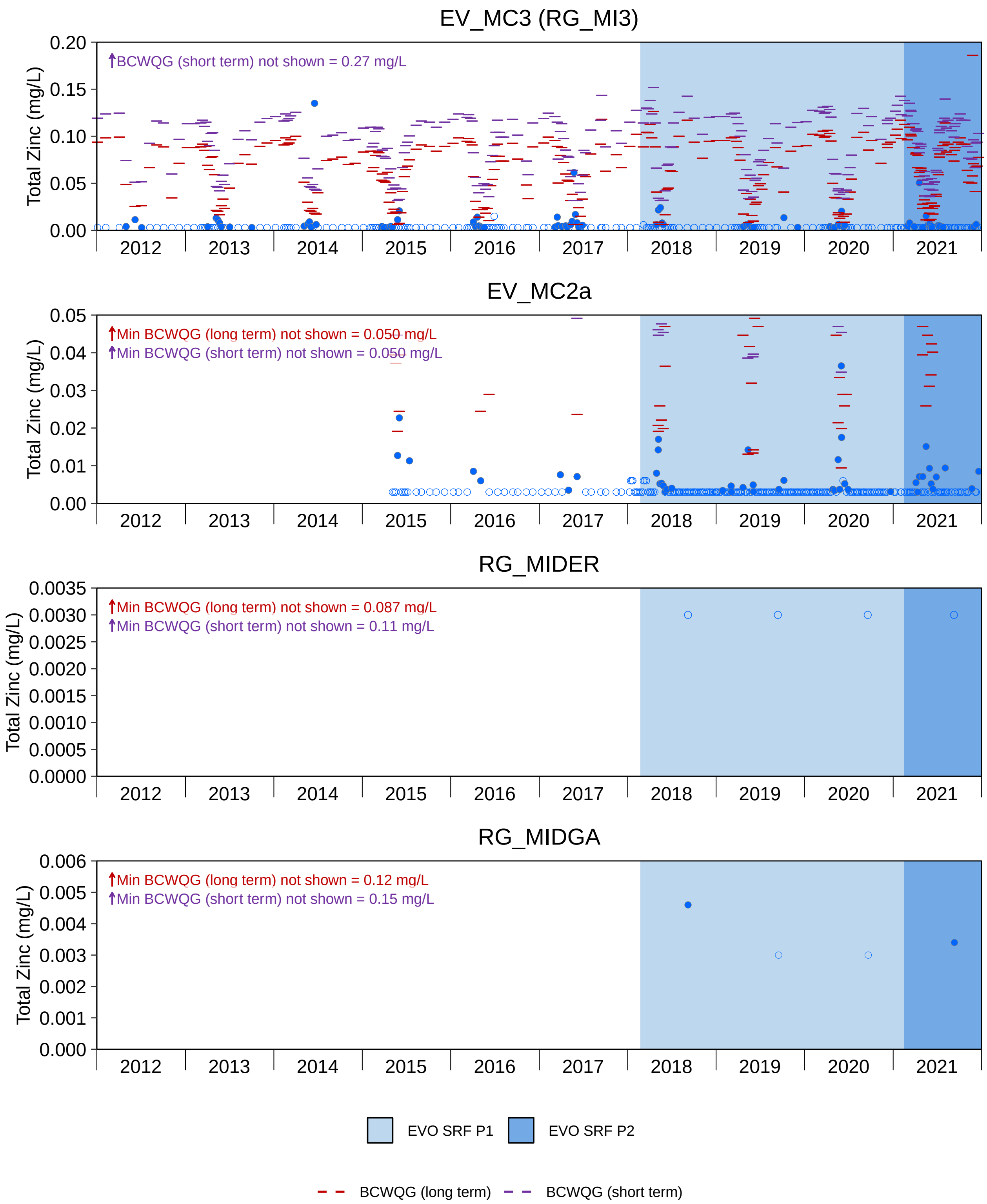

Figure D.28: Time Series Plots for Total Zinc from EVO LAEMP Areas, 2012 to 2021

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).

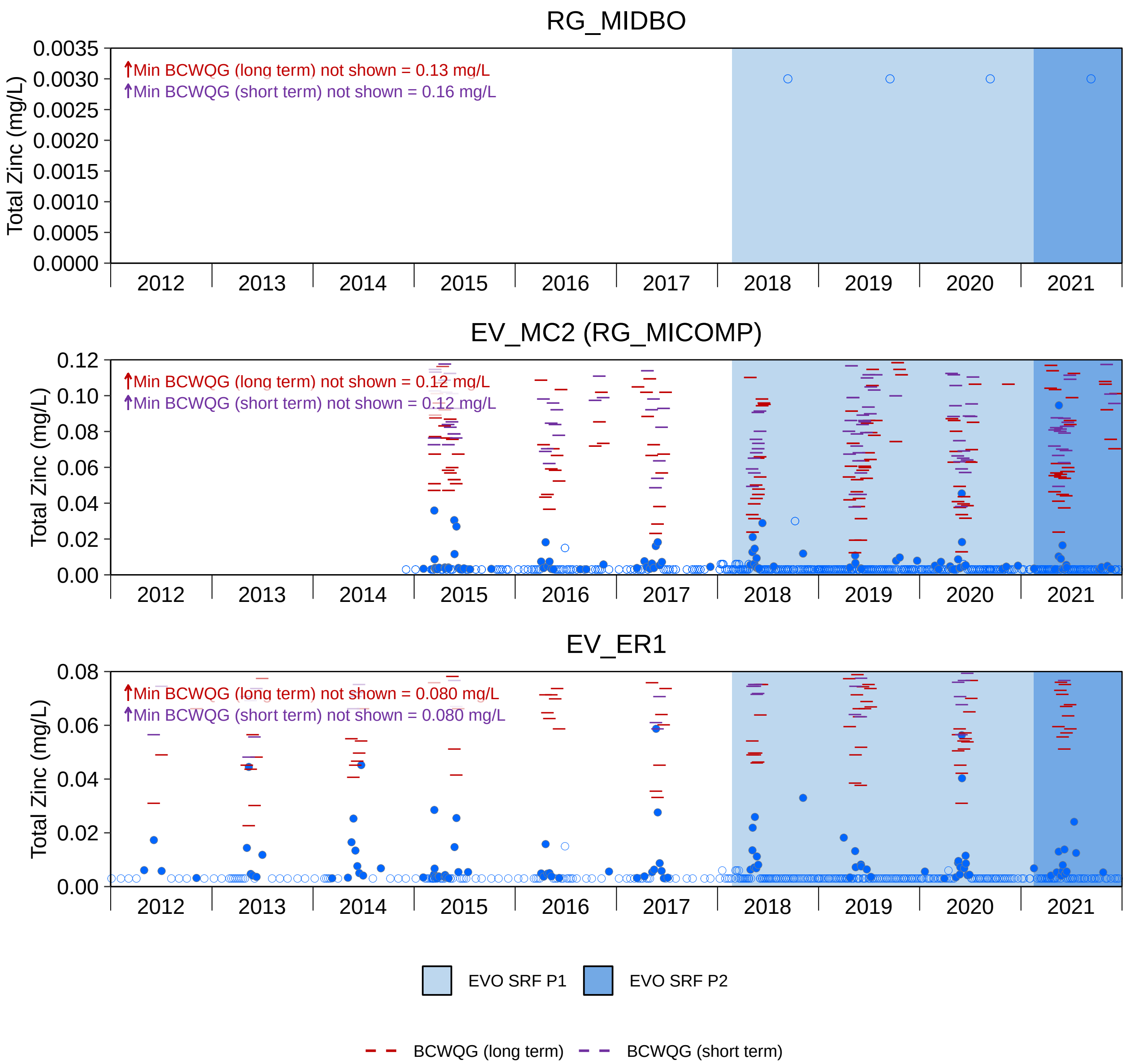

Figure D.28: Time Series Plots for Total Zinc from EVO LAEMP Areas, 2012 to 2021

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).

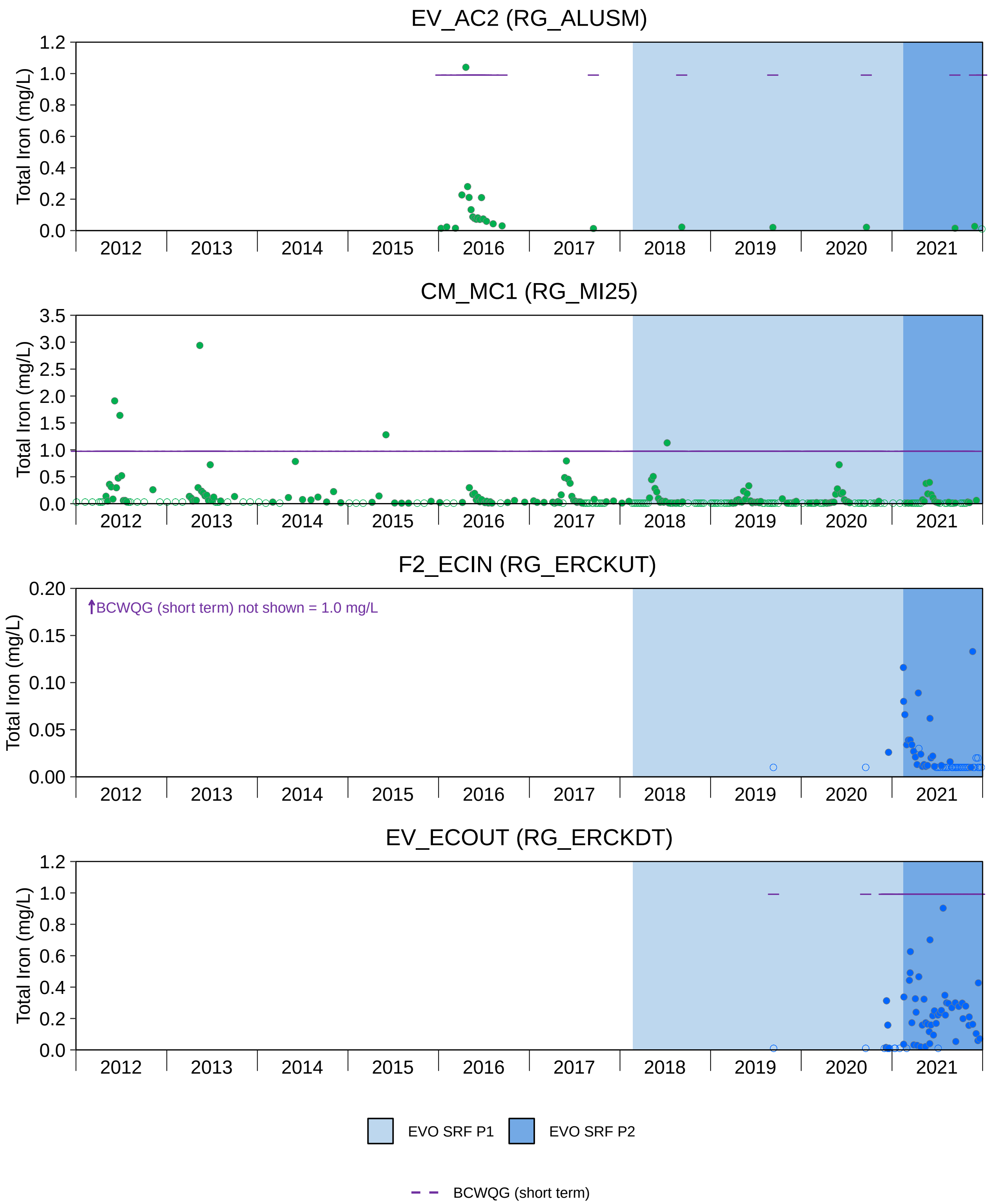

Figure D.29: Time Series Plots for Total Iron from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

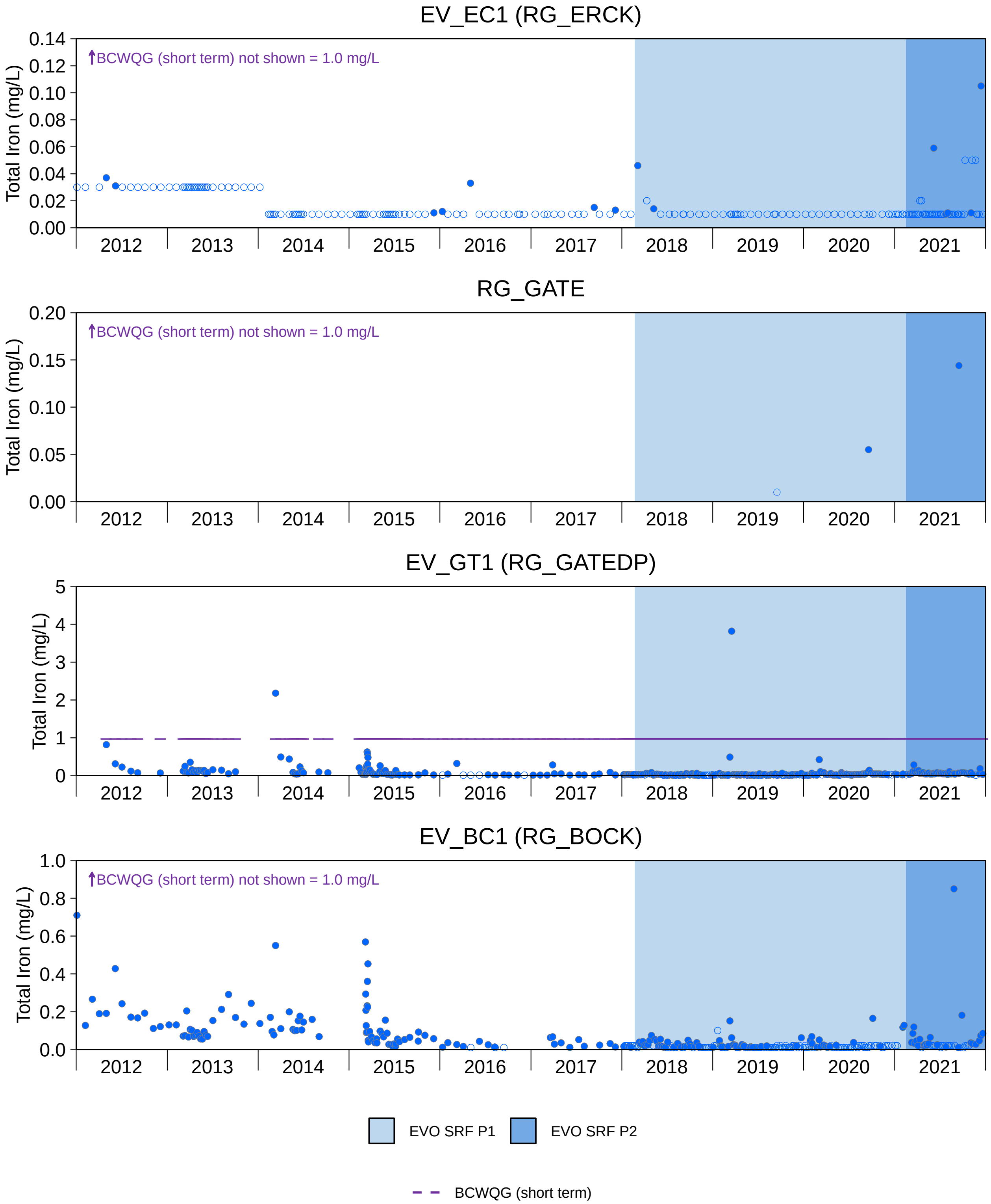

Figure D.29: Time Series Plots for Total Iron from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

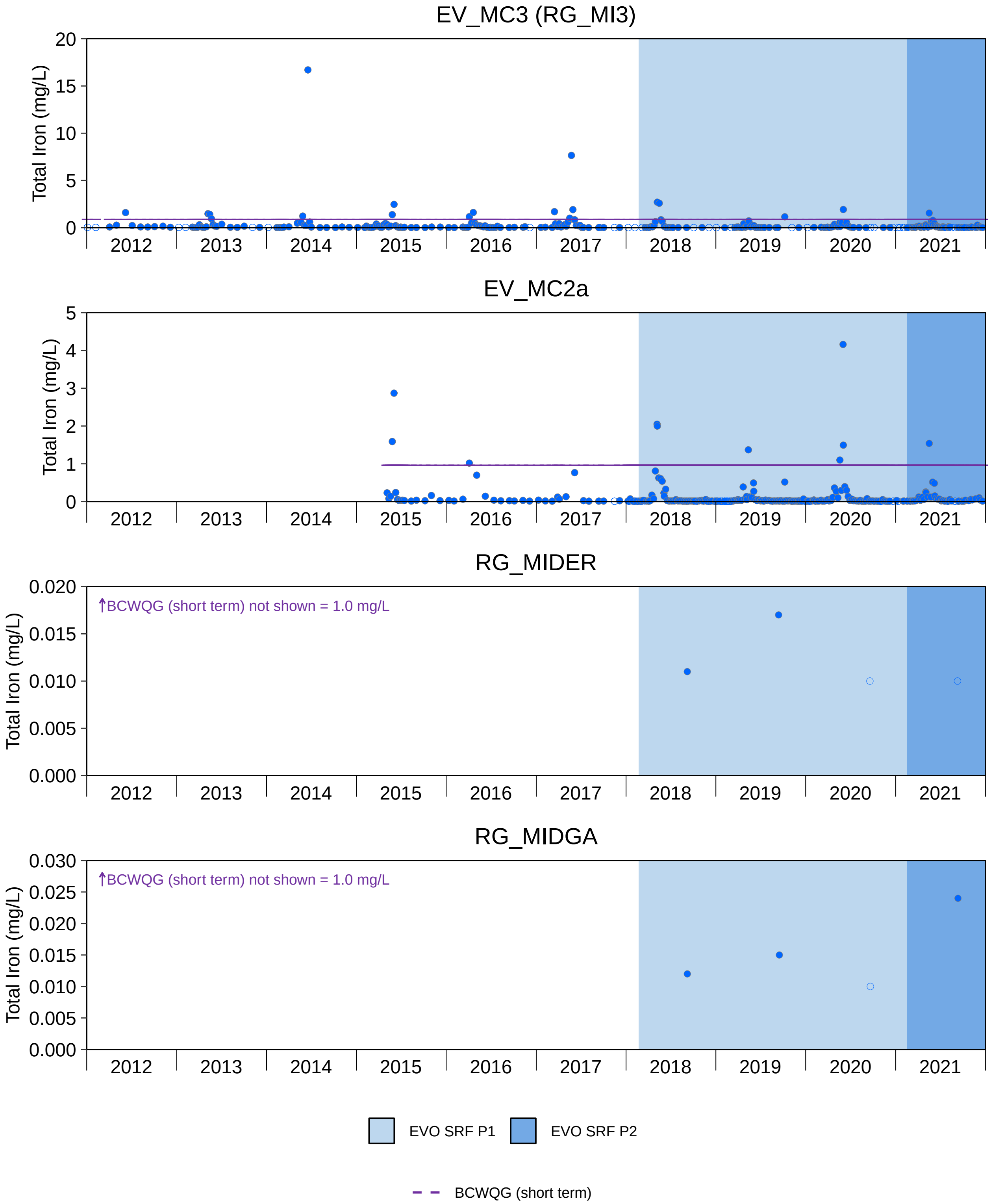

Figure D.29: Time Series Plots for Total Iron from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

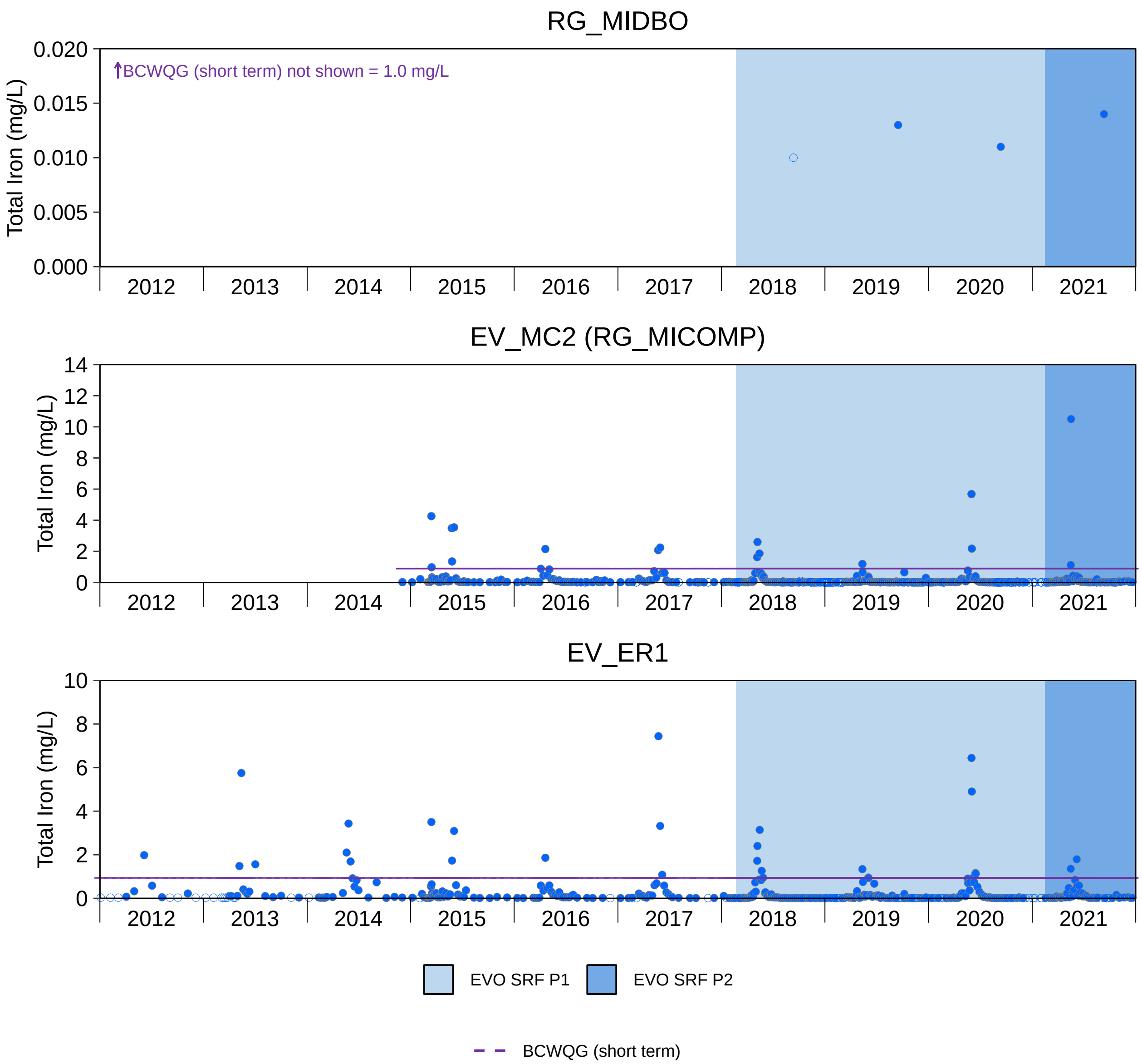

Figure D.29: Time Series Plots for Total Iron from EVO LAEMP Areas, 2012 to 2021

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

Table D.1: ANOVA Table Comparing the Change in Water Quality Concentrations for Michel, Gate and Bodie Creeks Mine Exposed Areas Relative to Reference Areas (CM_MC1) between Pre- (2013 to 2018), EVO SRF P1 (2018 to 2020) and EVO SRF P2 (2021)

Analyte	Exposed Area	ANOVA Terms (P-value)[a]					% of Samples <LRL		BAxCI Effects	Year(BA)xCI Effects									Trend Analyses		
									Period Magnitude of Difference (MOD)[b]	Year Magnitude of Difference (MOD[c]) for 2021 versus:									Period Effect	Year Effect	
		BA	CI	Year(BA)	BAxCI	Year(BA)xCI	Reference (CM_MC1)	Exposed Area	Pre vs SRF P2	2012	2013	2014	2015	2016	2017	2018	2019	2020		2021 vs 2020	2021 vs Historical Years
Nitrate (as N)	F2_ECIN	0.300	<0.001	1.000	0.318	1.000	2.33	0.342	ns	-	-	-	-	-	-	-	ns	ns	ns	ns	ns
	EV_ECOUT	0.022	<0.001	1.000	0.441	0.997	2.33	0	ns	-	-	-	-	-	-	-	ns	ns	ns	ns	ns
	EV_EC1	0.006	<0.001	<0.001	<0.001	<0.001	18.1	0	nc	-75	-88	-68	-69	-75	ns	-59	-57	-61	nt	↓	ns
	EV_GT1	0.214	<0.001	<0.001	0.003	<0.001	18.0	0	nc	-72	-78	ns	-56	-64	ns	ns	ns	-40	nt	↓	ns
	EV_BC1	0.075	<0.001	<0.001	0.004	<0.001	18.7	0	nc	-82	-90	-73	-47	ns	ns	ns	ns	ns	nt	ns	ns
	EV_MC3	0.542	<0.001	<0.001	<0.001	<0.001	17.8	0	nc	ns	-77	ns	ns	-74	-46	-49	ns	ns	nt	ns	ns
	EV_MC2a	<0.001	<0.001	0.063	<0.001	0.673	7.11	0	-65	-	-	-	nc	nc	nc	nc	nc	nc	↓	nt	nt
	EV_MC2	<0.001	<0.001	<0.001	<0.001	<0.001	7.00	0	nc	-	-	ns	-73	-82	-55	-67	ns	-42	nt	↓	ns
	EV_ER1	<0.001	<0.001	<0.001	0.381	<0.001	18.0	0	nc	ns	-66	ns	ns	ns	ns	ns	ns	ns	nt	ns	ns
Nitrite (as N)	F2_ECIN	nt	nt	nt	nt	nt	88.4	83.6	nt	-	-	-	-	-	-	-	nt	nt	nt	nt	ns
	EV_ECOUT	<0.001	nt	0.402	nt	nt	88.4	46.4	ns	-	-	-	-	-	-	-	nc	nc	ns	nt	nt
	EV_EC1	nt	nt	nt	nt	nt	95.9	88.8	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	ns
	EV_GT1	<0.001	nt	<0.001	nt	nt	95.8	22.9	nc	ns	ns	ns	ns	94	72	85	61	ns	nt	ns	ns
	EV_BC1	<0.001	nt	<0.001	nt	nt	96.2	3.25	nc	ns	ns	ns	ns	63	ns	63	60	ns	nt	ns	ns
	EV_MC3	0.193	nt	0.025	nt	nt	95.9	74.3	nc	ns	ns	ns	ns	ns	ns	ns	ns	ns	nt	ns	ns
	EV_MC2a	0.137	nt	0.090	nt	nt	94.9	54.7	ns	-	-	-	ns	ns	ns	ns	ns	ns	ns	ns	ns
	EV_MC2	0.126	nt	0.003	nt	nt	94.5	37.5	nc	-	-	ns	-63	ns	ns	ns	ns	ns	nt	ns	ns
	EV_ER1	0.036	nt	0.777	nt	nt	96.0	39.5	26	nc	nc	nc	nc	nc	nc	nc	nc	nc	↑	nt	nt
Phosphorus (P)-Total	F2_ECIN	0.004	<0.001	1.000	0.496	0.442	6.98	0	ns	-	-	-	-	-	-	-	ns	ns	ns	ns	ns
	EV_ECOUT	0.127	<0.001	0.981	0.002	0.998	6.98	0	-64	-	-	-	-	-	-	-	ns	ns	↓	nt	nt
	EV_EC1	<0.001	0.032	<0.001	<0.001	0.777	2.82	20.4	-73	ns	ns	ns	ns	ns	ns	ns	ns	ns	↓	nt	nt
	EV_GT1	0.006	0.145	<0.001	0.754	0.104	2.88	6.02	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	EV_BC1	0.002	<0.001	<0.001	0.684	0.523	2.52	19.2	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	EV_MC3	<0.001	<0.001	0.030	0.851	0.966	2.82	0	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	EV_MC2a	0.148	0.037	0.211	0.405	0.851	3.55	5.11	ns	-	-	-	nc	nc	nc	nc	nc	nc	ns	ns	ns
	EV_MC2	0.095	0.029	<0.001	0.345	0.909	3.50	6.75	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	EV_ER1	<0.001	0.081	0.002	0.557	0.958	2.82	11.6	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Orthophosphate	F2_ECIN	0.927	<0.001	0.247	0.028	0.995	4.65	0	33	-	-	-	-	-	-	-	nc	nc	↑	nt	nt
	EV_ECOUT	0.060	<0.001	0.981	0.078	0.998	4.65	3.57	ns	-	-	-	-	-	-	-	ns	ns	ns	ns	ns
	EV_EC1	<0.001	<0.001	<0.001	<0.001	<0.001	2.97	9.09	nc	-79	-84	-82	-82	-80	-83	-75	-49	-54	nt	↓	↓
	EV_GT1	0.002	<0.001	<0.001	0.391	0.269	3.09	31.7	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	EV_BC1	<0.001	<0.001	0.009	0.464	0.327	3.08	64.8	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	EV_MC3	0.814	0.008	0.900	0.019	0.840	2.97	6.98	50	nc	nc	nc	nc	nc	nc	nc	nc	nc	↑	nt	nt
	EV_MC2a	0.838	<0.001	0.996	0.029	0.973	4.06	11.9	ns	-	-	-	nc	nc	nc	nc	nc	nc	ns	nt	nt
	EV_MC2	0.957	<0.001	0.858	0.173	0.964	4.00	18.2	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	EV_ER1	0.034	<0.001	0.633	0.989	0.915	2.96	36.6	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns

P-value for Relevant BACI Term < 0.05.

Significantly Increased Relative to Reference (or overall) in 2021 or SRF2

Significantly Decreased Relative to Reference (or overall) in 2021 or SRF2

Notes: "-" indicates no data. "nc" indicates no comparisons. "nt" = not tested because there are more than 95% censored data. Shaded magnitudes of difference (MOD) were significant in the post-hoc analysis (α = 0.05) corrected for the number of tests using a Tukey's Honestly Significant Difference Test. January and February data were excluded from the analyses because there are no SFR2 data from these months.

[a] ANOVA model conducted to test for temporal differences relative to reference (Relative change model) where the percentage of data below the laboratory reporting limit was less than 80% for both the exposed and reference area or temporal changes at the exposed area alone (Temporal change model) when the reference area % LRL was greater than 80%. If both the exposed and reference area were above 80 % LRL no tests were conducted.

[b] MOD for relative change model calculated as ($Observed_{Exposed\ SRF2}$ - $Predicted_{ExposedPre}$)/$Predicted_{ExposedSRF2}$, where the predicted concentration was calculated as: $Observed_{ReferenceSRF2}$ + $Observed_{ExposedPre}$ - $Observed_{ReferencePre}$. This MOD represents how much the difference in SRF2 has changed from the difference observed in the early phase. For temporal model, MOD was calculated as (SRF2 -Pre)/SRF2.

[c] MOD calculated as ($Observed_{Exposed\ 2021}$ - $Predicted_{Exposed2021}$)/$Predicted_{Exposed2021}$, where the predicted concentration was calculated as: $Observed_{Reference2021}$ + $Observed_{Exposed\ year_i}$ - $Observed_{Reference\ year_i}$ and $year_i$ is the earlier year (or the early phase) in the comparison. This MOD represents how much the difference in 2021 has changed from the difference observed in the earlier year (or the early phase). This MOD represents how much the difference in 2021 has changed from the difference observed in the earlier year (or the early phase). For temporal model, MOD was calculated as (2021-earlier year)/2021.

Table D.1: ANOVA Table Comparing the Change in Water Quality Concentrations for Michel, Gate and Bodie Creeks Mine Exposed Areas Relative to Reference Areas (CM_MC1) between Pre- (2013 to 2018), EVO SRF P1 (2018 to 2020) and EVO SRF P2 (2021)

Analyte	Exposed Area	ANOVA Terms (P-value)[a]					% of Samples <LRL		BAxCI Effects	Year(BA)xCI Effects									Trend Analyses		
									Period Magnitude of Difference (MOD)[b]	Year Magnitude of Difference (MOD[c]) for 2021 versus:									Period Effect	Year Effect	
		BA	CI	Year(BA)	BAxCI	Year(BA)x CI	Reference (CM_MC1)	Exposed Area	Pre vs SRF P2	2012	2013	2014	2015	2016	2017	2018	2019	2020		2021 vs 2020	2021 vs Historical Years
Sulphate	F2_ECIN	0.047	<0.001	0.999	0.001	0.994	0	0	32	-	-	-	-	-	-	-	nc	nc	↑	nt	nt
	EV_ECOUT	0.740	<0.001	0.980	0.008	1.000	0	0	37	-	-	-	-	-	-	-	nc	nc	↑	nt	nt
	EV_EC1	<0.001	<0.001	0.074	0.066	0.998	0	0	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	EV_GT1	0.062	<0.001	<0.001	0.917	0.079	0	0	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	EV_BC1	0.043	<0.001	<0.001	0.948	0.037	0	0	nc	ns	ns	ns	ns	ns	ns	ns	ns	ns	nt	ns	ns
	EV_MC3	<0.001	<0.001	<0.001	0.002	<0.001	0	0	nc	48	49	73	ns	ns	ns	ns	ns	ns	nt	ns	ns
	EV_MC2a	0.479	<0.001	0.036	0.940	0.911	0	0	ns	-	-	-	ns	ns	ns	ns	ns	ns	ns	ns	ns
	EV_MC2	0.483	<0.001	<0.001	0.209	0.033	0	0	nc	-	-	ns	ns	ns	ns	-29	ns	ns	nt	ns	ns
	EV_ER1	0.001	<0.001	<0.001	0.106	0.220	0	0	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Total Dissolved Solids	F2_ECIN	0.345	<0.001	0.787	0.011	0.999	0	0	15	-	-	-	-	-	-	-	nc	nc	↑	nt	nt
	EV_ECOUT	0.966	<0.001	0.997	0.013	0.982	0	0	14	-	-	-	-	-	-	-	nc	nc	↑	nt	nt
	EV_EC1	<0.001	<0.001	<0.001	<0.001	0.771	0	0	13	nc	nc	nc	nc	nc	nc	nc	nc	nc	↑	nt	nt
	EV_GT1	0.689	<0.001	<0.001	0.691	<0.001	0	0	nc	ns	ns	38	ns	ns	ns	ns	ns	-17	nt	↓	ns
	EV_BC1	0.838	<0.001	<0.001	0.140	<0.001	0	0	nc	ns	-23	-25	ns	ns	ns	ns	ns	ns	nt	ns	ns
	EV_MC3	0.004	<0.001	0.036	0.132	0.826	0	0	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	EV_MC2a	0.173	<0.001	0.269	0.190	0.746	0	0	ns	-	-	-	ns	ns	ns	ns	ns	ns	ns	ns	ns
	EV_MC2	0.020	<0.001	<0.001	0.057	0.011	0	0	nc	-	-	ns	ns	ns	ns	-25	ns	ns	nt	ns	ns
	EV_ER1	0.102	<0.001	<0.001	0.381	0.340	0	0	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Antimony (Sb)-Total	F2_ECIN	0.016	nt	0.956	nt	nt	100	1.92	5.4	-	-	-	-	-	-	-	nc	nc	↑	nt	nt
	EV_ECOUT	<0.001	nt	0.994	nt	nt	100	8.93	36	-	-	-	-	-	-	-	nc	nc	↑	nt	nt
	EV_EC1	<0.001	nt	0.155	nt	nt	98.5	3.49	30	nc	nc	nc	nc	nc	nc	nc	nc	nc	↑	nt	nt
	EV_GT1	<0.001	nt	<0.001	nt	nt	98.4	0	nc	48	41	56	-230	-290	-120	-180	-94	-66	nt	↓	ns
	EV_BC1	<0.001	nt	<0.001	nt	nt	98.4	0	nc	22	30	37	-270	-240	-86	-150	-78	-73	nt	↓	ns
	EV_MC3	0.113	nt	0.143	nt	nt	98.5	58.6	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	EV_MC2a	0.379	nt	0.022	nt	nt	98.5	69.8	nc	-	-	-	ns	ns	ns	ns	ns	ns	nt	ns	ns
	EV_MC2	<0.001	nt	<0.001	nt	nt	98.5	20.6	nc	-	-	ns	-120	-100	-69	-110	ns	ns	nt	ns	ns
	EV_ER1	<0.001	nt	<0.001	nt	nt	98.5	55.5	nc	ns	ns	ns	-64	-49	-47	-47	ns	ns	nt	ns	ns
Barium (Ba)-Total	F2_ECIN	0.407	<0.001	0.999	0.003	0.896	0	0	27	-	-	-	-	-	-	-	nc	nc	↑	nt	nt
	EV_ECOUT	0.004	0.003	1.000	0.072	0.999	0	0	ns	-	-	-	-	-	-	-	ns	ns	ns	ns	ns
	EV_EC1	<0.001	<0.001	0.031	<0.001	0.001	0	0	nc	-60	-58	-56	-52	-52	-51	-50	-42	-41	nt	↓	↓
	EV_GT1	0.003	<0.001	<0.001	0.006	<0.001	0	0	nc	ns	76	ns	ns	ns	91	123	ns	ns	nt	ns	ns
	EV_BC1	<0.001	<0.001	<0.001	<0.001	<0.001	0	0	nc	-59	-60	-57	-57	-41	-47	-25	ns	ns	nt	ns	ns
	EV_MC3	0.614	<0.001	0.588	0.911	0.528	0	0	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	EV_MC2a	0.146	<0.001	0.128	0.133	0.115	0	0	ns	-	-	-	ns	ns	ns	ns	ns	ns	ns	ns	ns
	EV_MC2	0.979	<0.001	0.432	0.682	0.272	0	0	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	EV_ER1	0.403	<0.001	0.645	0.167	0.724	0	0	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns

P-value for Relevant BACI Term < 0.05.

Significantly Increased Relative to Reference (or overall) in 2021 or SRF2

Significantly Decreased Relative to Reference (or overall) in 2021 or SRF2

Notes: "-" indicates no data. "nc" indicates no comparisons. "nt" = not tested because there are more than 95% censored data. Shaded magnitudes of difference (MOD) were significant in the post-hoc analysis (α = 0.05) corrected for the number of tests using a Tukey's Honestly Significant Difference Test. January and February data were excluded from the analyses because there are no SFR2 data from these months.

[a] ANOVA model conducted to test for temporal differences relative to reference (Relative change model) where the percentage of data below the laboratory reporting limit was less than 80% for both the exposed and reference area or temporal changes at the exposed area alone (Temporal change model) when the reference area % LRL was greater than 80%. If both the exposed and reference area were above 80 % LRL no tests were conducted.

[b] MOD for relative change model calculated as ($Observed_{Exposed\ SRF2}$ - $Predicted_{ExposedPre}$)/$Predicted_{ExposedSRF2}$, where the predicted concentration was calculated as: $Observed_{ReferenceSRF2}$ + $Observed_{ExposedPre}$ - $Observed_{ReferencePre}$. This MOD represents how much the difference in SRF2 has changed from the difference observed in the early phase. For temporal model, MOD was calculated as (SRF2 -Pre)/SRF2.

[c] MOD calculated as ($Observed_{Exposed\ 2021}$ - $Predicted_{Exposed2021}$)/$Predicted_{Exposed2021}$, where the predicted concentration was calculated as: $Observed_{Reference2021}$ + $Observed_{Exposed\ year_i}$ - $Observed_{Reference\ year_i}$ and $year_i$ is the earlier year (or the early phase) in the comparison. This MOD represents how much the difference in 2021 has changed from the difference observed in the earlier year (or the early phase). This MOD represents how much the difference in 2021 has changed from the difference observed in the earlier year (or the early phase). For temporal model, MOD was calculated as (2021-earlier year)/2021.

Table D.1: ANOVA Table Comparing the Change in Water Quality Concentrations for Michel, Gate and Bodie Creeks Mine Exposed Areas Relative to Reference Areas (CM_MC1) between Pre- (2013 to 2018), EVO SRF P1 (2018 to 2020) and EVO SRF P2 (2021)

Analyte	Exposed Area	ANOVA Terms (P-value)[a]					% of Samples <LRL		BAxCI Effects	Year(BA)xCI Effects									Trend Analyses		
									Period Magnitude of Difference (MOD)[b]	Year Magnitude of Difference (MOD[c]) for 2021 versus:									Period Effect	Year Effect	
		BA	CI	Year(BA)	BAxCI	Year(BA)x CI	Reference (CM_MC1)	Exposed Area	Pre vs SRF P2	2012	2013	2014	2015	2016	2017	2018	2019	2020		2021 vs 2020	2021 vs Historical Years
Boron (B)-Total	F2_ECIN	0.715	0.004	0.884	<0.001	0.990	9.30	7.69	31	-	-	-	-	-	-	-	nc	nc	↑	nt	nt
	EV_ECOUT	0.130	<0.001	1.000	<0.001	0.926	9.30	8.93	108	-	-	-	-	-	-	-	nc	nc	↑	nt	nt
	EV_EC1	<0.001	0.515	0.138	<0.001	0.849	12.5	19.2	166	nc	nc	nc	nc	nc	nc	nc	nc	nc	↑	nt	nt
	EV_GT1	0.066	<0.001	<0.001	0.017	<0.001	13.0	0.328	nc	ns	64	ns	ns	ns	ns	-29	-25	-24	nt	↓	ns
	EV_BC1	0.880	<0.001	<0.001	0.302	0.042	12.6	0.325	nc	ns	ns	ns	ns	ns	ns	ns	ns	ns	nt	ns	ns
	EV_MC3	0.432	<0.001	<0.001	0.684	0.723	12.5	74.7	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	EV_MC2a	<0.001	<0.001	<0.001	0.412	0.003	15.7	49.8	nc	-	-	-	ns	ns	ns	ns	14	ns	nt	ns	ns
	EV_MC2	0.251	<0.001	<0.001	0.205	<0.001	15.5	31.4	nc	-	-	ns	ns	ns	ns	-19	ns	ns	nt	ns	ns
	EV_ER1	nt	nt	nt	nt	nt	12.4	82.5	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	ns
Iron (Fe)-Total	F2_ECIN	0.628	0.153	0.971	0.067	nt	60.5	57.7	ns	-	-	-	-	-	-	-	ns	ns	ns	ns	ns
	EV_ECOUT	<0.001	<0.001	0.916	0.607	1.000	60.5	12.5	ns	-	-	-	-	-	-	-	ns	ns	ns	ns	ns
	EV_EC1	nt	nt	nt	nt	nt	41.3	92.4	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	ns
	EV_GT1	0.264	<0.001	<0.001	<0.001	0.768	40.5	15.4	214	nc	nc	nc	nc	nc	nc	nc	nc	nc	↑	nt	nt
	EV_BC1	0.102	0.474	<0.001	0.214	0.018	42.0	40.6	nc	ns	ns	ns	ns	ns	ns	ns	ns	ns	nt	ns	ns
	EV_MC3	0.012	<0.001	<0.001	0.434	0.986	41.3	8.05	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	EV_MC2a	0.795	<0.001	0.609	0.509	0.995	45.1	5.96	ns	-	-	-	ns	ns	ns	ns	ns	ns	ns	ns	ns
	EV_MC2	0.839	<0.001	<0.001	0.297	1.000	44.9	13.1	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	EV_ER1	0.065	<0.001	<0.001	0.392	0.984	41.5	12.6	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Lithium (Li)-Total	F2_ECIN	0.370	<0.001	0.988	<0.001	0.987	0	0	45	-	-	-	-	-	-	-	nc	nc	↑	nt	nt
	EV_ECOUT	0.691	<0.001	1.000	<0.001	0.889	0	0	111	-	-	-	-	-	-	-	nc	nc	↑	nt	nt
	EV_EC1	<0.001	<0.001	<0.001	<0.001	<0.001	1.52	0	nc	269	234	198	198	174	170	166	141	119	nt	↑	↑
	EV_GT1	0.376	<0.001	<0.001	0.019	<0.001	1.57	0	nc	80	99	103	ns	ns	ns	-29	-35	-35	nt	↓	ns
	EV_BC1	0.588	<0.001	<0.001	0.003	<0.001	1.18	0	nc	ns	ns	ns	ns	ns	ns	ns	-24	-26	nt	↓	ns
	EV_MC3	<0.001	<0.001	<0.001	0.016	0.029	1.52	0.766	nc	ns	25	ns	30	26	ns	ns	ns	ns	nt	ns	ns
	EV_MC2a	<0.001	<0.001	0.002	0.003	0.026	1.47	0	nc	-	-	-	ns	37	ns	ns	23	ns	nt	ns	ns
	EV_MC2	0.951	<0.001	<0.001	0.343	<0.001	1.45	0	nc	-	-	ns	ns	ns	ns	-34	ns	ns	nt	ns	ns
	EV_ER1	<0.001	<0.001	<0.001	0.006	<0.001	1.51	0	nc	46	31	ns	ns	ns	ns	ns	ns	ns	nt	ns	ns
Manganese (Mn)-Total	F2_ECIN	0.273	0.003	0.994	0.213	0.820	6.98	9.62	ns	-	-	-	-	-	-	-	ns	ns	ns	ns	ns
	EV_ECOUT	<0.001	<0.001	0.932	<0.001	0.984	6.98	5.36	13,565	-	-	-	-	-	-	-	nc	nc	↑	nt	nt
	EV_EC1	<0.001	<0.001	0.588	<0.001	0.947	2.27	46.2	161,068	nc	nc	nc	nc	nc	nc	nc	nc	nc	↑	nt	nt
	EV_GT1	0.625	<0.001	<0.001	<0.001	0.002	2.36	0	nc	ns	475	ns	ns	616	ns	311	194	ns	nt	ns	ns
	EV_BC1	0.475	<0.001	<0.001	0.005	<0.001	2.35	0.325	nc	ns	ns	ns	ns	ns	ns	178	257	259	nt	↑	ns
	EV_MC3	0.002	<0.001	<0.001	0.167	0.814	2.27	0	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	EV_MC2a	0.753	<0.001	0.895	0.008	0.729	2.94	0	84	-	-	-	nc	nc	nc	nc	nc	nc	↑	nt	nt
	EV_MC2	0.580	<0.001	0.094	0.005	0.975	2.90	0	73	-	-	nc	nc	nc	nc	nc	nc	nc	↑	nt	nt
	EV_ER1	0.010	<0.001	<0.001	0.091	0.585	2.26	0	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns

P-value for Relevant BACI Term < 0.05.

Significantly Increased Relative to Reference (or overall) in 2021 or SRF2

Significantly Decreased Relative to Reference (or overall) in 2021 or SRF2

Notes: "-" indicates no data. "nc" indicates no comparisons. "nt" = not tested because there are more than 95% censored data. Shaded magnitudes of difference (MOD) were significant in the post-hoc analysis (α = 0.05) corrected for the number of tests using a Tukey's Honestly Significant Difference Test. January and February data were excluded from the analyses because there are no SFR2 data from these months.

[a] ANOVA model conducted to test for temporal differences relative to reference (Relative change model) where the percentage of data below the laboratory reporting limit was less than 80% for both the exposed and reference area or temporal changes at the exposed area alone (Temporal change model) when the reference area % LRL was greater than 80%. If both the exposed and reference area were above 80 % LRL no tests were conducted.

[b] MOD for relative change model calculated as ($Observed_{Exposed\ SRF2}$ - $Predicted_{ExposedPre}$)/$Predicted_{ExposedSRF2}$, where the predicted concentration was calculated as: $Observed_{ReferenceSRF2}$ + $Observed_{ExposedPre}$ - $Observed_{ReferencePre}$. This MOD represents how much the difference in SRF2 has changed from the difference observed in the early phase. For temporal model, MOD was calculated as (SRF2 -Pre)/SRF2.

[c] MOD calculated as ($Observed_{Exposed\ 2021}$ - $Predicted_{Exposed2021}$)/$Predicted_{Exposed2021}$, where the predicted concentration was calculated as: $Observed_{Reference2021}$ + $Observed_{Exposed\ year_i}$ - $Observed_{Reference\ year_i}$ and $year_i$ is the earlier year (or the early phase) in the comparison. This MOD represents how much the difference in 2021 has changed from the difference observed in the earlier year (or the early phase). This MOD represents how much the difference in 2021 has changed from the difference observed in the earlier year (or the early phase). For temporal model, MOD was calculated as (2021-earlier year)/2021.

Table D.1: ANOVA Table Comparing the Change in Water Quality Concentrations for Michel, Gate and Bodie Creeks Mine Exposed Areas Relative to Reference Areas (CM_MC1) between Pre- (2013 to 2018), EVO SRF P1 (2018 to 2020) and EVO SRF P2 (2021)

Analyte	Exposed Area	ANOVA Terms (P-value)[a]					% of Samples <LRL		BAxCI Effects	Year(BA)xCI Effects									Trend Analyses		
									Period Magnitude of Difference (MOD)[b]	Year Magnitude of Difference (MOD[c]) for 2021 versus:									Period Effect	Year Effect	
		BA	CI	Year(BA)	BAxCI	Year(BA)x CI	Reference (CM_MC1)	Exposed Area	Pre vs SRF P2	2012	2013	2014	2015	2016	2017	2018	2019	2020		2021 vs 2020	2021 vs Historical Years
	F2_ECIN	0.211	<0.001	0.994	0.220	0.996	0	0	ns	-	-	-	-	-	-	-	ns	ns	ns	ns	ns
	EV_ECOUT	0.024	<0.001	0.997	<0.001	0.992	0	0	497	-	-	-	-	-	-	-	nc	nc	↑	nt	nt
	EV_EC1	<0.001	<0.001	1.000	<0.001	0.095	0	0	712	nc	nc	nc	nc	nc	nc	nc	nc	nc	↑	nt	nt
	EV_GT1	<0.001	<0.001	<0.001	<0.001	<0.001	0	0	nc	ns	43	91	-51	-54	-44	-39	ns	-23	nt	↓	ns
Molybdenum (Mo)-Total	EV_BC1	<0.001	<0.001	<0.001	<0.001	<0.001	0	0	nc	ns	ns	ns	-57	-55	-39	-38	-15	-25	nt	↓	ns
	EV_MC3	0.747	<0.001	0.171	0.446	0.610	0	0.383	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	EV_MC2a	<0.001	0.262	0.087	<0.001	0.649	0	0	53	-	-	-	nc	nc	nc	nc	nc	nc	↑	nt	nt
	EV_MC2	<0.001	<0.001	<0.001	<0.001	<0.001	0	0	nc	-	-	ns	ns	ns	ns	ns	43	43	nt	↑	ns
	EV_ER1	0.005	<0.001	<0.001	<0.001	0.006	0	0	nc	ns	23	21	ns	ns	ns	ns	15	ns	nt	ns	ns
	F2_ECIN	0.248	nt	1.000	nt	nt	93.0	7.69	ns	-	-	-	-	-	-	-	ns	ns	ns	ns	ns
	EV_ECOUT	<0.001	nt	0.998	nt	nt	93.0	0	94	-	-	-	-	-	-	-	nc	nc	↑	nt	nt
	EV_EC1	<0.001	nt	0.160	nt	nt	84.1	5.23	97	nc	nc	nc	nc	nc	nc	nc	nc	nc	↑	nt	nt
	EV_GT1	<0.001	nt	<0.001	nt	nt	84.7	0	nc	59	56	66	-150	-160	ns	-230	-110	-110	nt	↓	ns
Nickel (Ni)-Total	EV_BC1	<0.001	nt	<0.001	nt	nt	84.3	0	nc	ns	ns	ns	-130	-80	-22	-120	-62	-70	nt	↓	ns
	EV_MC3	0.287	nt	0.003	nt	nt	84.1	21.5	nc	ns	ns	ns	ns	ns	-83	ns	ns	ns	nt	ns	ns
	EV_MC2a	<0.001	nt	0.010	nt	nt	87.2	16.2	nc	-	-	-	65	ns	41	40	53	39	nt	↑	ns
	EV_MC2	0.210	nt	<0.001	nt	nt	87.4	1.26	nc	-	-	ns	-33	-40	ns	-89	23	25	nt	↑	ns
	EV_ER1	0.071	nt	<0.001	nt	nt	84.2	16.5	nc	ns	ns	ns	-44	ns	ns	-49	ns	ns	nt	ns	ns
	F2_ECIN	0.307	<0.001	0.986	0.491	0.846	0	0	ns	-	-	-	-	-	-	-	ns	ns	ns	ns	ns
	EV_ECOUT	0.029	<0.001	1.000	0.012	0.891	0	0	-47	-	-	-	-	-	-	-	nc	nc	↓	nt	nt
	EV_EC1	<0.001	<0.001	0.862	<0.001	0.727	1.52	0	-56	nc	nc	nc	nc	nc	nc	nc	nc	nc	↓	nt	nt
	EV_GT1	<0.001	<0.001	<0.001	<0.001	<0.001	1.58	0	nc	ns	46	108	54	88	41	112	48	ns	nt	ns	ns
Selenium (Se)-Total	EV_BC1	<0.001	<0.001	<0.001	<0.001	<0.001	1.18	0	nc	-29	-37	ns	92	128	ns	158	52	ns	nt	ns	ns
	EV_MC3	<0.001	<0.001	<0.001	0.002	0.003	1.52	0	nc	39	36	41	ns	ns	ns	ns	ns	ns	nt	ns	ns
	EV_MC2a	<0.001	<0.001	0.023	<0.001	0.179	1.95	0	-48	-	-	-	nc	nc	nc	nc	nc	nc	↓	nt	nt
	EV_MC2	<0.001	<0.001	<0.001	<0.001	0.028	1.93	0	nc	-	-	ns	-40	ns	-37	-52	ns	ns	nt	ns	ns
	EV_ER1	<0.001	<0.001	<0.001	0.032	0.018	1.52	0	nc	38	32	ns	ns	ns	ns	ns	ns	ns	nt	ns	ns
	F2_ECIN	0.511	<0.001	0.992	<0.001	1.000	0	0	27	-	-	-	-	-	-	-	nc	nc	↑	nt	nt
	EV_ECOUT	0.536	<0.001	0.999	<0.001	0.907	0	0	50	-	-	-	-	-	-	-	nc	nc	↑	nt	nt
	EV_EC1	<0.001	<0.001	<0.001	<0.001	0.421	0	0	76	nc	nc	nc	nc	nc	nc	nc	nc	nc	↑	nt	nt
	EV_GT1	0.009	<0.001	<0.001	0.002	<0.001	0	0	nc	ns	44	104	ns	-28	ns	-35	-26	-23	nt	↓	ns
Uranium (U)-Total	EV_BC1	0.003	<0.001	<0.001	<0.001	<0.001	0	0	nc	ns	ns	ns	ns	ns	ns	-24	-21	-18	nt	↓	ns
	EV_MC3	0.048	<0.001	0.153	0.324	0.789	0	0	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	EV_MC2a	0.012	<0.001	0.261	0.006	0.221	0	0	15	-	-	-	nc	nc	nc	nc	nc	nc	↑	nt	nt
	EV_MC2	0.954	<0.001	<0.001	0.894	0.002	0	0	nc	-	-	ns	ns	ns	ns	-21	ns	ns	nt	ns	ns
	EV_ER1	<0.001	<0.001	<0.001	0.006	0.025	0	0	nc	22	22	ns	ns	ns	ns	ns	ns	ns	nt	ns	ns

P-value for Relevant BACI Term < 0.05.
Significantly Increased Relative to Reference (or overall) in 2021 or SRF2
Significantly Decreased Relative to Reference (or overall) in 2021 or SRF2

Notes: "-" indicates no data. "nc" indicates no comparisons. "nt" = not tested because there are more than 95% censored data. Shaded magnitudes of difference (MOD) were significant in the post-hoc analysis (α = 0.05) corrected for the number of tests using a Tukey's Honestly Significant Difference Test. January and February data were excluded from the analyses because there are no SFR2 data from these months.

[a] ANOVA model conducted to test for temporal differences relative to reference (Relative change model) where the percentage of data below the laboratory reporting limit was less than 80% for both the exposed and reference area or temporal changes at the exposed area alone (Temporal change model) when the reference area % LRL was greater than 80%. If both the exposed and reference area were above 80 % LRL no tests were conducted.

[b] MOD for relative change model calculated as (Observed$_{Exposed\ SRF2}$ - Predicted$_{ExposedPre}$)/Predicted$_{ExposedSRF2}$, where the predicted concentration was calculated as: Observed$_{ReferenceSRF2}$ + Observed$_{ExposedPre-}$ - Observed$_{ReferencePre-}$. This MOD represents how much the difference in SRF2 has changed from the difference observed in the early phase. For temporal model, MOD was calculated as (SRF2 -Pre)/SRF2.

[c] MOD calculated as (Observed$_{Exposed\ 2021}$ - Predicted$_{Exposed2021}$)/Predicted$_{Exposed2021}$, where the predicted concentration was calculated as: Observed$_{Reference2021}$ + Observed$_{Exposed\ yeari}$ - Observed$_{Reference\ yeari}$ and year$_i$ is the earlier year (or the early phase) in the comparison. This MOD represents how much the difference in 2021 has changed from the difference observed in the earlier year (or the early phase). This MOD represents how much the difference in 2021 has changed from the difference observed in the earlier year (or the early phase). For temporal model, MOD was calculated as (2021-earlier year)/2021.

Table D.1: ANOVA Table Comparing the Change in Water Quality Concentrations for Michel, Gate and Bodie Creeks Mine Exposed Areas Relative to Reference Areas (CM_MC1) between Pre- (2013 to 2018), EVO SRF P1 (2018 to 2020) and EVO SRF P2 (2021)

Analyte	Exposed Area	ANOVA Terms (P-value)[a]					% of Samples <LRL		BAxCI Effects	Year(BA)xCI Effects									Trend Analyses		
									Period Magnitude of Difference (MOD)[b]	Year Magnitude of Difference (MOD[c]) for 2021 versus:									Period Effect	Year Effect	
		BA	CI	Year(BA)	BAxCI	Year(BA)x CI	Reference (CM_MC1)	Exposed Area	Pre vs SRF P2	2012	2013	2014	2015	2016	2017	2018	2019	2020		2021 vs 2020	2021 vs Historical Years
Zinc (Zn)-Total	F2_ECIN	nt	nt	nt	nt	nt	83.7	82.7	nt	-	-	-	-	-	-	-	nt	nt	nt	nt	ns
	EV_ECOUT	<0.001	nt	0.986	nt	nt	83.7	23.2	ns	-	-	-	-	-	-	-	nc	nc	ns	nt	nt
	EV_EC1	nt	nt	nt	nt	nt	87.1	98.3	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	ns
	EV_GT1	0.066	nt	<0.001	nt	nt	87.0	14.1	nc	ns	ns	ns	-350	-110	ns	ns	37	ns	nt	ns	ns
	EV_BC1	0.198	nt	<0.001	nt	nt	87.5	49.4	nc	-210	-240	-100	-390	ns	ns	54	59	44	nt	↑	ns
	EV_MC3	0.773	nt	0.930	nt	nt	87.1	69.7	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	EV_MC2a	nt	nt	nt	nt	nt	88.2	80.4	nt	-	-	-	nt	nt	nt	nt	nt	nt	nt	nt	ns
	EV_MC2	0.234	nt	0.441	nt	nt	88.4	77.4	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	EV_ER1	0.448	nt	0.246	nt	nt	87.2	75.1	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Cadmium (Cd)-Dissolved	F2_ECIN	<0.001	<0.001	0.958	0.003	0.106	0	0	24	-	-	-	-	-	-	-	nc	nc	↑	nt	nt
	EV_ECOUT	<0.001	<0.001	1.000	<0.001	1.000	0	0	81	-	-	-	-	-	-	-	nc	nc	↑	nt	nt
	EV_EC1	0.831	0.801	0.001	0.756	<0.001	10.2	32.2	nc	-47	ns	ns	ns	ns	ns	ns	ns	48	nt	↑	ns
	EV_GT1	0.374	<0.001	<0.001	0.635	0.025	7.93	5.92	nc	ns	ns	ns	ns	ns	ns	ns	ns	ns	nt	ns	ns
	EV_BC1	0.203	<0.001	0.295	0.313	0.312	9.29	17.6	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	EV_MC3	0.012	<0.001	<0.001	0.049	0.124	10.2	2.70	19	nc	nc	nc	nc	nc	nc	nc	nc	nc	↑	nt	nt
	EV_MC2a	0.934	<0.001	<0.001	0.395	0.197	2.96	0.426	ns	-	-	-	ns	ns	ns	ns	ns	ns	ns	ns	ns
	EV_MC2	0.004	<0.001	<0.001	0.100	<0.001	3.88	0.505	nc	-	-	ns	ns	-27	ns	-30	ns	ns	nt	ns	ns
	EV_ER1	0.062	<0.001	0.973	0.601	0.912	10.6	1.05	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Cobalt (Co)-Dissolved	F2_ECIN	nt	nt	nt	nt	nt	100	98.5	nt	-	-	-	-	-	-	-	nt	nt	nt	nt	ns
	EV_ECOUT	<0.001	nt	0.961	nt	nt	100	13.0	ns	-	-	-	-	-	-	-	nc	nc	ns	nt	nt
	EV_EC1	<0.001	nt	<0.001	nt	nt	99.6	63.7	nc	ns	ns	97	ns	99	ns	96	ns	99	nt	↑	ns
	EV_GT1	<0.001	nt	<0.001	nt	nt	99.6	16.1	nc	ns	59	48	-250	ns	ns	-170	-130	-220	nt	↓	ns
	EV_BC1	<0.001	nt	<0.001	nt	nt	99.6	11.1	nc	-110	ns	ns	-280	ns	ns	-140	-100	-35	nt	↓	ns
	EV_MC3	nt	nt	nt	nt	nt	99.6	88.8	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	ns
	EV_MC2a	nt	nt	nt	nt	nt	99.5	88.9	nt	-	-	-	nt	nt	nt	nt	nt	nt	nt	nt	ns
	EV_MC2	nt	nt	nt	nt	nt	99.5	88.9	nt	-	-	nt	nt	nt	nt	nt	nt	nt	nt	nt	ns
	EV_ER1	nt	nt	nt	nt	nt	99.6	99.7	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	ns
Selenium (Se)-Dissolved	F2_ECIN	0.128	<0.001	0.902	0.116	0.859	0	0	ns	-	-	-	-	-	-	-	ns	ns	ns	ns	ns
	EV_ECOUT	0.045	<0.001	1.000	0.012	0.837	0	0	-48	-	-	-	-	-	-	-	nc	nc	↓	nt	nt
	EV_EC1	<0.001	<0.001	0.275	<0.001	0.817	1.71	0	-61	nc	nc	nc	nc	nc	nc	nc	nc	nc	↓	nt	nt
	EV_GT1	<0.001	<0.001	<0.001	<0.001	<0.001	1.77	0	nc	ns	ns	101	41	75	ns	97	44	ns	nt	ns	ns
	EV_BC1	<0.001	<0.001	<0.001	<0.001	<0.001	1.33	0	nc	-36	-43	-35	74	110	ns	143	48	ns	nt	ns	ns
	EV_MC3	<0.001	<0.001	<0.001	0.061	0.051	1.71	0	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	EV_MC2a	<0.001	<0.001	0.022	<0.001	0.095	1.97	0	-51	-	-	-	nc	nc	nc	nc	nc	nc	↓	nt	nt
	EV_MC2	<0.001	<0.001	<0.001	<0.001	0.009	1.94	0	nc	-	-	ns	-45	-39	-40	-57	ns	ns	nt	ns	ns
	EV_ER1	<0.001	<0.001	<0.001	0.358	0.450	1.70	0	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns

P-value for Relevant BACI Term < 0.05.

Significantly Increased Relative to Reference (or overall) in 2021 or SRF2

Significantly Decreased Relative to Reference (or overall) in 2021 or SRF2

Notes: "-" indicates no data. "nc" indicates no comparisons. "nt" = not tested because there are more than 95% censored data. Shaded magnitudes of difference (MOD) were significant in the post-hoc analysis (α = 0.05) corrected for the number of tests using a Tukey's Honestly Significant Difference Test. January and February data were excluded from the analyses because there are no SFR2 data from these months.

[a] ANOVA model conducted to test for temporal differences relative to reference (Relative change model) where the percentage of data below the laboratory reporting limit was less than 80% for both the exposed and reference area or temporal changes at the exposed area alone (Temporal change model) when the reference area % LRL was greater than 80%. If both the exposed and reference area were above 80 % LRL no tests were conducted.

[b] MOD for relative change model calculated as ($Observed_{Exposed\ SRF2}$ - $Predicted_{ExposedPre}$)/$Predicted_{ExposedSRF2}$, where the predicted concentration was calculated as: $Observed_{ReferenceSRF2}$ + $Observed_{ExposedPre}$ - $Observed_{ReferencePre}$. This MOD represents how much the difference in SRF2 has changed from the difference observed in the early phase. For temporal model, MOD was calculated as (SRF2 -Pre)/SRF2.

[c] MOD calculated as ($Observed_{Exposed\ 2021}$ - $Predicted_{Exposed2021}$)/$Predicted_{Exposed2021}$, where the predicted concentration was calculated as: $Observed_{Reference2021}$ + $Observed_{Exposed\ year_i}$ - $Observed_{Reference\ year_i}$ and year$_i$ is the earlier year (or the early phase) in the comparison. This MOD represents how much the difference in 2021 has changed from the difference observed in the earlier year (or the early phase). This MOD represents how much the difference in 2021 has changed from the difference observed in the earlier year (or the early phase). For temporal model, MOD was calculated as (2021-earlier year)/2021.

Table D.2: Summary of Water Chemistry Data for Key Constituents at Monitoring Stations, EVO LAEMP, 2021

Station	Summary Statistic	Total Dissolved Solids (mg/L)[c]	Lab pH	Field pH	Dissolved Oxygen (mg/L)	Total Organic Carbon (mg/L)	Dissolved Organic Carbon (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)
	n	3	3	4	4	3	3	3	3	3	3	3	3	3
	Annual Minimum	170	8.10	8.16	10.6	0.990	0.770	151	0.00690	<0.001	<0.005	15.6	0.530	0.111
	Annual Maximum	197	8.38	8.49	12.7	1.43	1.52	184	0.0892	<0.001	0.00860	16.9	1.14	0.163
	Annual Mean	185	8.25	8.32	11.8	1.16	1.06	162	0.0489	<0.001	0.00620	16.4	0.820	0.140
	Annual Median	189	8.26	8.32	11.9	1.05	0.890	152	0.0507	<0.001	<0.005	16.6	0.790	0.146
EV_AC2 (RG_ALUSM)	% < LRL	0%	0%	0%	0%	0%	0%	0%	0%	100%	67%	0%	0%	0%
	% > BCWQG[a]	-	-	0%	0%	-	-	0%	0%	0%	0%	0%	0%	-
	% > BCWQG[b]	-	-	0%	0%	-	-	-	0%	0%	0%	-	0%	0%
	% > Level 1 Benchmark	0%	-	-	-	-	-	-	-	-	-	0%	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	n	37	37	36	36	37	37	37	37	37	37	37	37	37
	Annual Minimum	95.0	7.48	6.34	10.5	<0.5	<0.5	88.0	<0.005	<0.001	<0.005	4.92	0.110	0.0410
	Annual Maximum	196	8.37	8.63	16.7	9.07	6.00	177	0.0868	0.00260	0.0161	19.7	0.750	0.0840
	Annual Mean	154	8.13	7.82	13.8	2.09	1.83	139	0.0236	0.00106	0.00641	13.2	0.401	0.0604
	Annual Median	157	8.17	7.90	14.1	1.36	1.38	150	0.0197	<0.001	<0.005	13.4	0.360	0.0580
CM_MC1 (RG_MI25)	% < LRL	0%	0%	0%	0%	5%	5%	0%	3%	89%	70%	0%	0%	0%
	% > BCWQG[a]	-	-	3%	0%	-	-	0%	0%	0%	0%	0%	0%	-
	% > BCWQG[b]	-	-	3%	0%	-	-	-	0%	0%	0%	-	0%	0%
	% > Level 1 Benchmark	0%	-	-	-	-	-	-	-	-	-	0%	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	n	295	295	297	297	51	295	295	298	298	295	298	298	298
	Annual Minimum	690	7.69	7.04	6.76	<0.5	<0.5	276	<0.025	<0.005	<0.005	352	2.79	<0.1
	Annual Maximum	1,940	8.28	8.78	22.4	8.96	83.8	513	20.5	0.0580	0.123	1,560	17.2	0.238
	Annual Mean	1,601	8.05	7.43	11.1	1.09	1.21	430	16.1	0.00612	0.00967	796	6.08	0.108
	Annual Median	1,610	8.06	7.41	10.4	0.800	0.750	434	16.4	<0.005	0.00500	798	6.07	<0.1
F2_ECIN (RG_ERCKUT)	% < LRL	0%	0%	0%	0%	18%	22%	0%	0.3%	83%	50%	0%	0%	66%
	% > BCWQG[a]	-	-	0%	1%	-	-	0%	99%	0%	0%	100%	0%	-
	% > BCWQG[b]	-	-	0%	0%	-	-	-	0%	0%	0%	-	0%	0%
	% > Level 1 Benchmark	99%	-	-	-	-	-	-	-	-	-	100%	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	n	52	52	55	53	51	51	54	52	52	52	52	52	52
	Annual Minimum	1,470	7.79	7.10	8.95	<0.5	<0.5	367	1.52	<0.005	<0.005	677	5.12	<0.1
	Annual Maximum	1,810	8.49	8.21	92.3	7,090	4.07	540	19.8	0.0526	0.231	917	12.4	0.266
	Annual Mean	1,635	8.15	7.65	12.3	140	1.27	464	10.2	0.0126	0.0790	814	7.57	0.148
	Annual Median	1,635	8.15	7.64	10.7	1.05	1.10	472	9.94	0.00680	0.0790	814	7.10	0.134
EV_ECOUT (RG_ERCKDT)	% < LRL	0%	0%	0%	0%	10%	12%	0%	0.0%	40%	17%	0%	0%	23%
	% > BCWQG[a]	-	-	0%	0%	-	-	0%	87%	0%	0%	100%	0%	-
	% > BCWQG[b]	-	-	0%	0%	-	-	-	0%	0%	0%	-	0%	0%
	% > Level 1 Benchmark[c]	100%	-	-	-	-	-	-	-	-	-	100%	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > 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. The EVWQP Level 1 Benchmark for Nitrate is consistent with the long term BCWQG.

[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.

[c] Total Dissolved Solids and Nickel were screened against the Level 1 Screening Value instead of EVWQP Level 1 Benchmark.

[d] Level 3 Benchmark for EV_MC2 reflect the SPO for selenium and nitrate.

Table D.2: Summary of Water Chemistry Data for Key Constituents at Monitoring Stations, EVO LAEMP, 2021

Station	Summary Statistic	Total Dissolved Solids (mg/L)[c]	Lab pH	Field pH	Dissolved Oxygen (mg/L)	Total Organic Carbon (mg/L)	Dissolved Organic Carbon (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)
EV_EC1 (RG_ERCK)	n	58	57	62	62	52	52	57	57	57	57	57	57	57
	Annual Minimum	1,220	7.96	7.35	8.48	<0.5	<0.5	301	1.52	<0.005	<0.005	678	4.12	<0.1
	Annual Maximum	1,850	8.39	9.40	12.8	2.53	2.85	456	17.2	0.0268	0.0463	907	15.7	0.291
	Annual Mean	1,567	8.24	8.09	10.8	1.02	1.02	398	8.40	0.00633	0.00881	812	7.81	0.152
	Annual Median	1,560	8.24	8.05	10.8	0.980	1.00	402	7.23	<0.005	<0.005	806	7.40	0.148
	% < LRL	0%	0%	0%	0%	12%	13%	0%	0%	77%	58%	0%	0%	21%
	% > BCWQG[a]	-	-	2%	0%	-	-	0%	84%	0%	0%	100%	0%	-
	% > BCWQG[b]	-	-	2%	0%	-	-	-	0%	0%	0%	-	0%	0%
	% > Level 1 Benchmark	100%	-	-	-	-	-	-	-	-	-	100%	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
RG_GATE	n	1	1	0	0	1	1	1	1	1	1	1	1	1
	Annual Minimum	1,860	8.32	-	-	2.39	1.69	256	26.1	0.0825	0.334	983	15.6	0.229
	Annual Maximum	1,860	8.32	-	-	2.39	1.69	256	26.1	0.0825	0.334	983	15.6	0.229
	Annual Mean	1,860	8.32	-	-	2.39	1.69	256	26.1	0.0825	0.334	983	15.6	0.229
	Annual Median	1,860	8.32	-	-	2.39	1.69	256	26.1	0.0825	0.334	983	15.6	0.229
	% < LRL	0%	0%	-	-	0%	0%	0%	0.0%	0%	0%	0%	0%	0%
	% > BCWQG[a]	-	-	-	-	-	-	0%	100%	0%	100%	100%	0%	-
	% > BCWQG[b]	-	-	-	-	-	-	-	0%	0%	0%	-	0%	0%
	% > Level 1 Benchmark	100%	-	-	-	-	-	-	-	-	-	100%	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
EV_GT1 (RG_GATEDP)	n	51	51	51	51	51	51	52	51	51	51	51	51	51
	Annual Minimum	855	6.99	7.65	5.63	1.31	1.34	162	9.38	<0.005	<0.005	461	2.36	<0.1
	Annual Maximum	2,120	8.47	9.14	15.3	4.50	3.97	308	32.4	0.291	0.289	1,200	24.2	0.349
	Annual Mean	1,632	8.23	8.19	11.8	2.30	2.19	247	21.8	0.0595	0.0683	902.1	13.4	0.217
	Annual Median	1,630	8.26	8.19	11.6	2.24	2.08	246	21.9	0.0535	0.0479	894	14.4	0.217
	% < LRL	0%	0%	0%	0%	0%	0%	0%	0.0%	6%	4%	0%	0%	4%
	% > BCWQG[a]	-	-	2%	4%	-	-	0%	100%	2%	0%	100%	0%	-
	% > BCWQG[b]	-	-	2%	0%	-	-	-	0%	0%	0%	-	0%	0%
	% > Level 1 Benchmark	98%	-	-	-	-	-	-	-	-	-	100%	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
EV_BC1 (RG_BOCK)	n	49	49	50	50	49	49	50	49	49	49	49	49	49
	Annual Minimum	932	7.86	7.38	6.18	0.790	0.770	143	16.9	<0.005	0.00660	500	18.1	<0.1
	Annual Maximum	2,790	8.39	8.41	17.7	11.0	9.63	326	64.0	0.312	0.631	1,500	59.6	0.346
	Annual Mean	1,808	8.17	7.91	9.44	2.15	1.96	237	32.7	0.106	0.118	987.8	35.9	0.228
	Annual Median	1,740	8.16	7.92	9.64	1.59	1.53	236	30.9	0.105	0.0543	976	34.7	0.226
	% < LRL	0%	0%	0%	0%	0%	0%	0%	0.0%	6%	0%	0%	0%	12%
	% > BCWQG[a]	-	-	0%	20%	-	-	0%	100%	8%	2%	100%	0%	-
	% > BCWQG[b]	-	-	0%	0%	-	-	-	33%	0%	0%	-	0%	0%
	% > Level 1 Benchmark	96%	-	-	-	-	-	-	-	-	-	100%	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > 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. The EVWQP Level 1 Benchmark for Nitrate is consistent with the long term BCWQG.

[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.

[c] Total Dissolved Solids and Nickel were screened against the Level 1 Screening Value instead of EVWQP Level 1 Benchmark.

[d] Level 3 Benchmark for EV_MC2 reflect the SPO for selenium and nitrate.

Table D.2: Summary of Water Chemistry Data for Key Constituents at Monitoring Stations, EVO LAEMP, 2021

Station	Summary Statistic	Total Dissolved Solids (mg/L)[c]	Lab pH	Field pH	Dissolved Oxygen (mg/L)	Total Organic Carbon (mg/L)	Dissolved Organic Carbon (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)
	n	64	64	61	61	64	64	64	64	64	64	64	64	64
	Annual Minimum	108	7.69	7.48	8.95	<0.5	<0.5	73.5	0.0221	<0.001	<0.005	19.7	0.270	0.0260
	Annual Maximum	516	8.45	9.44	208	5.20	4.40	208	1.11	<0.005	0.0503	235	2.98	0.161
	Annual Mean	213	8.22	8.28	14.6	2.32	2.12	132	0.191	0.00116	0.0104	52.2	1.24	0.108
	Annual Median	214	8.25	8.25	11.5	2.22	2.04	134	0.174	<0.001	0.00800	54.9	0.980	0.107
EV_MC3 (RG_MI3)	% < LRL	0%	0%	0%	0%	5%	5%	0%	0.0%	73%	17%	0%	0%	2%
	% > BCWQG[a]	-	-	3%	0%	-	-	0%	0%	0%	0%	0%	0%	-
	% > BCWQG[b]	-	-	3%	0%	-	-	-	0%	0%	0%	-	0%	0%
	% > Level 1 Benchmark	0%	-	-	-	-	-	-	-	-	-	0%	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	n	48	48	48	48	48	48	48	48	48	48	48	48	48
	Annual Minimum	112	7.90	7.75	9.05	<0.5	<0.5	89.5	0.121	<0.001	<0.005	23.5	0.400	0.0610
	Annual Maximum	370	8.51	8.88	14.4	4.34	4.58	200	1.40	0.00600	0.0605	127	4.88	0.192
	Annual Mean	262	8.29	8.27	11.5	1.89	1.79	152	0.439	0.00134	0.0141	78.7	1.91	0.112
	Annual Median	278	8.32	8.27	11.4	1.81	1.40	162	0.248	<0.001	0.0106	85.2	1.68	0.109
EV_MC2a	% < LRL	0%	0%	0%	0%	6%	8%	0%	0.0%	65%	4%	0%	0%	2%
	% > BCWQG[a]	-	-	0%	0%	-	-	0%	0%	0%	0%	0%	0%	-
	% > BCWQG[b]	-	-	0%	0%	-	-	-	0%	0%	0%	-	0%	0%
	% > Level 1 Benchmark[c]	0%	-	-	-	-	-	-	-	-	-	0%	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	n	1	1	0	0	1	1	1	1	1	1	1	1	1
	Annual Minimum	261	8.42	-	-	1.80	1.75	161	0.153	<0.001	0.0311	62.4	1.11	0.127
	Annual Maximum	261	8.42	-	-	1.80	1.75	161	0.153	<0.001	0.0311	62.4	1.11	0.127
	Annual Mean	261	8.42	-	-	1.80	1.75	161	0.153	<0.001	0.0311	62.4	1.11	0.127
	Annual Median	261	8.42	-	-	1.80	1.75	161	0.153	<0.001	0.0311	62.4	1.11	0.127
RG_MIDER	% < LRL	0%	0%	-	-	0%	0%	0%	0.0%	100%	0%	0%	0%	0%
	% > BCWQG[a]	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-
	% > BCWQG[b]	-	-	-	-	-	-	-	0%	0%	0%	-	0%	0%
	% > Level 1 Benchmark	0%	-	-	-	-	-	-	-	-	-	0%	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	n	1	1	0	0	1	1	1	1	1	1	1	1	1
	Annual Minimum	454	8.43	-	-	1.87	1.70	182	2.72	0.00590	0.0183	170	3.26	0.168
	Annual Maximum	454	8.43	-	-	1.87	1.70	182	2.72	0.00590	0.0183	170	3.26	0.168
	Annual Mean	454	8.43	-	-	1.87	1.70	182	2.72	0.00590	0.0183	170	3.26	0.168
	Annual Median	454	8.43	-	-	1.87	1.70	182	2.72	0.00590	0.0183	170	3.26	0.168
RG_MIDGA	% < LRL	0%	0%	-	-	0%	0%	0%	0.0%	0%	0%	0%	0%	0%
	% > BCWQG[a]	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-
	% > BCWQG[b]	-	-	-	-	-	-	-	0%	0%	0%	-	0%	0%
	% > Level 1 Benchmark[c]	0%	-	-	-	-	-	-	-	-	-	0%	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-

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

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[c] Total Dissolved Solids and Nickel were screened against the Level 1 Screening Value instead of EVWQP Level 1 Benchmark.

[d] Level 3 Benchmark for EV_MC2 reflect the SPO for selenium and nitrate.

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Station	Summary Statistic	Total Dissolved Solids (mg/L)[c]	Lab pH	Field pH	Dissolved Oxygen (mg/L)	Total Organic Carbon (mg/L)	Dissolved Organic Carbon (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)
RG_MIDBO	n	1	1	0	0	1	1	1	1	1	1	1	1	1
	Annual Minimum	374	8.38	-	-	1.63	1.78	182	1.02	0.00160	0.0268	123	2.42	0.160
	Annual Maximum	374	8.38	-	-	1.63	1.78	182	1.02	0.00160	0.0268	123	2.42	0.160
	Annual Mean	374	8.38	-	-	1.63	1.78	182	1.02	0.00160	0.0268	123	2.42	0.160
	Annual Median	374	8.38	-	-	1.63	1.78	182	1.02	0.00160	0.0268	123	2.42	0.160
	% < LRL	0%	0%	-	-	0%	0%	0%	0.0%	0%	0%	0%	0%	0%
	% > BCWQG[a]	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	-
	% > BCWQG[b]	-	-	-	-	-	-	-	0%	0%	0%	-	0%	0%
	% > Level 1 Benchmark[c]	0%	-	-	-	-	-	-	-	-	-	0%	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
EV_MC2 (RG_MICOMP)	n	82	82	86	86	77	77	82	82	82	82	82	82	82
	Annual Minimum	118	7.80	5.08	7.13	<0.5	<0.5	98.1	0.271	<0.001	<0.005	26.8	0.860	0.0480
	Annual Maximum	525	8.51	8.67	13.0	7.59	4.40	216	3.36	0.0114	0.0682	181	19.0	0.180
	Annual Mean	306	8.24	8.08	10.7	1.86	1.72	161	0.962	0.00184	0.0116	100	3.83	0.119
	Annual Median	319	8.25	8.16	10.8	1.54	1.55	166	0.845	0.00120	0.00820	106	3.58	0.118
	% < LRL	0%	0%	0%	0%	6%	8%	0%	0.0%	43%	20%	0%	0%	2%
	% > BCWQG[a]	-	-	1%	1%	-	-	0%	1%	0%	0%	0%	0%	-
	% > BCWQG[b]	-	-	1%	0%	-	-	-	0%	0%	0%	-	0%	0%
	% > Level 1 Benchmark[c]	0%	-	-	-	-	-	-	-	-	-	0%	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark[d]	-	-	-	-	-	-	-	0%	-	-	-	-	-
EV_ER1	n	59	59	61	61	59	59	59	59	59	59	59	59	59
	Annual Minimum	158	7.86	7.63	9.48	<0.5	<0.5	115	1.01	<0.001	<0.005	32.0	0.670	0.0795
	Annual Maximum	369	8.49	9.06	13.2	3.90	4.06	202	3.88	3.27	0.154	116	6.10	0.212
	Annual Mean	276	8.28	8.23	11.3	1.44	1.34	158	2.17	0.0573	0.0152	75.8	2.56	0.151
	Annual Median	279	8.30	8.20	11.4	1.19	1.11	165	2.00	0.00120	0.00660	79.1	2.24	0.153
	% < LRL	0%	0%	0%	0%	15%	17%	0%	0.0%	46%	32%	0%	0%	0%
	% > BCWQG[a]	-	-	2%	0%	-	-	0%	19%	2%	0%	0%	0%	-
	% > BCWQG[b]	-	-	2%	0%	-	-	-	0%	2%	0%	-	0%	0%
	% > Level 1 Benchmark[c]	0%	-	-	-	-	-	-	-	-	-	0%	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-

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

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[c] Total Dissolved Solids and Nickel were screened against the Level 1 Screening Value instead of EVWQP Level 1 Benchmark.

[d] Level 3 Benchmark for EV_MC2 reflect the SPO for selenium and nitrate.

Table D.2: Summary of Water Chemistry Data for Key Constituents at Monitoring Stations, EVO LAEMP, 2021

Station	Summary Statistic	Total Antimony (mg/L)	Total Arsenic (mg/L)	Total Barium (mg/L)	Total Beryllium (mg/L)	Total Boron (mg/L)	Total Chromium (mg/L)	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)
EV_AC2 (RG_ALUSM)	n	3	3	3	3	3	3	3	3	3	3	3	3	3
	Annual Minimum	<0.0001	0.000120	0.0608	<0.00002	<0.01	0.000190	<0.0001	<0.01	<0.00005	0.00290	0.000810	<0.0000005	0.000565
	Annual Maximum	<0.0001	0.000150	0.0699	<0.00002	<0.01	0.000240	<0.0001	0.0270	<0.00005	0.00370	0.00171	<0.000005	0.000705
	Annual Mean	<0.0001	0.000133	0.0654	<0.00002	<0.01	0.000207	<0.0001	0.0173	<0.00005	0.00323	0.00129	<0.0000005	0.000638
	Annual Median	<0.0001	0.000130	0.0654	<0.00002	<0.01	0.000190	<0.0001	0.0150	<0.00005	0.00310	0.00134	<0.000005	0.000644
	% < LRL	100%	0%	0%	100%	100%	0%	100%	33%	100%	0%	0%	100%	0%
	% > BCWQG[a]	0%	-	0%	0%	0%	0%	0%	-	0%	-	0%	67%	0%
	% > BCWQG[b]	-	0%	-	-	-	-	0%	0%	0%	-	0%	-	0%
	% > Level 1 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
CM_MC1 (RG_MI25)	n	37	37	37	37	37	37	37	37	37	37	37	37	37
	Annual Minimum	<0.0001	0.000150	0.0273	<0.00002	<0.01	0.000160	<0.0001	<0.01	<0.00005	0.00210	<0.0001	<0.0000005	0.000452
	Annual Maximum	<0.0001	0.000470	0.0579	0.0000540	0.0200	0.00338	0.000430	0.395	0.00152	0.00560	0.0453	0.00000513	0.00101
	Annual Mean	<0.0001	0.000218	0.0471	0.0000209	0.0144	0.000360	0.000111	0.0492	0.0000984	0.00435	0.00230	0.000000950	0.000824
	Annual Median	<0.0001	0.000200	0.0514	<0.00002	0.0150	0.000200	<0.0001	<0.01	<0.00005	0.00480	0.000490	<0.0000005	0.000882
	% < LRL	100%	0%	0%	97%	11%	0%	95%	54%	81%	0%	14%	54%	0%
	% > BCWQG[a]	0%	-	0%	0%	0%	3%	0%	-	0%	-	0%	22%	0%
	% > BCWQG[b]	-	0%	-	-	-	-	0%	0%	0%	-	0%	-	0%
	% > Level 1 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
F2_ECIN (RG_ERCKUT)	n	52	52	52	52	52	52	52	52	52	52	52	135	52
	Annual Minimum	0.000160	0.000200	0.0591	<0.00002	0.0120	0.000120	<0.0001	<0.01	<0.00005	0.0239	<0.0001	<0.0000005	0.000983
	Annual Maximum	0.000220	<0.0004	0.0707	<0.00004	<0.02	0.000510	<0.0002	0.133	<0.0001	0.0315	0.00228	0.00000925	0.00157
	Annual Mean	0.000197	0.000264	0.0640	<0.00002	0.0136	0.000213	0.000100	0.0230	0.0000502	0.0267	0.000489	0.000000580	0.00110
	Annual Median	0.000200	0.000260	0.0633	<0.00002	0.0135	0.000200	<0.0001	<0.01	<0.00005	0.0264	0.000305	<0.0000005	0.00109
	% < LRL	2%	2%	0%	100%	8%	8%	98%	54%	92%	0%	6%	96%	0%
	% > BCWQG[a]	0%	-	0%	0%	0%	0%	0%	-	0%	-	0%	1%	0%
	% > BCWQG[b]	-	0%	-	-	-	-	0%	0%	0%	-	0%	-	0%
	% > Level 1 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
EV_ECOUT (RG_ERCKDT)	n	52	52	52	52	52	52	52	52	52	52	52	51	52
	Annual Minimum	0.000170	0.000220	0.0128	<0.00002	0.0120	<0.0001	<0.0001	<0.01	<0.00005	0.0241	<0.0001	<0.0000005	0.00100
	Annual Maximum	0.00108	0.00113	0.0703	0.000110	0.0520	<0.0005	0.0230	0.903	<0.00025	0.129	0.551	0.00000159	0.0217
	Annual Mean	0.000285	0.000514	0.0422	0.0000217	0.0245	0.000163	0.00781	0.221	0.0000628	0.0486	0.196	0.000000533	0.00993
	Annual Median	0.000210	0.000495	0.0426	<0.00002	0.0240	0.000140	0.00800	0.205	0.0000500	0.0458	0.205	<0.0000005	0.0100
	% < LRL	10%	4%	0%	98%	10%	33%	6%	10%	56%	0%	2%	86%	0%
	% > BCWQG[a]	0%	-	0%	0%	0%	0%	71%	-	0%	-	0%	2%	0%
	% > BCWQG[b]	-	0%	-	-	-	-	0%	0%	0%	-	0%	-	0%
	% > Level 1 Benchmark[c]	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > 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. The EVWQP Level 1 Benchmark for Nitrate is consistent with the long term BCWQG.

[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.

[c] Total Dissolved Solids and Nickel were screened against the Level 1 Screening Value instead of EVWQP Level 1 Benchmark.

[d] Level 3 Benchmark for EV_MC2 reflect the SPO for selenium and nitrate.

Table D.2: Summary of Water Chemistry Data for Key Constituents at Monitoring Stations, EVO LAEMP, 2021

Station	Summary Statistic	Total Antimony (mg/L)	Total Arsenic (mg/L)	Total Barium (mg/L)	Total Beryllium (mg/L)	Total Boron (mg/L)	Total Chromium (mg/L)	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)
	n	52	52	52	52	52	52	52	52	52	52	52	52	52
	Annual Minimum	0.000160	0.000200	0.0193	<0.00002	0.0120	<0.0001	<0.0001	<0.01	<0.00005	0.0227	<0.0001	<0.0000005	0.000956
	Annual Maximum	<0.0005	0.000600	0.0535	<0.0001	<0.05	<0.0005	0.00874	0.105	<0.00025	0.131	0.156	0.000000630	0.0216
	Annual Mean	0.000270	0.000374	0.0326	<0.00002	0.0273	0.000133	0.00319	0.0128	0.0000553	0.0534	0.0538	0.000000502	0.0119
	Annual Median	0.000240	0.000360	0.0308	<0.00002	0.0280	<0.0001	0.00290	<0.01	<0.0001	0.0502	0.0436	<0.0000005	0.0134
EV_EC1 (RG_ERCK)	% < LRL	10%	6%	0%	100%	6%	56%	10%	90%	96%	0%	6%	98%	0%
	% > BCWQG[a]	0%	-	0%	0%	0%	0%	27%	-	0%	-	0%	0%	0%
	% > BCWQG[b]	-	0%	-	-	-	-	0%	0%	0%	-	0%	-	0%
	% > Level 1 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	n	1	1	1	1	1	1	1	1	1	1	1	1	1
	Annual Minimum	0.00133	0.000340	0.240	<0.00002	0.0450	<0.0001	0.000310	0.144	<0.00005	0.146	0.0159	<0.0000005	0.00772
	Annual Maximum	0.00133	0.000340	0.240	<0.00002	0.0450	<0.0001	0.000310	0.144	<0.00005	0.146	0.0159	<0.0000005	0.00772
	Annual Mean	0.00133	0.000340	0.240	<0.00002	0.0450	<0.0001	0.000310	0.144	<0.00005	0.146	0.0159	<0.0000005	0.00772
	Annual Median	0.00133	0.000340	0.240	<0.00002	0.0450	<0.0001	0.000310	0.144	<0.00005	0.146	0.0159	<0.0000005	0.00772
RG_GATE	% < LRL	0%	0%	0%	100%	0%	100%	0%	0%	100%	0%	0%	100%	0%
	% > BCWQG[a]	0%	-	0%	0%	0%	0%	0%	-	0%	-	0%	0%	0%
	% > BCWQG[b]	-	0%	-	-	-	-	0%	0%	0%	-	0%	-	0%
	% > Level 1 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	n	51	51	51	51	51	51	51	51	51	51	51	51	51
	Annual Minimum	0.000500	0.000195	0.0478	<0.00002	0.0170	<0.0001	<0.0001	<0.01	<0.00005	0.0524	0.00153	<0.0000005	0.00432
	Annual Maximum	0.00169	0.00102	0.196	<0.00004	0.0490	0.000600	0.000480	0.284	0.000179	0.167	0.0151	0.00000203	0.00904
	Annual Mean	0.00102	0.000385	0.126	<0.00002	0.0352	0.000153	0.000246	0.0627	0.0000663	0.115	0.00725	0.000000767	0.00752
	Annual Median	0.000830	0.000360	0.132	<0.00002	0.0360	0.000110	0.000230	0.0510	<0.00005	0.108	0.00647	0.000000540	0.00738
EV_GT1 (RG_GATEDP)	% < LRL	0%	0%	0%	100%	2%	63%	16%	4%	78%	0%	0%	45%	0%
	% > BCWQG[a]	0%	-	0%	0%	0%	0%	0%	-	0%	-	0%	14%	0%
	% > BCWQG[b]	-	0%	-	-	-	-	0%	0%	0%	-	0%	-	0%
	% > Level 1 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	n	49	49	49	49	49	49	49	49	49	49	49	49	49
	Annual Minimum	0.000480	<0.0002	0.0404	<0.00002	0.0220	<0.0001	0.000110	<0.01	<0.00005	0.0692	0.000650	<0.0000005	0.00369
	Annual Maximum	0.00188	0.000820	0.254	<0.00004	0.0660	0.000820	0.00119	0.850	0.00112	0.194	0.0292	0.00000175	0.0154
	Annual Mean	0.00124	0.000309	0.0828	0.0000211	0.0500	0.000138	0.000298	0.0505	0.0000927	0.160	0.00790	0.000000617	0.00804
	Annual Median	0.00118	0.000280	0.0820	<0.00002	0.0520	<0.0001	0.000190	0.0190	<0.00005	0.168	0.00250	<0.0000005	0.00824
EV_BC1 (RG_BOCK)	% < LRL	0%	4%	0%	98%	0%	88%	37%	45%	84%	0%	0%	71%	0%
	% > BCWQG[a]	0%	-	0%	0%	0%	0%	0%	-	0%	-	0%	4%	0%
	% > BCWQG[b]	-	0%	-	-	-	-	0%	0%	0%	-	0%	-	0%
	% > Level 1 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > 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. The EVWQP Level 1 Benchmark for Nitrate is consistent with the long term BCWQG.

[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.

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Station	Summary Statistic	Total Antimony (mg/L)	Total Arsenic (mg/L)	Total Barium (mg/L)	Total Beryllium (mg/L)	Total Boron (mg/L)	Total Chromium (mg/L)	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)
EV_MC3 (RG_MI3)	n	64	64	64	64	64	64	64	64	64	64	64	64	64
	Annual Minimum	<0.0001	0.000140	0.0534	<0.00002	<0.01	<0.0001	<0.0001	<0.01	<0.00005	0.00300	0.000540	<0.0000005	0.000467
	Annual Maximum	0.000320	0.000935	0.132	0.000102	0.0130	0.00178	0.00120	1.55	0.00138	0.0152	0.0533	0.00000790	0.00430
	Annual Mean	0.000108	0.000244	0.0949	0.0000221	0.0104	0.000296	0.000161	0.122	0.000121	0.00521	0.00444	0.00000159	0.000734
	Annual Median	<0.0001	0.000210	0.0970	<0.00002	<0.01	0.000200	<0.0001	0.0475	<0.00005	0.00525	0.00202	0.00000106	0.000705
	% < LRL	69%	0%	0%	94%	72%	2%	69%	17%	55%	0%	0%	31%	0%
	% > BCWQG[a]	0%	-	0%	0%	0%	2%	0%	-	0%	-	0%	42%	0%
	% > BCWQG[b]	-	0%	-	-	-	-	0%	2%	0%	-	0%	-	0%
	% > Level 1 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
EV_MC2a	n	48	48	48	48	48	48	48	48	48	48	48	48	48
	Annual Minimum	<0.0001	0.000140	0.0563	<0.00002	<0.01	<0.0001	<0.0001	<0.01	<0.00005	0.00350	0.00168	<0.0000005	0.000512
	Annual Maximum	0.000160	0.000930	0.143	0.0000940	0.0160	0.00202	0.00125	1.54	0.00131	0.0150	0.0532	0.00000576	0.00212
	Annual Mean	0.000102	0.000235	0.0999	0.0000217	0.0111	0.000271	0.000183	0.103	0.000107	0.00748	0.00561	0.00000121	0.00115
	Annual Median	<0.0001	0.000210	0.105	<0.00002	0.0105	0.000180	0.000135	0.0340	<0.00005	0.00785	0.00411	0.000000620	0.00103
	% < LRL	71%	0%	0%	94%	44%	4%	27%	8%	67%	0%	0%	48%	0%
	% > BCWQG[a]	0%	-	0%	0%	0%	2%	0%	-	0%	-	0%	29%	0%
	% > BCWQG[b]	-	0%	-	-	-	-	0%	2%	0%	-	0%	-	0%
	% > Level 1 Benchmark[c]	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
RG_MIDER	n	1	1	1	1	1	1	1	1	1	1	1	1	1
	Annual Minimum	<0.0001	0.000190	0.113	<0.00002	0.0110	0.000120	<0.0001	<0.01	<0.00005	0.00660	0.00141	0.000000530	0.000858
	Annual Maximum	<0.0001	0.000190	0.113	<0.00002	0.0110	0.000120	<0.0001	<0.01	<0.00005	0.00660	0.00141	0.000000530	0.000858
	Annual Mean	<0.0001	0.000190	0.113	<0.00002	0.0110	0.000120	<0.0001	<0.01	<0.00005	0.00660	0.00141	0.000000530	0.000858
	Annual Median	<0.0001	0.000190	0.113	<0.00002	0.0110	0.000120	<0.0001	<0.01	<0.00005	0.00660	0.00141	0.000000530	0.000858
	% < LRL	100%	0%	0%	100%	0%	0%	100%	100%	100%	0%	0%	0%	0%
	% > BCWQG[a]	0%	-	0%	0%	0%	0%	0%	-	0%	-	0%	0%	0%
	% > BCWQG[b]	-	0%	-	-	-	-	0%	0%	0%	-	0%	-	0%
	% > Level 1 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
RG_MIDGA	n	1	1	1	1	1	1	1	1	1	1	1	1	1
	Annual Minimum	0.000350	0.000230	0.138	<0.00002	0.0180	0.000140	0.000140	0.0240	<0.00005	0.0351	0.00453	<0.0000005	0.00276
	Annual Maximum	0.000350	0.000230	0.138	<0.00002	0.0180	0.000140	0.000140	0.0240	<0.00005	0.0351	0.00453	<0.0000005	0.00276
	Annual Mean	0.000350	0.000230	0.138	<0.00002	0.0180	0.000140	0.000140	0.0240	<0.00005	0.0351	0.00453	<0.0000005	0.00276
	Annual Median	0.000350	0.000230	0.138	<0.00002	0.0180	0.000140	0.000140	0.0240	<0.00005	0.0351	0.00453	<0.0000005	0.00276
	% < LRL	0%	0%	0%	100%	0%	0%	0%	0%	100%	0%	0%	100%	0%
	% > BCWQG[a]	0%	-	0%	0%	0%	0%	0%	-	0%	-	0%	0%	0%
	% > BCWQG[b]	-	0%	-	-	-	-	0%	0%	0%	-	0%	-	0%
	% > Level 1 Benchmark[c]	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-

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RG_MIDBO	n	1	1	1	1	1	1	1	1	1	1	1	1	1
	Annual Minimum	0.000130	0.000210	0.121	<0.00002	0.0150	0.000130	<0.0001	0.0140	<0.00005	0.0135	0.00296	<0.0000005	0.00188
	Annual Maximum	0.000130	0.000210	0.121	<0.00002	0.0150	0.000130	<0.0001	0.0140	<0.00005	0.0135	0.00296	<0.0000005	0.00188
	Annual Mean	0.000130	0.000210	0.121	<0.00002	0.0150	0.000130	<0.0001	0.0140	<0.00005	0.0135	0.00296	<0.0000005	0.00188
	Annual Median	0.000130	0.000210	0.121	<0.00002	0.0150	0.000130	<0.0001	0.0140	<0.00005	0.0135	0.00296	<0.0000005	0.00188
	% < LRL	0%	0%	0%	100%	0%	0%	100%	0%	100%	0%	0%	100%	0%
	% > BCWQG[a]	0%	-	0%	0%	0%	0%	0%	-	0%	-	0%	0%	0%
	% > BCWQG[b]	-	0%	-	-	-	-	0%	0%	0%	-	0%	-	0%
	% > Level 1 Benchmark[c]	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
EV_MC2 (RG_MICOMP)	n	78	78	78	78	78	78	78	78	78	78	78	77	78
	Annual Minimum	<0.0001	0.000130	0.0548	<0.00002	<0.01	0.000100	<0.0001	<0.01	<0.00003	0.00480	0.00108	<0.0000005	0.000424
	Annual Maximum	0.000420	0.00437	0.284	0.000560	0.0170	0.00932	0.00782	10.5	0.00923	0.0251	0.390	0.0000149	0.00217
	Annual Mean	0.000112	0.000271	0.0980	0.0000278	0.0121	0.000352	0.000252	0.210	0.000189	0.0116	0.00930	0.00000125	0.00117
	Annual Median	<0.0001	0.000200	0.101	<0.00002	0.0120	0.000180	0.000120	0.0290	<0.00005	0.0116	0.00305	0.000000630	0.00112
	% < LRL	51%	0%	0%	95%	29%	1%	37%	13%	68%	0%	0%	44%	0%
	% > BCWQG[a]	0%	-	0%	1%	0%	3%	1%	-	1%	-	0%	27%	0%
	% > BCWQG[b]	-	0%	-	-	-	-	0%	3%	0%	-	0%	-	0%
	% > Level 1 Benchmark[c]	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark[d]	-	-	-	-	-	-	-	-	-	-	-	-	-
EV_ER1	n	60	60	60	60	60	60	60	60	60	60	60	59	60
	Annual Minimum	<0.0001	0.000170	0.0518	<0.00002	<0.01	0.000180	<0.0001	<0.01	<0.00005	0.00510	0.00142	<0.0000005	0.000749
	Annual Maximum	0.000270	0.00109	0.0990	0.0000900	0.0110	0.00245	0.000860	1.79	0.00114	0.0130	0.0862	0.00000612	0.00154
	Annual Mean	0.000106	0.000261	0.0739	0.0000230	0.0100	0.000438	0.000149	0.154	0.000146	0.00877	0.00854	0.00000107	0.00115
	Annual Median	<0.0001	0.000210	0.0746	<0.00002	<0.01	0.000280	<0.0001	0.0375	<0.00005	0.00890	0.00320	<0.0000005	0.00116
	% < LRL	80%	0%	0%	88%	97%	0%	77%	13%	58%	0%	0%	54%	0%
	% > BCWQG[a]	0%	-	0%	0%	0%	8%	0%	-	0%	-	0%	22%	0%
	% > BCWQG[b]	-	0%	-	-	-	-	0%	3%	0%	-	0%	-	0%
	% > Level 1 Benchmark[c]	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 2 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	-	-	-	-	-	-	-	-	-	-	-	-	-

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

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[c] Total Dissolved Solids and Nickel were screened against the Level 1 Screening Value instead of EVWQP Level 1 Benchmark.

[d] Level 3 Benchmark for EV_MC2 reflect the SPO for selenium and nitrate.

Table D.2: Summary of Water Chemistry Data for Key Constituents at Monitoring Stations, EVO LAEMP, 2021

Station	Summary Statistic	Total Nickel (ug/L)[c]	Total Selenium (ug/L)	Total Silver (mg/L)	Total Thallium (mg/L)	Total Uranium (mg/L)	Total Zinc (mg/L)	Dissolved Aluminum (mg/L)	Dissolved Cadmium (ug/L)	Dissolved Copper (mg/L)	Dissolved Iron (mg/L)
EV_AC2 (RG_ALUSM)	n	3	3	3	3	3	3	3	3	3	3
	Annual Minimum	<0.5	0.617	<0.00001	<0.00001	0.000557	<0.003	<0.001	<0.005	<0.0002	<0.01
	Annual Maximum	<0.5	0.688	<0.00001	<0.00001	0.000594	<0.003	0.00190	0.00570	<0.0002	<0.01
	Annual Mean	<0.5	0.641	<0.00001	<0.00001	0.000580	<0.003	0.00130	0.00523	<0.0002	<0.01
	Annual Median	<0.5	0.618	<0.00001	<0.00001	0.000590	<0.003	<0.001	<0.005	<0.0002	<0.01
	% < LRL	100%	0%	100%	100%	0%	100%	67%	67%	100%	100%
	% > BCWQG[a]	-	0%	0%	0%	0%	0%	0%	0%	0%	-
	% > BCWQG[b]	-	-	0%	-	-	0%	0%	0%	0%	0%
	% > Level 1 Benchmark	0%	0%	-	-	-	-	-	0%	-	-
	% > Level 2 Benchmark	0%	0%	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	0%	-	-	-	-	-	-	-	-	-
CM_MC1 (RG_MI25)	n	37	37	37	37	37	37	37	37	37	37
	Annual Minimum	<0.5	0.163	<0.00001	<0.00001	0.000129	<0.003	<0.001	0.00570	<0.0002	<0.01
	Annual Maximum	1.89	0.385	<0.00001	0.0000280	0.000299	0.00680	0.0162	0.0132	0.000600	0.0190
	Annual Mean	0.565	0.248	<0.00001	0.0000111	0.000220	0.00338	0.00351	0.00935	0.000251	0.0104
	Annual Median	<0.5	0.226	<0.00001	<0.00001	0.000227	<0.003	0.00190	0.00910	<0.0002	<0.01
	% < LRL	92%	0%	100%	86%	0%	81%	11%	0%	51%	92%
	% > BCWQG[a]	-	0%	0%	0%	0%	0%	0%	0%	5%	-
	% > BCWQG[b]	-	-	0%	-	-	0%	0%	0%	0%	0%
	% > Level 1 Benchmark	0%	0%	-	-	-	-	-	0%	-	-
	% > Level 2 Benchmark	0%	0%	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	0%	-	-	-	-	-	-	-	-	-
F2_ECIN (RG_ERCKUT)	n	52	59	52	52	52	52	135	135	135	135
	Annual Minimum	<0.5	132	<0.00001	<0.00001	0.00806	<0.003	<0.001	0.0539	<0.0002	<0.01
	Annual Maximum	1.26	169	<0.00002	<0.00002	0.00957	0.0123	0.198	0.109	0.00127	0.0770
	Annual Mean	0.872	148	<0.00001	<0.00001	0.00868	0.00352	0.00378	0.0789	0.000253	0.0142
	Annual Median	0.860	148	<0.00001	<0.00001	0.00863	<0.003	<0.001	0.0798	<0.0002	<0.01
	% < LRL	10%	0%	100%	100%	0%	83%	64%	0%	75%	61%
	% > BCWQG[a]	-	100%	0%	0%	65%	0%	1%	0%	9%	-
	% > BCWQG[b]	-	-	0%	-	-	0%	1%	0%	1%	0%
	% > Level 1 Benchmark	0%	100%	-	-	-	-	-	0%	-	-
	% > Level 2 Benchmark	0%	100%	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	0%	-	-	-	-	-	-	-	-	-
EV_ECOUT (RG_ERCKDT)	n	52	58	52	52	52	52	51	51	51	51
	Annual Minimum	0.820	16.4	<0.00001	<0.00001	0.00812	<0.003	<0.001	0.0680	<0.0002	<0.01
	Annual Maximum	80.2	168	0.000289	0.000113	0.0147	0.0258	<0.005	0.288	0.00110	0.136
	Annual Mean	28.5	91.1	0.0000154	0.0000455	0.0109	0.0119	0.00121	0.148	0.000220	0.0243
	Annual Median	29.7	87.4	<0.00001	0.0000450	0.0108	0.0115	0.00100	0.150	<0.0002	0.0110
	% < LRL	0%	0%	98%	25%	0%	17%	57%	0%	94%	49%
	% > BCWQG[a]	-	100%	0%	0%	90%	0%	0%	0%	6%	-
	% > BCWQG[b]	-	-	0%	-	-	0%	0%	0%	0%	0%
	% > Level 1 Benchmark[c]	73%	93%	-	-	-	-	-	0%	-	-
	% > Level 2 Benchmark	71%	66%	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	67%	-	-	-	-	-	-	-	-	-

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[d] Level 3 Benchmark for EV_MC2 reflect the SPO for selenium and nitrate.

Table D.2: Summary of Water Chemistry Data for Key Constituents at Monitoring Stations, EVO LAEMP, 2021

Station	Summary Statistic	Total Nickel (ug/L)[c]	Total Selenium (ug/L)	Total Silver (mg/L)	Total Thallium (mg/L)	Total Uranium (mg/L)	Total Zinc (mg/L)	Dissolved Aluminum (mg/L)	Dissolved Cadmium (ug/L)	Dissolved Copper (mg/L)	Dissolved Iron (mg/L)
EV_EC1 (RG_ERCK)	n	52	64	52	52	52	52	52	52	52	52
	Annual Minimum	0.920	16.8	<0.00001	<0.00001	0.00742	<0.003	<0.001	<0.005	<0.0002	<0.01
	Annual Maximum	36.8	172	<0.00005	0.0000550	0.0156	<0.015	<0.005	<0.025	0.00265	<0.05
	Annual Mean	23.1	79.1	<0.00001	0.0000346	0.0111	0.00309	0.00113	0.00942	0.000266	<0.01
	Annual Median	26.0	65.9	<0.00001	0.0000360	0.0113	<0.006	<0.001	0.00920	<0.0002	<0.01
	% < LRL	0%	0%	100%	15%	0%	98%	88%	52%	90%	100%
	% > BCWQG[a]	-	100%	0%	0%	88%	0%	0%	0%	8%	-
	% > BCWQG[b]	-	-	0%	-	-	0%	0%	0%	0%	0%
	% > Level 1 Benchmark	88%	97%	-	-	-	-	-	0%	-	-
	% > Level 2 Benchmark	85%	39%	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	75%	-	-	-	-	-	-	-	-	-
RG_GATE	n	1	1	1	1	1	1	1	1	1	1
	Annual Minimum	26.4	228	<0.00001	0.0000380	0.00961	0.0128	<0.002	0.148	<0.0004	<0.02
	Annual Maximum	26.4	228	<0.00001	0.0000380	0.00961	0.0128	<0.002	0.148	<0.0004	<0.02
	Annual Mean	26.4	228	<0.00001	0.0000380	0.00961	0.0128	<0.002	0.148	<0.0004	<0.02
	Annual Median	26.4	228	<0.00001	0.0000380	0.00961	0.0128	<0.002	0.148	<0.0004	<0.02
	% < LRL	0%	0%	100%	0%	0%	0%	100%	0%	100%	100%
	% > BCWQG[a]	-	100%	0%	0%	100%	0%	0%	0%	0%	-
	% > BCWQG[b]	-	-	0%	-	-	0%	0%	0%	0%	0%
	% > Level 1 Benchmark	100%	100%	-	-	-	-	-	0%	-	-
	% > Level 2 Benchmark	100%	100%	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	100%	-	-	-	-	-	-	-	-	-
EV_GT1 (RG_GATEDP)	n	51	51	51	51	51	51	51	51	51	51
	Annual Minimum	6.00	130	<0.00001	0.0000250	0.00490	0.00470	<0.001	<0.01	<0.0002	<0.01
	Annual Maximum	36.4	321	0.000139	0.0000520	0.0133	0.0746	0.0886	0.205	0.000650	0.0540
	Annual Mean	19.8	223	0.0000128	0.0000379	0.00864	0.00943	0.00489	0.0786	0.000356	0.0128
	Annual Median	18.5	220	<0.00001	0.0000380	0.00882	0.00720	0.00210	0.0721	0.000380	<0.01
	% < LRL	0%	0%	94%	0%	0%	20%	33%	2%	45%	80%
	% > BCWQG[a]	-	100%	0%	0%	55%	0%	2%	0%	0%	-
	% > BCWQG[b]	-	-	0%	-	-	0%	0%	0%	0%	0%
	% > Level 1 Benchmark	100%	100%	-	-	-	-	-	0%	-	-
	% > Level 2 Benchmark	76%	100%	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	35%	-	-	-	-	-	-	-	-	-
EV_BC1 (RG_BOCK)	n	49	49	49	49	49	49	49	49	49	49
	Annual Minimum	14.2	133	<0.00001	0.0000230	0.00485	<0.003	<0.001	0.00990	<0.0002	<0.01
	Annual Maximum	42.5	496	0.0000330	0.0000780	0.0140	0.0463	0.0440	0.167	0.00162	0.0900
	Annual Mean	27.5	270	0.0000105	0.0000454	0.0101	0.00773	0.00441	0.0433	0.000368	0.0121
	Annual Median	27.0	260	<0.00001	0.0000420	0.0101	0.00440	0.00280	0.0235	0.000340	<0.01
	% < LRL	0%	0%	96%	0%	0%	59%	16%	8%	51%	94%
	% > BCWQG[a]	-	100%	0%	0%	90%	0%	0%	0%	2%	-
	% > BCWQG[b]	-	-	0%	-	-	0%	0%	0%	0%	0%
	% > Level 1 Benchmark	100%	100%	-	-	-	-	-	0%	-	-
	% > Level 2 Benchmark	96%	100%	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	92%	-	-	-	-	-	-	-	-	-

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	n	64	64	64	64	64	64	64	64	64	64
	Annual Minimum	<0.5	0.993	<0.00001	<0.00001	0.000349	<0.003	<0.001	0.0105	<0.0002	<0.01
	Annual Maximum	6.89	10.4	0.000118	0.0000620	0.00314	0.0506	0.0651	0.0282	0.000570	0.0400
	Annual Mean	1.22	1.70	0.0000130	0.0000123	0.000655	0.00438	0.00640	0.0199	0.000284	0.0114
	Annual Median	0.905	1.57	<0.00001	<0.00001	0.000665	<0.003	0.00285	0.0190	0.000242	<0.01
EV_MC3 (RG_MI3)	% < LRL	27%	0%	86%	77%	0%	75%	20%	0%	36%	80%
	% > BCWQG[a]	-	11%	0%	0%	0%	2%	2%	0%	0%	-
	% > BCWQG[b]	-	-	0%	-	-	0%	2%	0%	0%	0%
	% > Level 1 Benchmark	2%	0%	-	-	-	-	-	0%	-	-
	% > Level 2 Benchmark	0%	0%	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	0%	-	-	-	-	-	-	-	-	-
	n	48	48	48	48	48	48	48	48	48	48
	Annual Minimum	<0.5	1.52	<0.00001	<0.00001	0.000451	<0.003	<0.001	0.0125	<0.0002	<0.01
	Annual Maximum	4.84	13.1	0.0000760	0.0000630	0.00191	0.0151	0.0200	0.0244	0.00245	0.0360
	Annual Mean	1.59	4.50	0.0000119	0.0000118	0.00105	0.00402	0.00503	0.0187	0.000309	0.0110
	Annual Median	1.58	3.03	<0.00001	<0.00001	0.00115	<0.003	0.00280	0.0186	0.000230	<0.01
EV_MC2a	% < LRL	10%	0%	88%	85%	0%	75%	35%	0%	35%	79%
	% > BCWQG[a]	-	90%	0%	0%	0%	0%	0%	0%	2%	-
	% > BCWQG[b]	-	-	0%	-	-	0%	0%	0%	0%	0%
	% > Level 1 Benchmark[c]	0%	0%	-	-	-	-	-	0%	-	-
	% > Level 2 Benchmark	0%	0%	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	0%	-	-	-	-	-	-	-	-	-
	n	1	1	1	1	1	1	1	1	1	1
	Annual Minimum	0.700	1.95	<0.00001	<0.00001	0.000841	<0.003	<0.001	0.0190	<0.0002	<0.01
	Annual Maximum	0.700	1.95	<0.00001	<0.00001	0.000841	<0.003	<0.001	0.0190	<0.0002	<0.01
	Annual Mean	0.700	1.95	<0.00001	<0.00001	0.000841	<0.003	<0.001	0.0190	<0.0002	<0.01
	Annual Median	0.700	1.95	<0.00001	<0.00001	0.000841	<0.003	<0.001	0.0190	<0.0002	<0.01
RG_MIDER	% < LRL	0%	0%	100%	100%	0%	100%	100%	0%	100%	100%
	% > BCWQG[a]	-	0%	0%	0%	0%	0%	0%	0%	0%	-
	% > BCWQG[b]	-	-	0%	-	-	0%	0%	0%	0%	0%
	% > Level 1 Benchmark	0%	0%	-	-	-	-	-	0%	-	-
	% > Level 2 Benchmark	0%	0%	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	0%	-	-	-	-	-	-	-	-	-
	n	1	1	1	1	1	1	1	1	1	1
	Annual Minimum	6.57	18.5	<0.00001	0.0000100	0.00286	0.00340	<0.001	0.0279	<0.0002	<0.01
	Annual Maximum	6.57	18.5	<0.00001	0.0000100	0.00286	0.00340	<0.001	0.0279	<0.0002	<0.01
	Annual Mean	6.57	18.5	<0.00001	0.0000100	0.00286	0.00340	<0.001	0.0279	<0.0002	<0.01
	Annual Median	6.57	18.5	<0.00001	0.0000100	0.00286	0.00340	<0.001	0.0279	<0.0002	<0.01
RG_MIDGA	% < LRL	0%	0%	100%	0%	0%	0%	100%	0%	100%	100%
	% > BCWQG[a]	-	100%	0%	0%	0%	0%	0%	0%	0%	-
	% > BCWQG[b]	-	-	0%	-	-	0%	0%	0%	0%	0%
	% > Level 1 Benchmark[c]	100%	0%	-	-	-	-	-	0%	-	-
	% > Level 2 Benchmark	0%	0%	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	0%	-	-	-	-	-	-	-	-	-

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Station	Summary Statistic	Total Nickel (ug/L)[c]	Total Selenium (ug/L)	Total Silver (mg/L)	Total Thallium (mg/L)	Total Uranium (mg/L)	Total Zinc (mg/L)	Dissolved Aluminum (mg/L)	Dissolved Cadmium (ug/L)	Dissolved Copper (mg/L)	Dissolved Iron (mg/L)
RG_MIDBO	n	1	1	1	1	1	1	1	1	1	1
	Annual Minimum	2.51	8.09	<0.00001	<0.00001	0.00164	<0.003	0.00140	0.0207	<0.0002	<0.01
	Annual Maximum	2.51	8.09	<0.00001	<0.00001	0.00164	<0.003	0.00140	0.0207	<0.0002	<0.01
	Annual Mean	2.51	8.09	<0.00001	<0.00001	0.00164	<0.003	0.00140	0.0207	<0.0002	<0.01
	Annual Median	2.51	8.09	<0.00001	<0.00001	0.00164	<0.003	0.00140	0.0207	<0.0002	<0.01
	% < LRL	0%	0%	100%	100%	0%	100%	0%	0%	100%	100%
	% > BCWQG[a]	-	100%	0%	0%	0%	0%	0%	0%	0%	-
	% > BCWQG[b]	-	-	0%	-	-	0%	0%	0%	0%	0%
	% > Level 1 Benchmark[c]	0%	0%	-	-	-	-	-	0%	-	-
	% > Level 2 Benchmark	0%	0%	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark	0%	-	-	-	-	-	-	-	-	-
EV_MC2 (RG_MICOMP)	n	78	84	78	78	78	78	78	78	78	78
	Annual Minimum	<0.5	2.58	<0.00001	<0.00001	0.000504	<0.003	<0.001	0.0152	<0.0002	<0.01
	Annual Maximum	26.0	20.7	0.000294	0.000316	0.00179	0.0946	0.0226	0.0421	0.000700	0.0180
	Annual Mean	1.90	8.55	0.0000147	0.0000150	0.00114	0.00464	0.00436	0.0237	0.000275	0.0103
	Annual Median	1.59	7.82	<0.00001	<0.00001	0.00124	<0.003	0.00200	0.0228	0.000235	<0.01
	% < LRL	4%	0%	92%	79%	0%	82%	28%	0%	33%	87%
	% > BCWQG[a]	-	100%	0%	0%	0%	1%	0%	0%	0%	-
	% > BCWQG[b]	-	-	0%	-	-	1%	0%	0%	0%	0%
	% > Level 1 Benchmark[c]	1%	1%	-	-	-	-	-	0%	-	-
	% > Level 2 Benchmark	1%	0%	-	-	-	-	-	-	-	-
	% > Level 3 Benchmark[d]	1%	1%	-	-	-	-	-	-	-	-
EV_ER1	n	60	60	60	60	60	60	60	60	60	60
	Annual Minimum	<0.5	4.95	<0.00001	<0.00001	0.000726	<0.003	<0.001	0.00860	<0.0002	<0.01
	Annual Maximum	3.79	18.7	0.0000520	0.0000560	0.00168	0.0241	0.0111	0.0210	0.000450	0.0180
	Annual Mean	0.929	10.7	0.0000116	0.0000126	0.00118	0.00423	0.00278	0.0134	0.000223	0.0102
	Annual Median	0.750	10.1	<0.00001	<0.00001	0.00119	<0.003	0.00185	0.0130	<0.0002	<0.01
	% < LRL	8%	0%	88%	80%	0%	78%	25%	0%	70%	95%
	% > BCWQG[a]	-	100%	0%	0%	0%	0%	0%	0%	0%	-
	% > BCWQG[b]	-	-	0%	-	-	0%	0%	0%	0%	0%
	% > Level 1 Benchmark[c]	0%	0%	-	-	-	-	-	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. The EVWQP Level 1 Benchmark for Nitrate is consistent with the long term BCWQG.

[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.

[c] Total Dissolved Solids and Nickel were screened against the Level 1 Screening Value instead of EVWQP Level 1 Benchmark.

[d] Level 3 Benchmark for EV_MC2 reflect the SPO for selenium and nitrate.

Table D.3: Raw Selenium Speciation Data from Biological Monitoring Areas, EVO LAEMP, 2021

Water Body		Biological Monitoring Area	Sample Date	Selenate (µg/L)	Selenite (µg/L)	Dimethylselenoxide (µg/L)	Methylseleninic Acid (µg/L)	Selenocyanate (µg/L)	Selenomethionine (µg/L)	Selenosulphate (µg/L)	Methaneselenonic Acid (µg/L)	Unknown Species (µg/L)	Sum of Species (µg/L)
Lower Alexander Creek	Reference	RG_ALUSM	12-Sep-21	0.56	0.015	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.58
Michel Creek		RG_MI25	13-Sep-21	0.15	0.020	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.17
Erickson Creek	Mine-Exposed	RG_ERCKUT	17-Feb-21	89	0.021	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	89
			22-Feb-21	138	0.060	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	138
			1-Mar-21	138	0.038	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	138
			8-Mar-21	140	0.041	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	140
			15-Mar-21	149	0.044	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	149
			22-Mar-21	145	0.049	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	145
			29-Mar-21	132	0.049	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.027	132
			5-Apr-21	133	0.030	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	133
			12-Apr-21	141	0.026	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	141
			19-Apr-21	128	0.014	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	128
			27-Apr-21	134	0.040	<0.01	<0.01	<0.01	<0.01	0.039	<0.01	<0.01	134
			3-May-21	136	0.038	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	136
			10-May-21	141	0.041	<0.01	<0.01	<0.01	<0.01	0.047	<0.01	<0.01	141
			17-May-21	139	0.035	<0.01	<0.01	<0.01	<0.01	0.071	<0.01	<0.01	139
			24-May-21	127	0.037	<0.01	<0.01	<0.01	<0.01	0.041	<0.01	<0.01	127
			3-Jun-21	127	0.016	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	127
			7-Jun-21	152	0.051	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	152
			14-Jun-21	124	0.028	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	124
			21-Jun-21	160	0.052	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	160
			28-Jun-21	138	0.034	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	138
			5-Jul-21	134	0.036	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	134
			13-Jul-21	136	0.028	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	136
			19-Jul-21	99	0.019	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	99
			27-Jul-21	138	0.043	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	138
			2-Aug-21	143	0.033	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	143
			9-Aug-21	145	0.032	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	145
			16-Aug-21	138	0.034	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	138
			23-Aug-21	151	0.048	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	151
			30-Aug-21	135	0.026	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	135
			6-Sep-21	161	0.036	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	161
			12-Sep-21	145	0.036	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	145
			15-Sep-21	110	0.019	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	110
			20-Sep-21	140	0.039	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	140
			27-Sep-21	147	0.045	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	147
			4-Oct-21	146	0.035	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	146
			11-Oct-21	141	0.039	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	141
			18-Oct-21	142	0.031	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	142
			25-Oct-21	149	0.040	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	149
			1-Nov-21	153	0.044	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	153
			8-Nov-21	150	0.042	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	150
			15-Nov-21	147	0.054	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	147
			22-Nov-21	160	0.037	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	160
			29-Nov-21	146	0.041	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	146
			2-Dec-21	150	0.037	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	150
			6-Dec-21	143	0.032	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	143
			9-Dec-21	149	0.030	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	149
			13-Dec-21	141	0.034	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	141
			14-Dec-21	139	0.030	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	139
			16-Dec-21	139	0.036	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	139
			20-Dec-21	135	0.29	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	135
			23-Dec-21	140	0.017	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	140
			27-Dec-21	150	0.040	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	150
			30-Dec-21	181	0.032	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	181

Note: The sum of species was calculated using zero for values reported as < LRL (laboratory reporting limit).

Table D.3: Raw Selenium Speciation Data from Biological Monitoring Areas, EVO LAEMP, 2021

Water Body		Biological Monitoring Area	Sample Date	Selenate (µg/L)	Selenite (µg/L)	Dimethylselenoxide (µg/L)	Methylseleninic Acid (µg/L)	Selenocyanate (µg/L)	Selenomethionine (µg/L)	Selenosulphate (µg/L)	Methaneselenonic Acid (µg/L)	Unknown Species (µg/L)	Sum of Species (µg/L)
Erickson Creek	Mine-Exposed	RG_ERCKDT	1-Feb-21	137	0.051	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	137
			18-Feb-21	135	0.055	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	135
			1-Mar-21	137	0.047	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	137
			22-Mar-21	84	0.34	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	84
			30-Mar-21	132	0.048	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.012	132
			5-Apr-21	56	0.15	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	56
			12-Apr-21	60	0.020	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	60
			19-Apr-21	48	0.15	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	48
			26-Apr-21	135	0.042	<0.01	<0.01	<0.01	<0.01	0.050	<0.01	<0.01	135
			3-May-21	73	0.28	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	73
			10-May-21	60	0.32	<0.01	<0.01	0.011	<0.01	<0.01	<0.01	<0.01	60
			24-May-21	71	0.29	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	71
			2-Jun-21	140	0.066	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	140
			3-Jun-21	29	0.49	<0.01	0.012	<0.01	<0.01	<0.01	<0.01	<0.01	29
			7-Jun-21	50	0.51	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	51
			21-Jun-21	76	0.39	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	76
			5-Jul-21	80	0.44	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	80
			19-Jul-21	54	0.85	<0.01	<0.01	0.013	<0.01	<0.01	<0.01	<0.01	54
			2-Aug-21	26	1.3	<0.01	0.011	<0.01	<0.01	<0.01	<0.01	<0.01	27
			16-Aug-21	18	1.9	0.011	<0.01	0.019	<0.01	<0.01	<0.01	<0.01	20
			30-Aug-21	18	1.3	0.015	0.015	<0.01	<0.01	<0.01	<0.01	<0.01	19
			13-Sep-21	15	1.8	0.024	0.011	<0.01	<0.01	<0.01	<0.01	<0.01	17
			15-Sep-21	137	0.064	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	137
			27-Sep-21	21	1.7	0.020	0.011	<0.01	<0.01	<0.01	<0.01	<0.01	23
			11-Oct-21	16	1.6	<0.01	<0.01	0.020	<0.01	<0.01	<0.01	<0.01	18
			25-Oct-21	15	1.6	0.027	<0.01	0.017	<0.01	<0.01	<0.01	<0.01	17
			8-Nov-21	51	1.3	0.014	0.019	<0.01	<0.01	<0.01	<0.01	<0.01	52
			22-Nov-21	45	0.76	0.013	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	46
			2-Dec-21	127	0.12	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	127
			6-Dec-21	78	0.54	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	78
			9-Dec-21	117	0.55	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	118
			13-Dec-21	122	0.28	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	122
			15-Dec-21	94	0.054	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	94
			16-Dec-21	101	0.26	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	101
			20-Dec-21	81	0.37	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	81
			24-Dec-21	104	0.31	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	104
			27-Dec-21	92	0.40	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	93
			30-Dec-21	98	0.42	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	98
		RG_ERCK	18-Jan-21	147	0.18	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	147
			1-Feb-21	133	0.17	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	133
			17-Feb-21	107	0.16	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	107
			1-Mar-21	64	0.50	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	64
			22-Mar-21	37	0.56	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	37
			29-Mar-21	119	0.36	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	119
			5-Apr-21	119	0.25	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	119
			12-Apr-21	32	0.31	<0.01	0.014	<0.01	<0.01	<0.01	<0.01	<0.01	33
			19-Apr-21	31	0.24	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	32
			26-Apr-21	125	0.20	<0.01	<0.01	<0.01	<0.01	0.027	<0.01	<0.01	125
			3-May-21	50	0.41	0.016	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	51
			10-May-21	44	0.40	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	44
			24-May-21	52	0.40	<0.01	0.013	<0.01	<0.01	<0.01	<0.01	<0.01	53
			7-Jun-21	70	0.42	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	71
			21-Jun-21	78	0.44	<0.01	0.011	<0.01	<0.01	<0.01	<0.01	<0.01	78
			5-Jul-21	55	0.60	<0.01	0.014	0.013	<0.01	<0.01	<0.01	<0.01	56
			19-Jul-21	36	0.92	0.016	0.021	<0.01	<0.01	<0.01	<0.01	<0.01	37
			2-Aug-21	15	1.0	0.020	0.016	<0.01	<0.01	<0.01	<0.01	<0.01	16
			16-Aug-21	20	1.4	0.026	0.022	<0.01	<0.01	<0.01	<0.01	<0.01	21
			30-Aug-21	16	1.2	0.019	0.017	<0.01	<0.01	<0.01	<0.01	<0.01	17
			10-Sep-21	145	0.87	0.017	0.018	<0.01	<0.01	<0.01	<0.01	<0.01	146
			13-Sep-21	36	1.3	0.030	0.017	<0.01	<0.01	<0.01	<0.01	<0.01	38
			27-Sep-21	13	1.4	0.039	0.022	<0.01	<0.01	<0.01	<0.01	<0.01	15
			11-Oct-21	21	1.2	0.015	0.016	<0.01	<0.01	<0.01	<0.01	<0.01	22
			8-Nov-21	28	1.3	0.019	0.021	<0.01	<0.01	<0.01	<0.01	<0.01	30
			22-Nov-21	23	0.96	0.020	0.018	<0.01	<0.01	<0.01	<0.01	<0.01	24
			2-Dec-21	66	0.72	0.015	0.017	<0.01	<0.01	<0.01	<0.01	<0.01	67
			6-Dec-21	48	0.72	0.022	0.018	<0.01	<0.01	<0.01	<0.01	<0.01	49
			9-Dec-21	69	0.83	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	70
			13-Dec-21	70	0.67	0.011	0.013	<0.01	<0.01	<0.01	<0.01	<0.01	70
			14-Dec-21	62	0.51	<0.01	0.014	<0.01	<0.01	<0.01	<0.01	<0.01	62
			16-Dec-21	54	0.40	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	54
			20-Dec-21	54	0.57	0.013	0.016	<0.01	<0.01	<0.01	<0.01	<0.01	55
			23-Dec-21	54	0.66	0.012	0.014	<0.01	<0.01	<0.01	<0.01	<0.01	55
			30-Dec-21	56	0.68	<0.01	0.017	<0.01	<0.01	<0.01	<0.01	<0.01	56

Note: The sum of species was calculated using zero for values reported as < LRL (laboratory reporting limit).

Table D.3: Raw Selenium Speciation Data from Biological Monitoring Areas, EVO LAEMP, 2021

Water Body		Biological Monitoring Area	Sample Date	Selenate (µg/L)	Selenite (µg/L)	Dimethylselenoxide (µg/L)	Methylseleninic Acid (µg/L)	Selenocyanate (µg/L)	Selenomethionine (µg/L)	Selenosulphate (µg/L)	Methaneselenonic Acid (µg/L)	Unknown Species (µg/L)	Sum of Species (µg/L)
Gate Creek	Mine-Exposed	RG_GATE	27-Aug-21	207	0.86	<0.01	0.026	<0.01	<0.01	<0.01	<0.01	<0.01	208
			16-Sep-21	224	0.91	<0.01	0.042	<0.01	<0.01	<0.01	<0.01	<0.01	225
		RG_GATEDP	4-Jan-21	260	0.93	0.015	0.050	<0.01	<0.01	<0.01	<0.01	<0.01	261
			1-Feb-21	251	1.2	0.019	0.053	<0.01	<0.01	<0.01	<0.01	<0.01	252
			3-Feb-21	203	0.78	<0.01	0.036	<0.01	<0.01	<0.01	<0.01	<0.01	204
			17-Feb-21	165	0.66	<0.01	0.025	<0.01	<0.01	<0.01	<0.01	<0.01	166
			1-Mar-21	260	0.93	0.019	0.053	<0.01	<0.01	<0.01	<0.01	<0.01	261
			22-Mar-21	221	1.0	<0.01	0.055	<0.01	<0.01	<0.01	<0.01	<0.01	222
			29-Mar-21	183	0.86	0.014	0.043	<0.01	<0.01	<0.01	<0.01	<0.01	184
			5-Apr-21	205	0.84	<0.01	0.063	<0.01	<0.01	<0.01	<0.01	<0.01	206
			12-Apr-21	232	0.93	0.033	0.079	<0.01	<0.01	<0.01	<0.01	<0.01	233
			19-Apr-21	210	0.93	0.012	0.080	<0.01	<0.01	<0.01	<0.01	<0.01	211
			26-Apr-21	224	0.90	<0.01	0.079	<0.01	<0.01	0.025	<0.01	<0.01	225
			3-May-21	205	0.99	0.036	0.085	<0.01	<0.01	0.025	<0.01	<0.01	206
			10-May-21	191	0.78	0.023	0.061	<0.01	<0.01	<0.01	<0.01	<0.01	192
			24-May-21	195	0.82	<0.01	0.056	<0.01	<0.01	<0.01	<0.01	<0.01	196
			7-Jun-21	205	1.0	0.055	0.081	<0.01	<0.01	<0.01	<0.01	<0.01	206
			21-Jun-21	210	1.0	0.042	0.070	<0.01	<0.01	<0.01	<0.01	<0.01	211
			5-Jul-21	188	0.94	0.024	0.060	<0.01	<0.01	<0.01	<0.01	<0.01	189
			19-Jul-21	206	0.89	0.022	0.059	<0.01	<0.01	<0.01	<0.01	<0.01	207
			2-Aug-21	195	0.82	0.026	0.047	<0.01	<0.01	<0.01	<0.01	<0.01	196
			16-Aug-21	226	1.1	0.036	0.058	<0.01	<0.01	<0.01	<0.01	<0.01	227
			27-Aug-21	202	0.95	<0.01	0.055	<0.01	<0.01	<0.01	<0.01	<0.01	203
			31-Aug-21	206	0.96	0.041	0.053	<0.01	<0.01	<0.01	<0.01	<0.01	207
			14-Sep-21	207	0.95	0.040	0.037	<0.01	<0.01	<0.01	<0.01	<0.04	208
			16-Sep-21	201	0.91	0.034	0.051	<0.01	<0.01	<0.01	<0.01	<0.01	202
			28-Sep-21	178	0.82	0.028	0.041	<0.01	<0.01	<0.01	<0.01	<0.01	179
			12-Oct-21	222	1.0	0.021	0.082	<0.01	<0.01	<0.01	<0.01	<0.01	223
			26-Oct-21	223	1.0	0.087	0.083	<0.01	<0.01	<0.01	<0.01	<0.01	224
			9-Nov-21	150	1.2	0.027	0.082	<0.01	<0.01	<0.01	<0.01	<0.01	151
			23-Nov-21	196	1.0	0.014	0.039	<0.01	<0.01	<0.01	<0.01	<0.01	197
			7-Dec-21	159	0.78	0.011	0.032	<0.01	<0.01	<0.01	<0.01	<0.01	160
			21-Dec-21	171	0.79	<0.01	0.030	<0.01	<0.01	<0.01	<0.01	<0.01	172
Bodie Creek		RG_BOCK	4-Jan-21	400	0.72	0.017	0.034	<0.01	<0.01	<0.01	<0.01	<0.01	401
			8-Feb-21	397	0.78	0.020	0.032	<0.01	<0.01	<0.01	<0.01	<0.01	398
			22-Mar-21	127	0.75	<0.01	0.047	<0.01	<0.01	<0.01	<0.01	<0.01	128
			29-Mar-21	184	0.86	0.022	0.051	<0.01	<0.01	<0.01	<0.01	<0.01	185
			5-Apr-21	131	0.85	<0.01	0.075	<0.01	<0.01	<0.01	<0.01	<0.01	132
			12-Apr-21	238	1.0	0.060	0.084	<0.01	<0.01	<0.01	<0.01	<0.01	239
			19-Apr-21	242	1.1	0.041	0.093	<0.01	<0.01	<0.01	<0.01	<0.01	243
			29-Apr-21	285	1.2	0.098	0.087	<0.01	<0.01	0.079	<0.01	<0.01	286
			3-May-21	269	1.1	0.077	0.081	<0.01	<0.01	0.036	<0.01	<0.01	270
			10-May-21	260	1.1	0.058	0.079	<0.01	<0.01	<0.01	<0.01	<0.01	261
			24-May-21	242	0.93	0.020	0.043	<0.01	<0.01	<0.01	<0.01	<0.01	243
			7-Jun-21	282	1.5	0.12	0.10	<0.01	<0.01	<0.01	<0.01	<0.01	284
			21-Jun-21	237	1.4	0.065	0.068	<0.01	<0.01	<0.01	<0.01	<0.01	239
			5-Jul-21	207	2.7	0.18	0.097	<0.01	<0.01	<0.01	<0.01	<0.01	210
			19-Jul-21	110	1.6	0.022	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	112
			2-Aug-21	202	2.7	0.15	0.084	<0.01	<0.01	<0.01	<0.01	<0.01	205
			16-Aug-21	217	2.3	0.14	0.088	<0.01	<0.01	<0.01	<0.01	<0.01	220
			27-Aug-21	195	1.2	<0.01	0.029	<0.01	<0.01	<0.01	<0.01	<0.01	196
			31-Aug-21	195	2.0	0.10	0.082	<0.01	<0.01	<0.01	<0.01	<0.01	197
			14-Sep-21	212	1.9	0.13	0.089	<0.01	<0.01	<0.01	<0.01	<0.01	214
			16-Sep-21	201	2.2	0.12	0.089	<0.01	<0.01	<0.01	<0.01	<0.01	203
			28-Sep-21	210	1.9	0.14	0.10	<0.01	<0.01	<0.01	<0.01	<0.01	212
			12-Oct-21	199	1.6	0.057	0.10	<0.01	<0.01	<0.01	<0.01	<0.01	201
			26-Oct-21	248	0.80	0.037	0.059	<0.01	<0.01	<0.01	<0.01	<0.01	249
			9-Nov-21	317	0.70	0.019	0.046	<0.01	<0.01	<0.01	<0.01	<0.01	318
			23-Nov-21	362	0.79	0.013	0.030	<0.01	<0.01	<0.01	<0.01	<0.01	363
			7-Dec-21	316	0.69	0.013	0.029	<0.01	<0.01	<0.01	<0.01	<0.01	317
			21-Dec-21	249	0.48	<0.01	0.020	<0.01	<0.01	<0.01	<0.01	<0.01	250

Note: The sum of species was calculated using zero for values reported as < LRL (laboratory reporting limit).

Table D.3: Raw Selenium Speciation Data from Biological Monitoring Areas, EVO LAEMP, 2021

Water Body		Biological Monitoring Area	Sample Date	Selenate (µg/L)	Selenite (µg/L)	Dimethylselenoxide (µg/L)	Methylseleninic Acid (µg/L)	Selenocyanate (µg/L)	Selenomethionine (µg/L)	Selenosulphate (µg/L)	Methaneselenonic Acid (µg/L)	Unknown Species (µg/L)	Sum of Species (µg/L)
Michel Creek	Mine-Exposed	RG_MI3	18-Jan-21	1.7	0.031	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.7
			1-Feb-21	1.6	0.028	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.6
			1-Mar-21	1.6	0.034	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.7
			22-Mar-21	1.7	0.030	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.8
			29-Mar-21	1.6	0.052	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.014	1.7
			5-Apr-21	1.6	0.037	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.7
			12-Apr-21	1.5	0.034	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.6
			19-Apr-21	1.3	0.022	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.3
			26-Apr-21	1.4	0.056	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.5
			3-May-21	0.93	0.051	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.98
			10-May-21	1.4	0.041	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.4
			24-May-21	1.5	0.039	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.5
			7-Jun-21	1.2	0.049	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.3
			21-Jun-21	1.0	0.045	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.1
			5-Jul-21	1.2	0.046	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.2
			19-Jul-21	1.1	0.057	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.2
			2-Aug-21	1.0	0.061	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.1
			16-Aug-21	1.2	0.12	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.3
			30-Aug-21	1.2	0.051	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.2
			10-Sep-21	1.0	0.045	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.1
			13-Sep-21	1.3	0.062	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.4
			27-Sep-21	1.4	0.11	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.5
			11-Oct-21	1.4	0.051	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.4
			25-Oct-21	1.3	0.074	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.3
			8-Nov-21	1.2	0.035	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.3
			22-Nov-21	2.2	0.039	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.2
			6-Dec-21	1.6	0.039	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.6
			14-Dec-21	1.7	0.027	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.7
			20-Dec-21	1.4	0.039	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.4
		EV_MC2a	4-Jan-21	9.7	0.027	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	9.7
			1-Feb-21	9.5	0.030	<0.01	<0.01	0.011	<0.01	<0.01	<0.01	<0.01	9.5
			1-Mar-21	6.9	0.060	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	7.0
			22-Mar-21	4.4	0.058	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	4.4
			30-Mar-21	10	0.067	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10
			5-Apr-21	6.8	0.042	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	6.9
			12-Apr-21	3.7	0.039	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	3.7
			19-Apr-21	2.6	0.022	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.7
			26-Apr-21	5.6	0.043	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	5.6
			3-May-21	1.6	0.056	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.7
			10-May-21	1.9	0.044	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.0
			24-May-21	2.1	0.10	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.2
			7-Jun-21	1.6	0.043	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.7
			21-Jun-21	1.9	0.039	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.9
			5-Jul-21	2.7	0.067	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.7
			19-Jul-21	2.8	0.085	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.013	2.9
			2-Aug-21	2.0	0.12	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.1
			16-Aug-21	2.4	0.16	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.6
			30-Aug-21	2.0	0.11	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.1
			13-Sep-21	3.8	0.14	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	4.0
			27-Sep-21	2.4	0.14	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.6
			11-Oct-21	3.1	0.12	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	3.3
			25-Oct-21	2.4	0.11	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.5
			8-Nov-21	2.1	0.073	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.1
			22-Nov-21	2.5	0.048	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.6
			6-Dec-21	2.4	0.048	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.4
			20-Dec-21	4.6	0.052	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	4.7
		RG_MIDER	9-Sep-21	1.8	0.076	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.9
		RG_MIDGA	11-Sep-21	3.0	0.16	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	3.2
		RG_MIDBO	11-Sep-21	8.2	0.17	<0.01	0.012	<0.01	<0.01	<0.01	<0.01	<0.01	8.3

Note: The sum of species was calculated using zero for values reported as < LRL (laboratory reporting limit).

Table D.3: Raw Selenium Speciation Data from Biological Monitoring Areas, EVO LAEMP, 2021

Water Body		Biological Monitoring Area	Sample Date	Selenate (µg/L)	Selenite (µg/L)	Dimethylselenoxide (µg/L)	Methylseleninic Acid (µg/L)	Selenocyanate (µg/L)	Selenomethionine (µg/L)	Selenosulphate (µg/L)	Methaneselenonic Acid (µg/L)	Unknown Species (µg/L)	Sum of Species (µg/L)
Michel Creek	Mine-Exposed	RG_MICOMP	4-Jan-21	13	0.034	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	13
			1-Feb-21	13	0.032	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	13
			3-Feb-21	11	0.042	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	11
			23-Feb-21	7.0	0.030	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	7.0
			1-Mar-21	9.9	0.062	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10
			20-Mar-21	8.0	0.069	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8.0
			22-Mar-21	8.4	0.066	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8.4
			29-Mar-21	9.0	0.10	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.017	9.1
			5-Apr-21	10	0.058	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10
			7-Apr-21	6.4	0.073	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	6.5
			12-Apr-21	7.2	0.049	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	7.3
			19-Apr-21	5.3	0.032	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	5.3
			26-Apr-21	8.1	0.055	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8.1
			3-May-21	2.5	0.054	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.6
			10-May-21	2.9	0.051	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.9
			24-May-21	3.2	0.042	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	3.2
			7-Jun-21	2.9	0.050	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	3.0
			21-Jun-21	2.8	0.045	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.9
			5-Jul-21	4.5	0.078	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	4.6
			7-Jul-21	9.8	0.12	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	9.9
			19-Jul-21	6.2	0.12	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	6.3
			2-Aug-21	4.9	0.13	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	5.1
			16-Aug-21	8.0	0.20	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8.2
			30-Aug-21	5.1	0.11	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	5.2
			13-Sep-21	9.0	0.17	<0.01	0.012	<0.01	<0.01	<0.01	<0.01	<0.01	9.2
			22-Sep-21	8.3	0.13	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8.5
			27-Sep-21	8.6	0.13	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8.7
			11-Oct-21	8.0	0.13	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8.2
			25-Oct-21	6.1	0.11	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	6.2
			8-Nov-21	4.2	0.074	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	4.2
			22-Nov-21	4.2	0.046	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	4.2
			6-Dec-21	4.4	0.040	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	4.4
			20-Dec-21	7.6	0.062	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	7.7
		EV_ER1	3-Feb-21	10	0.057	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10
			7-Apr-21	17	0.092	<0.01	0.014	<0.01	<0.01	<0.01	<0.01	<0.01	17
			7-Jul-21	6.6	0.089	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	6.7
			22-Sep-21	11	0.091	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	11

Note: The sum of species was calculated using zero for values reported as < LRL (laboratory reporting limit).

Table D.4: Acute Toxicity Results from EVO LAEMP, 2021

Month	Percent Mortality														
	F2_BPO			EV_ECOUT			EV_EC1			EV_GT1			EV_BC1		
	Date	*Daphnia magna*	*Oncorhynchus mykiss*	Date	*Daphnia magna*	*Oncorhynchus mykiss*	Date	*Daphnia magna*	*Oncorhynchus mykiss*	Date	*Daphnia magna*	*Oncorhynchus mykiss*	Date	*Daphnia magna*	*Oncorhynchus mykiss*
Jan	-	-	-	11-Jan-21	0%	0%	14-Jan-21	0%	0%	11-Jan-21	0%	0%	11-Jan-21	0%	0%
	-	-	-	-	-	-	18-Jan-21	0%	0%	-	-	-	-	-	-
Feb	17-Feb-21	0%	0%	1-Feb-21	0%	0%	1-Feb-21	0%	0%	1-Feb-21	0%	0%	-	-	-
	-	-	-	17-Feb-21	0%	0%	17-Feb-21	0%	0%	17-Feb-21	0%	0%	-	-	-
Mar	1-Mar-21	0%	0%	1-Mar-21	0%	0%	1-Mar-21	0%	10%	1-Mar-21	0%	0%	15-Mar-21	0%	0%
	15-Mar-21	0%	0%	15-Mar-21	0%	0%	15-Mar-21	0%	0%	15-Mar-21	0%	0%	19-Mar-21	0%	0%
	-	-	-	30-Mar-21	0%	0%	30-Mar-21	0%	0%	19-Mar-21	0%	0%	29-Mar-21	0%	0%
	-	-	-	-	-	-	-	-	-	29-Mar-21	0%	0%	-	-	-
Apr	-	-	-	12-Apr-21	0%	0%	7-Apr-21	0%	0%	7-Apr-21	0%	0%	12-Apr-21	0%	0%
	-	-	-	26-Apr-21	0%	0%	12-Apr-21	0%	0%	12-Apr-21	0%	0%	28-Apr-21	0%	0%
				-	-	-	26-Apr-21	0%	0%	26-Apr-21	0%	0%	29-Apr-21	0%	0%
May	-	-	-	10-May-21	0%	0%	10-May-21	0%	0%	10-May-21	0%	0%	10-May-21	0%	0%
	-	-	-	24-May-21	0%	0%	24-May-21	3%	0%	24-May-21	0%	0%	24-May-21	0%	0%
	-	-	-	26-May-21	0%	0%		-	-	-	-	-	-	-	-
Jun	-	-	-	2-Jun-21	0%	0%	3-Jun-21	0%	0%	7-Jun-21	0%	0%	7-Jun-21	0%	0%
	-	-	-	3-Jun-21	0%	0%	7-Jun-21	0%	0%	21-Jun-21	0%	0%	21-Jun-21	0%	0%
	-	-	-	3-Jun-21	0%	0%	21-Jun-21	0%	0%	-	-	-		-	-
	-	-	-	7-Jun-21	0%	0%	-	-	-	-	-	-		-	-
	-	-	-	21-Jun-21	0%	0%	-	-	-	-	-	-		-	-
Jul	-	-	-	5-Jul-21	0%	0%	5-Jul-21	0%	0%	5-Jul-21	0%	0%	5-Jul-21	0%	0%
	-	-	-	19-Jul-21	0%	0%	7-Jul-21	0%	10%	7-Jul-21	0%	0%	7-Jul-21	0%	0%
	-	-	-	-	-	-	19-Jul-21	3%	0%	19-Jul-21	0%	0%	19-Jul-21	0%	0%
Aug	-	-	-	2-Aug-21	0%	0%	2-Aug-21	0%	0%	2-Aug-21	0%	0%	2-Aug-21	0%	0%
	-	-	-	16-Aug-21	0%	10%	16-Aug-21	0%	0%	16-Aug-21	0%	0%	16-Aug-21	0%	0%
	-	-	-	30-Aug-21	0%	0%	30-Aug-21	0%	0%	31-Aug-21	0%	0%	31-Aug-21	0%	0%
Sep	-	-	-	13-Sep-21	0%	0%	13-Sep-21	0%	0%	14-Sep-21	0%	0%	14-Sep-21	0%	0%
	-	-	-	27-Sep-21	0%	0%	27-Sep-21	0%	0%	28-Sep-21	0%	0%	28-Sep-21	0%	0%
				-	-	-	-	-	-	28-Sep-21	0%	0%	12-Oct-21	-	-
Oct	-	-	-	11-Oct-21	0%	0%	11-Oct-21	0%	0%	12-Oct-21	0%	0%	19-Oct-21	0%	0%
	-	-	-	25-Oct-21	0%	0%	-	-	-	19-Oct-21	0%	0%	26-Oct-21	0%	0%
				-	-	-	-	-	-	26-Oct-21	0%	10%	3-Nov-21	0%	0%
Nov	-	-	-	8-Nov-21	0%	0%	4-Nov-21	0%	0%	3-Nov-21	0%	0%	9-Nov-21	0%	0%
	-	-	-	22-Nov-21	0%	0%	8-Nov-21	0%	0%	9-Nov-21	0%	0%	23-Nov-21	0%	0%
	-	-	-	-	-	-	22-Nov-21	0%	0%	23-Nov-21	0%	0%		0%	0%
Dec	-	-	-	6-Dec-21	0%	0%	6-Dec-21	0%	0%	7-Dec-21	0%	0%	7-Dec-21	0%	0%
	-	-	-	20-Dec-21	0%	0%	20-Dec-21	0%	0%	21-Dec-21	0%	0%	21-Dec-21	0%	0%

APPENDIX E
PERIPHYTON

Figure E.1: Site and Substrate Coverage Photograph at Reference Station RG_ALUSM, September 2021

Note: Site photo was taken looking upstream.

Figure E.1: Site and Substrate Coverage Photograph at Reference Station RG_MI25, September 2021

Note: Site photo was taken looking upstream.

Figure E.1: Site and Substrate Coverage Photograph at RG_ERCKUT, September 2021

Note: Site photo was taken looking upstream.

Figure E.1: Site and Substrate Coverage Photograph at RG_ERCKDT, September 2021

Note: Site photo was taken looking upstream.

Figure E.1: Site and Substrate Coverage Photograph at RG_ERCK, September 2021

Note: Site photo was taken looking upstream.

Figure E.1: Site and Substrate Coverage Photograph at RG_BOCK, September 2021

Note: Site photo was taken looking upstream.

Figure E.1: Site and Substrate Coverage Photograph at Station RG_GATEDP, September 2021

Note: Site photo was taken looking upstream.

Figure E.1: Site and Substrate Coverage Photograph at RG_GATE, September 2021

Note: Site photo was taken looking upstream.

Figure E.1: Site and Substrate Coverage Photograph at RG_MI3, September 2021

Note: Site photo was taken looking upstream. Photos for the other areas in Michel Creek (RG_MIDER, RG_MIDGA, RG_MIDBO, and RG_MICOMP) are unavailable for 2021.

APPENDIX F
BENTHIC INVERTEBRATES

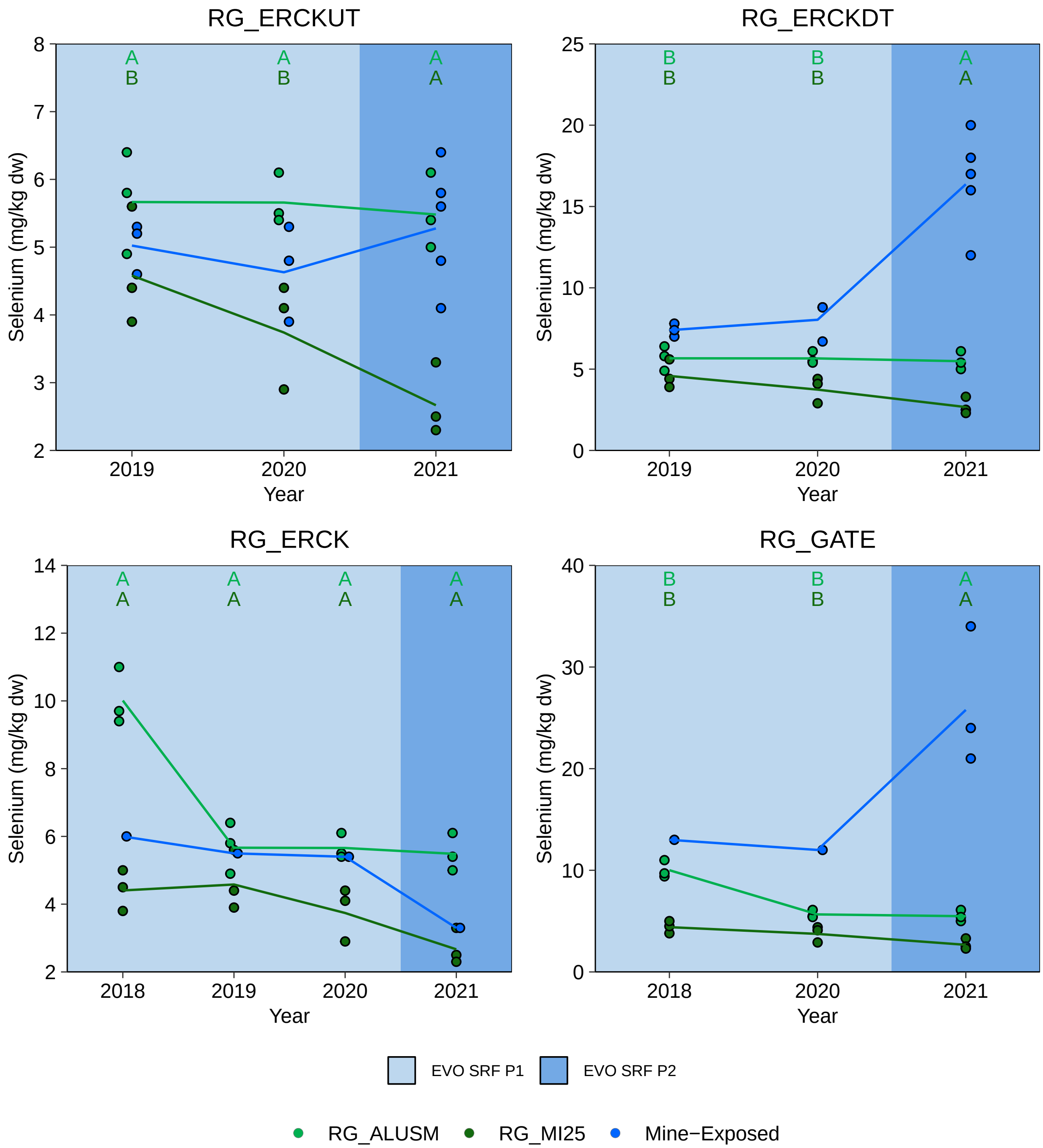

Figure F.1: Benthic Invertebrate Tissue Selenium Concentrations in Bodie, Erickson, Gate, and Michel Creeks, EVO LAEMP, 2018 to 2021

Notes: Individual samples are plotted and lines join the estimated marginal mean values for each year. Statistical analyses were conducted using an ANOVA comparison to each reference area. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years when compared to the corresponding reference area. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference).

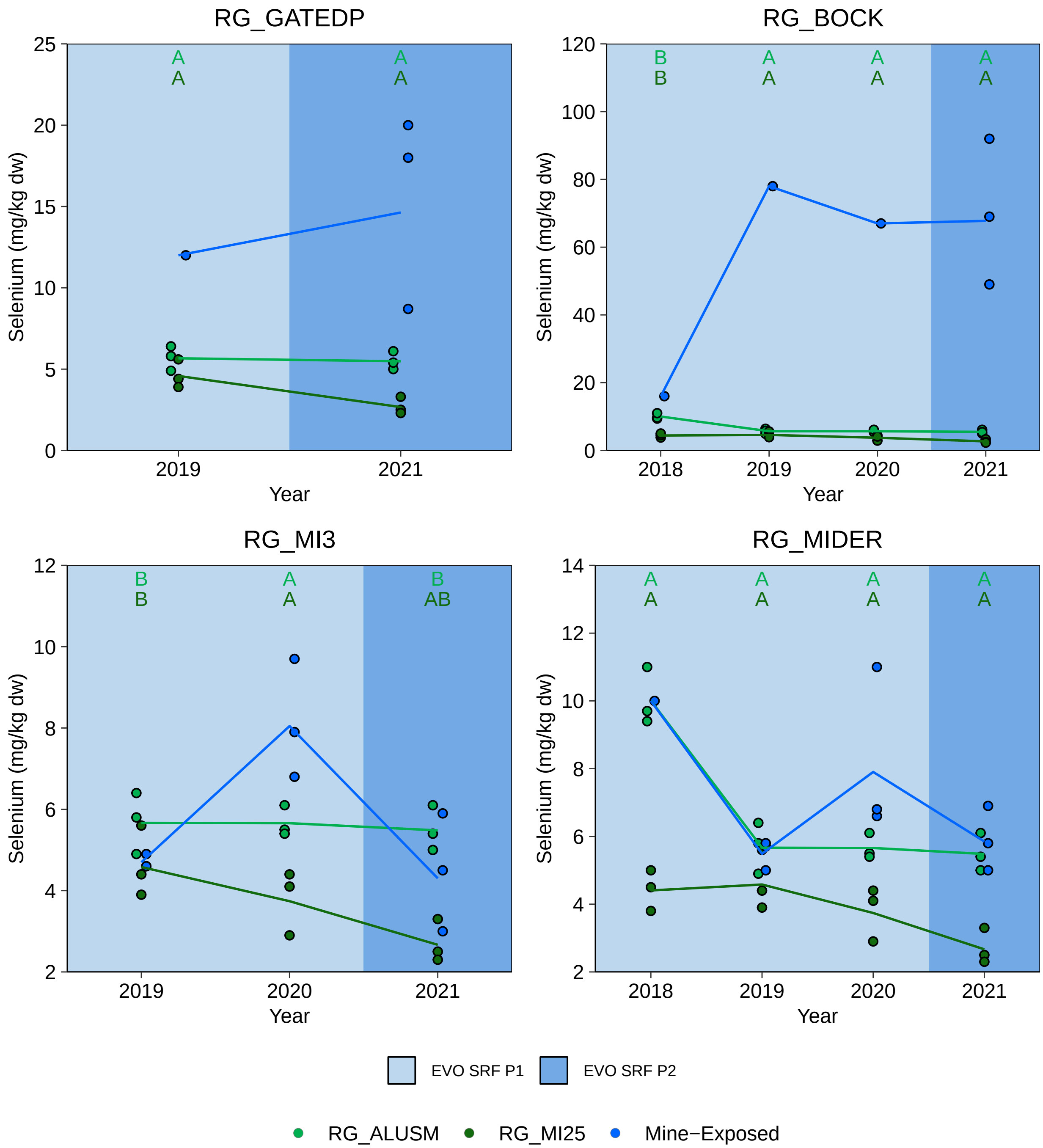

Figure F.1: Benthic Invertebrate Tissue Selenium Concentrations in Bodie, Erickson, Gate, and Michel Creeks, EVO LAEMP, 2018 to 2021

Notes: Individual samples are plotted and lines join the estimated marginal mean values for each year. Statistical analyses were conducted using an ANOVA comparison to each reference area. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years when compared to the corresponding reference area. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference).

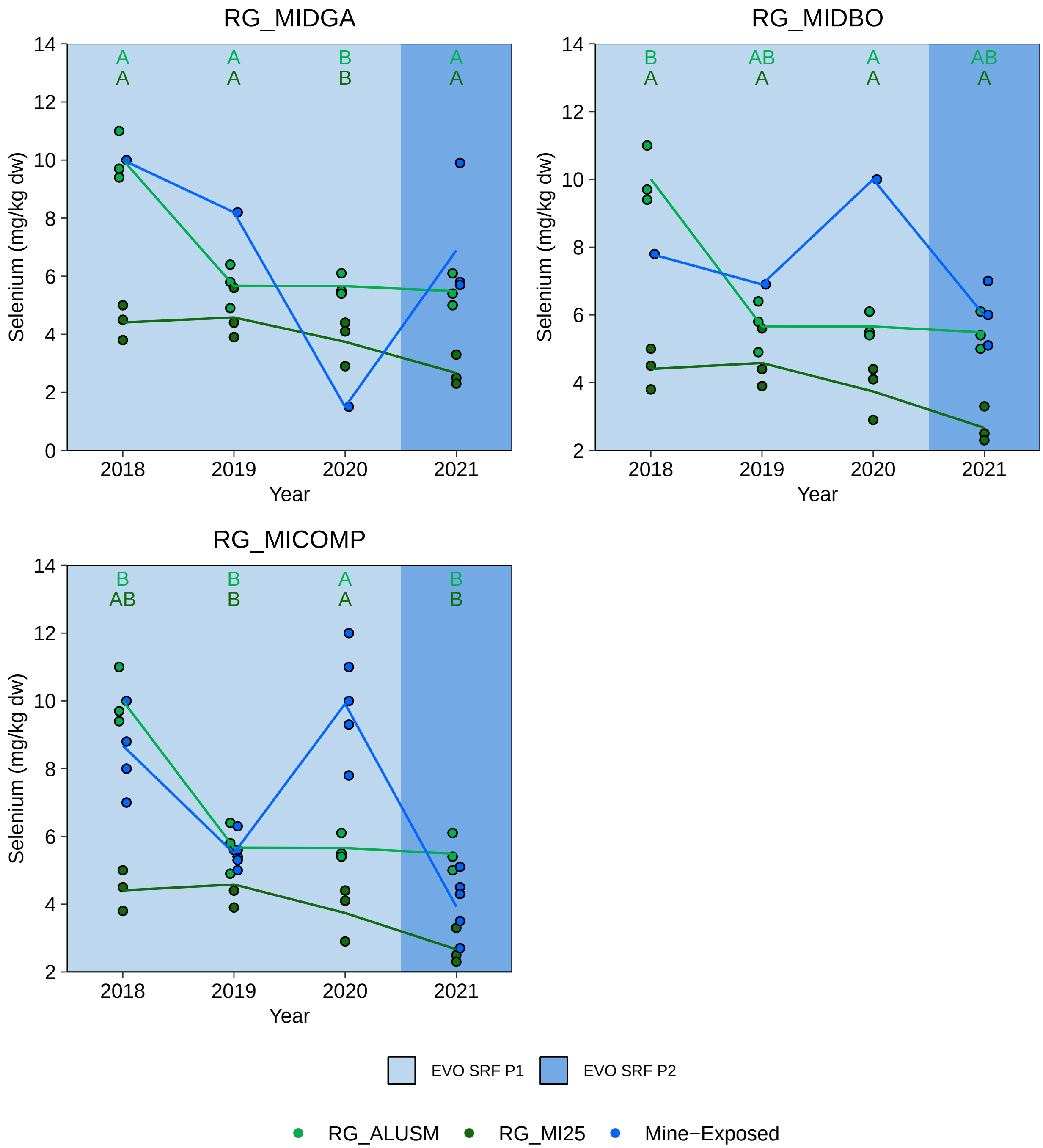

Figure F.1: Benthic Invertebrate Tissue Selenium Concentrations in Bodie, Erickson, Gate, and Michel Creeks, EVO LAEMP, 2018 to 2021

Notes: Individual samples are plotted and lines join the estimated marginal mean values for each year. Statistical analyses were conducted using an ANOVA comparison to each reference area. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years when compared to the corresponding reference area. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference).

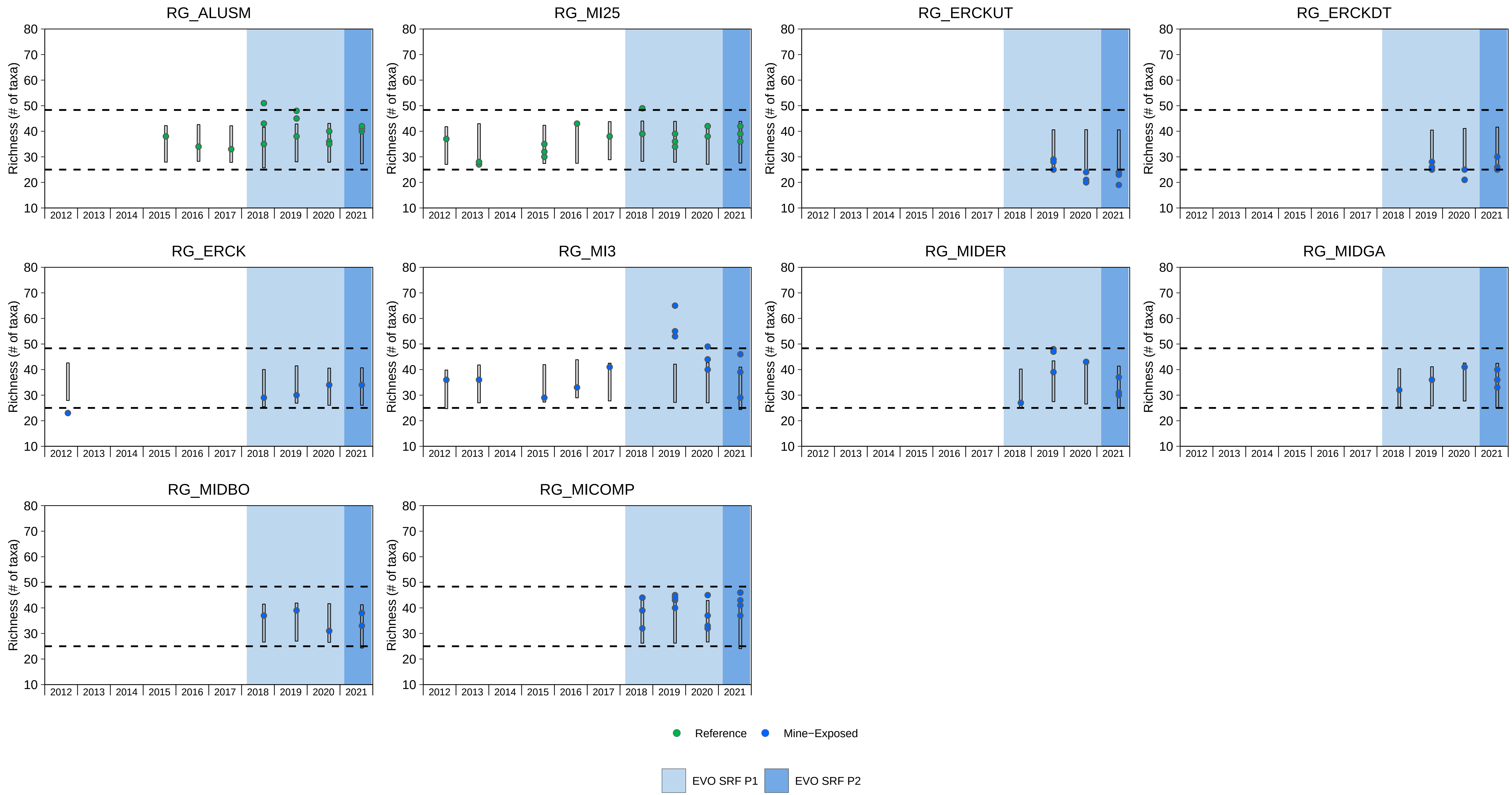

Figure F.2: Benthic Invertebrate Richness (Lowest Practical Level; 3-Minute Kick and Sweep Sampling) from EVO LAEMP Sampling Areas, September 2012 to 2021

Notes: Site specific normal ranges using regression models shown with gray shading and black rectangle (when available). Dashed horizontal lines represent the normal range defined as the 2.5th and 97.5 percentiles of the 2012 to 2019 reference area data from the Regional Aquatic Environmental Monitoring Program (RAEMP).

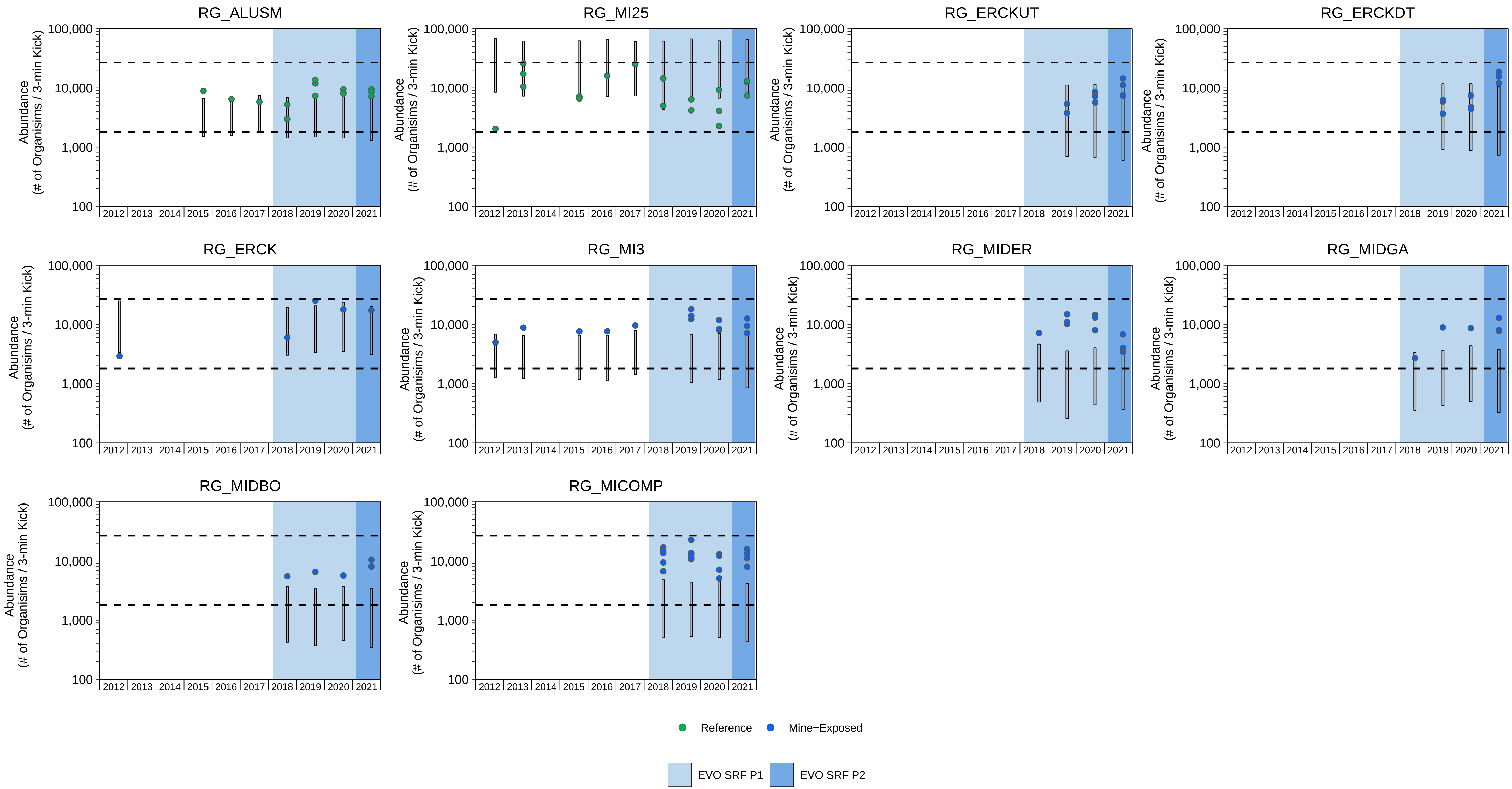

Figure F.3: Benthic Invertebrate Community Abundance (# Organisms / 3-minute Kick and Sweep Sampling) from EVO LAEMP Sampling Areas, September 2012 to 2021

Notes: Site specific normal ranges using regression models shown with grey shading and black rectangle (when available). Dashed horizontal lines represent the normal range defined as the 2.5th and 97.5 percentiles of the 2012 to 2019 reference area data from the Regional Aquatic Environmental Monitoring Program (RAEMP).

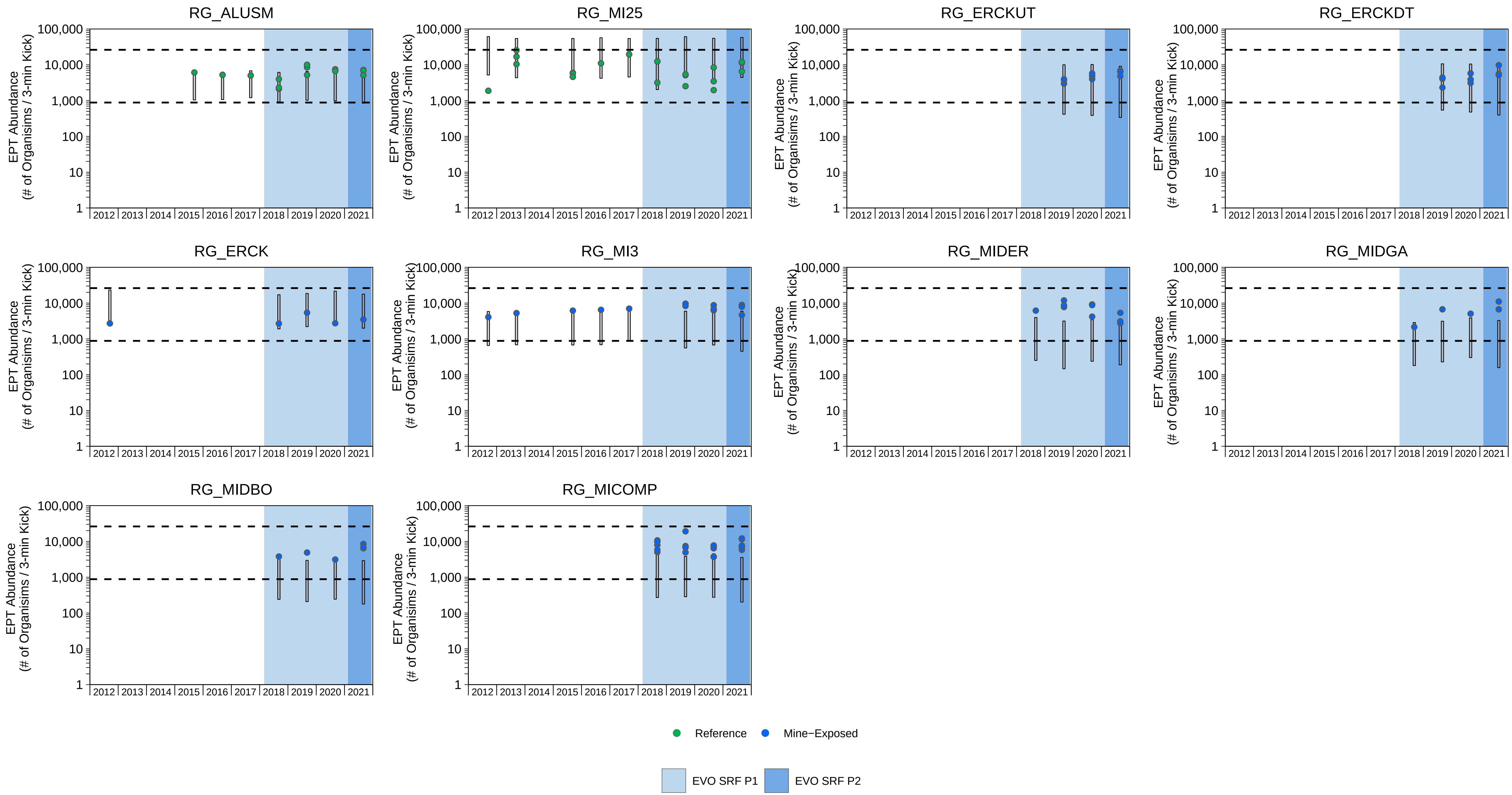

Figure F.4: Benthic Invertebrate Community Ephemeroptera, Plecoptera, and Trichoptera Abundance (EPT; # of Organisms / 3-Minute Kick and Sweep Sampling) from EVO LAEMP Sampling Areas, September 2012 to 2021

Notes: Site specific normal ranges using regression models shown with grey shading and black rectangle (when available). Dashed horizontal lines represent the normal range defined as the 2.5th and 97.5 percentiles of the 2012 to 2019 reference area data from the Regional Aquatic Environmental Monitoring Program (RAEMP).

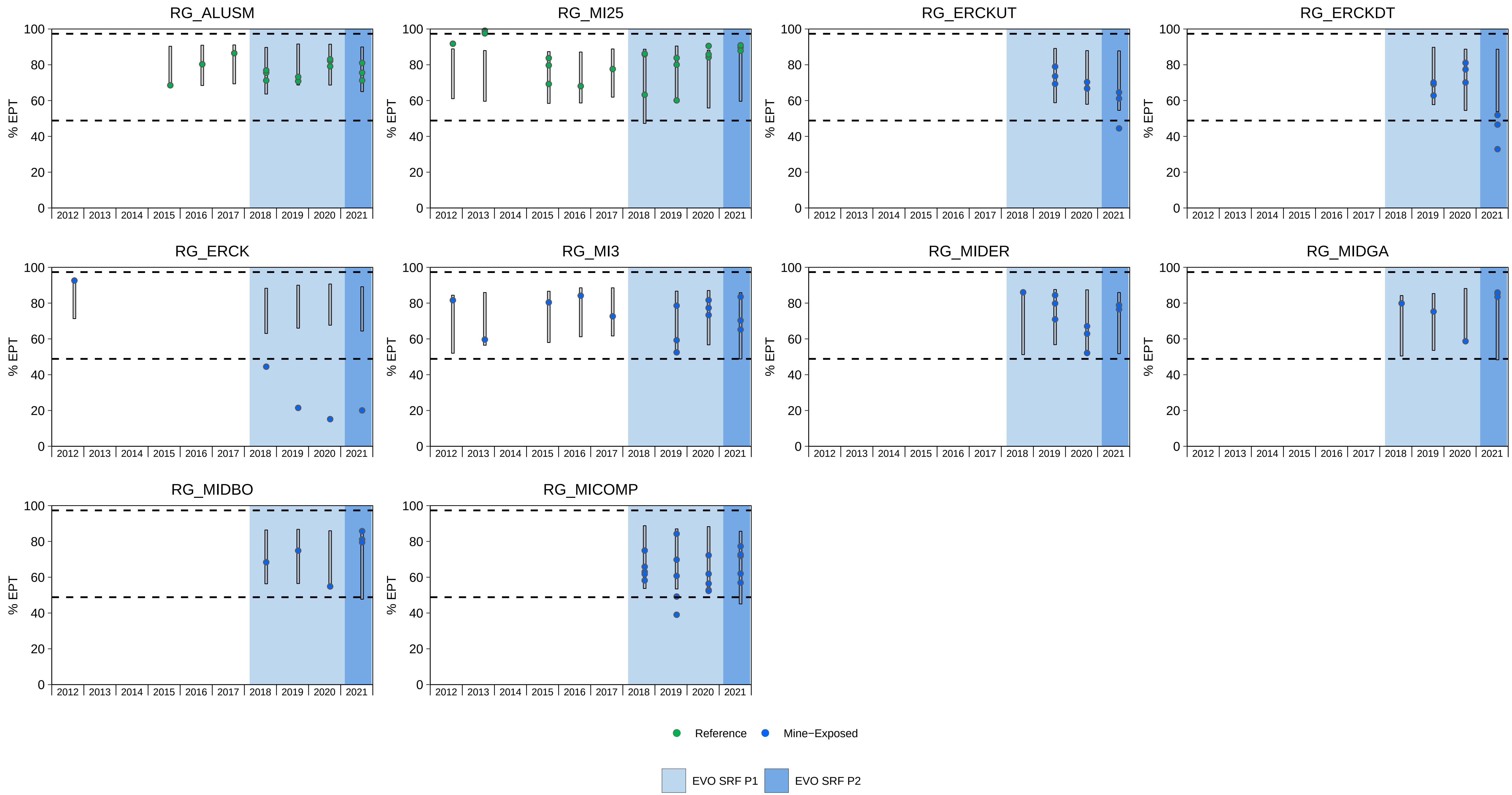

Figure F.5: Benthic Invertebrate Community Relative Ephemeroptera, Plecoptera, Trichoptera Abundance (%EPT; 3-Minute Kick and Sweep Sampling) from EVO LAEMP Sampling Areas, September 2012 to 2021

Notes: EPT = Ephemeroptera, Plecoptera, Trichoptera. Site specific normal ranges using regression models shown with grey shading and black rectangle (when available). Normal ranges using percentiles of reference areas from 2012 to 2019 shown as dashed horizontal lines. Dashed horizontal lines represent the normal range defined as the 2.5th and 97.5 percentiles of the 2012 to 2019 reference area data from the Regional Aquatic Environmental Monitoring Program (RAEMP).

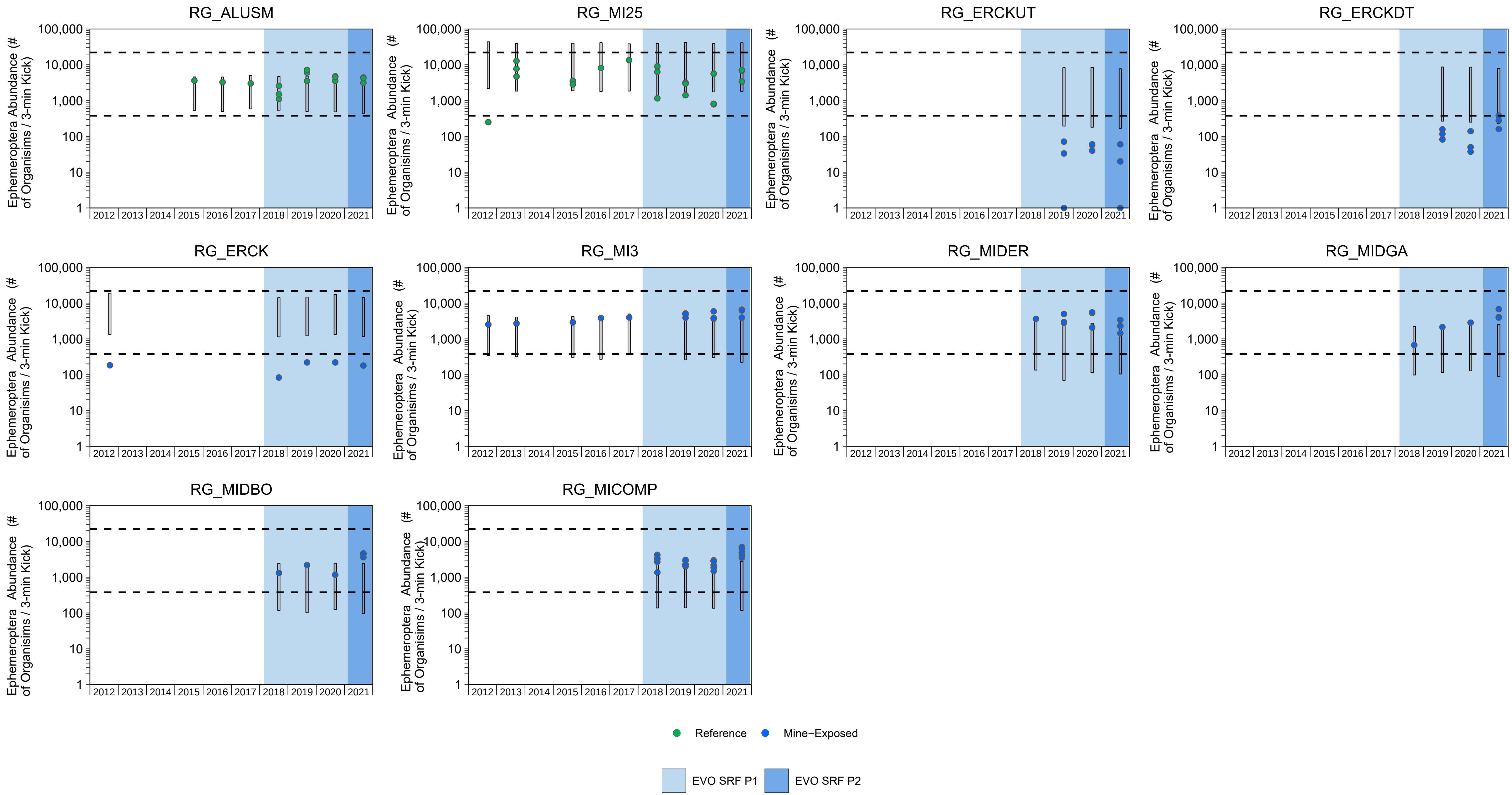

Figure F.6: Benthic Invertebrate Community Ephemeroptera Abundance (# of Organisms / 3-Minute Kick and Sweep Sampling) from EVO LAEMP Sampling Areas, September 2012 to 2021

Notes: Site specific normal ranges using regression models shown with grey shading and black rectangle (when available). Dashed horizontal lines represent the normal range defined as the 2.5th and 97.5 percentiles of the 2012 to 2019 reference area data from the Regional Aquatic Environmental Monitoring Program (RAEMP).

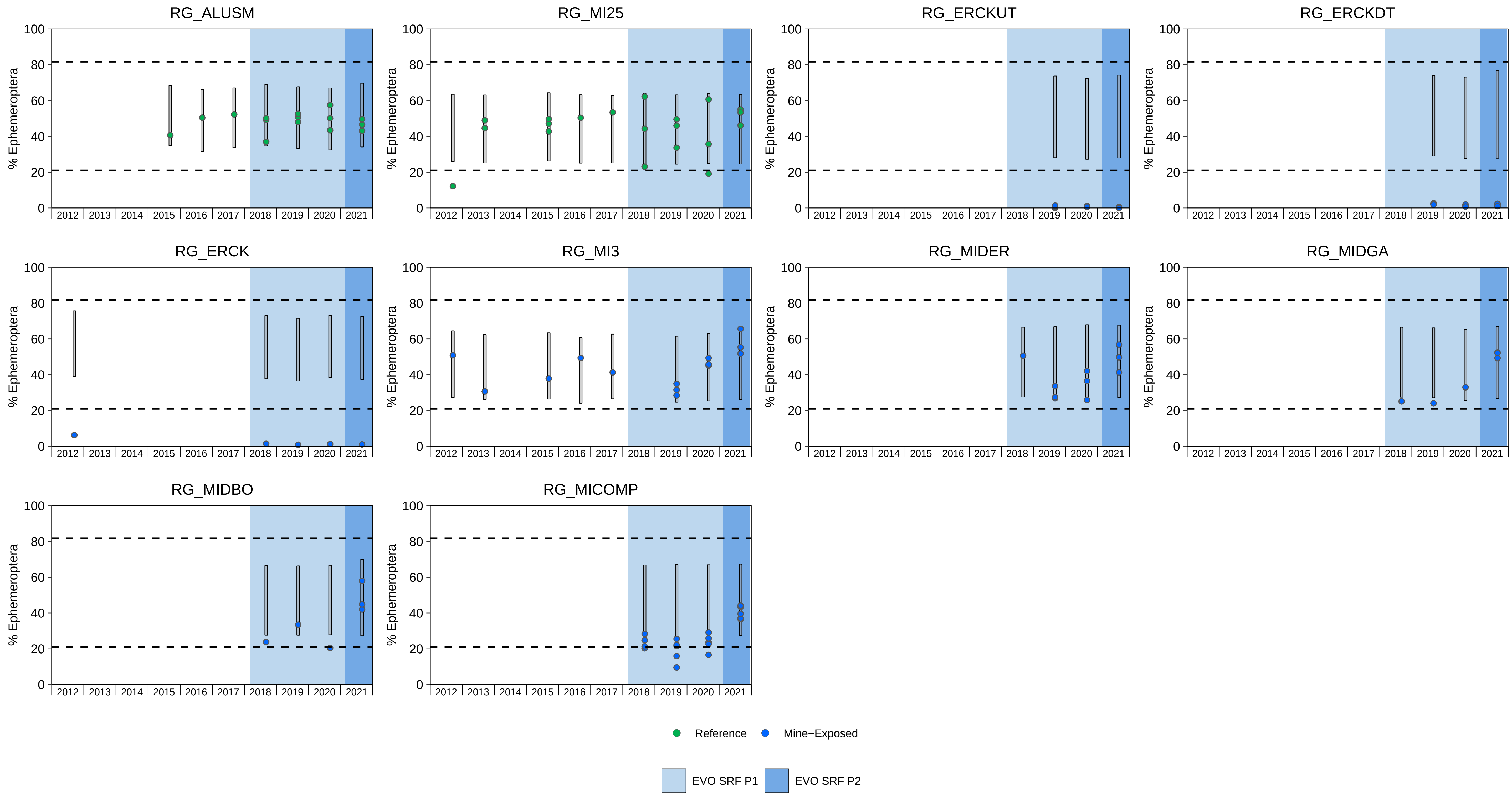

Figure F.7: Benthic Invertebrate Community Relative Ephemeroptera Abundance (%Ephemeroptera; 3-Minute Kick and Sweep Sampling) from EVO LAEMP Sampling Areas, September 2012 to 2021

Notes: Site specific normal ranges using regression models shown with grey shading and black rectangle (when available). Normal ranges using percentiles of reference areas from 2012 to 2019 shown as dashed horizontal lines. Dashed horizontal lines represent the normal range defined as the 2.5th and 97.5 percentiles of the 2012 to 2019 reference area data from the Regional Aquatic Environmental Monitoring Program (RAEMP).

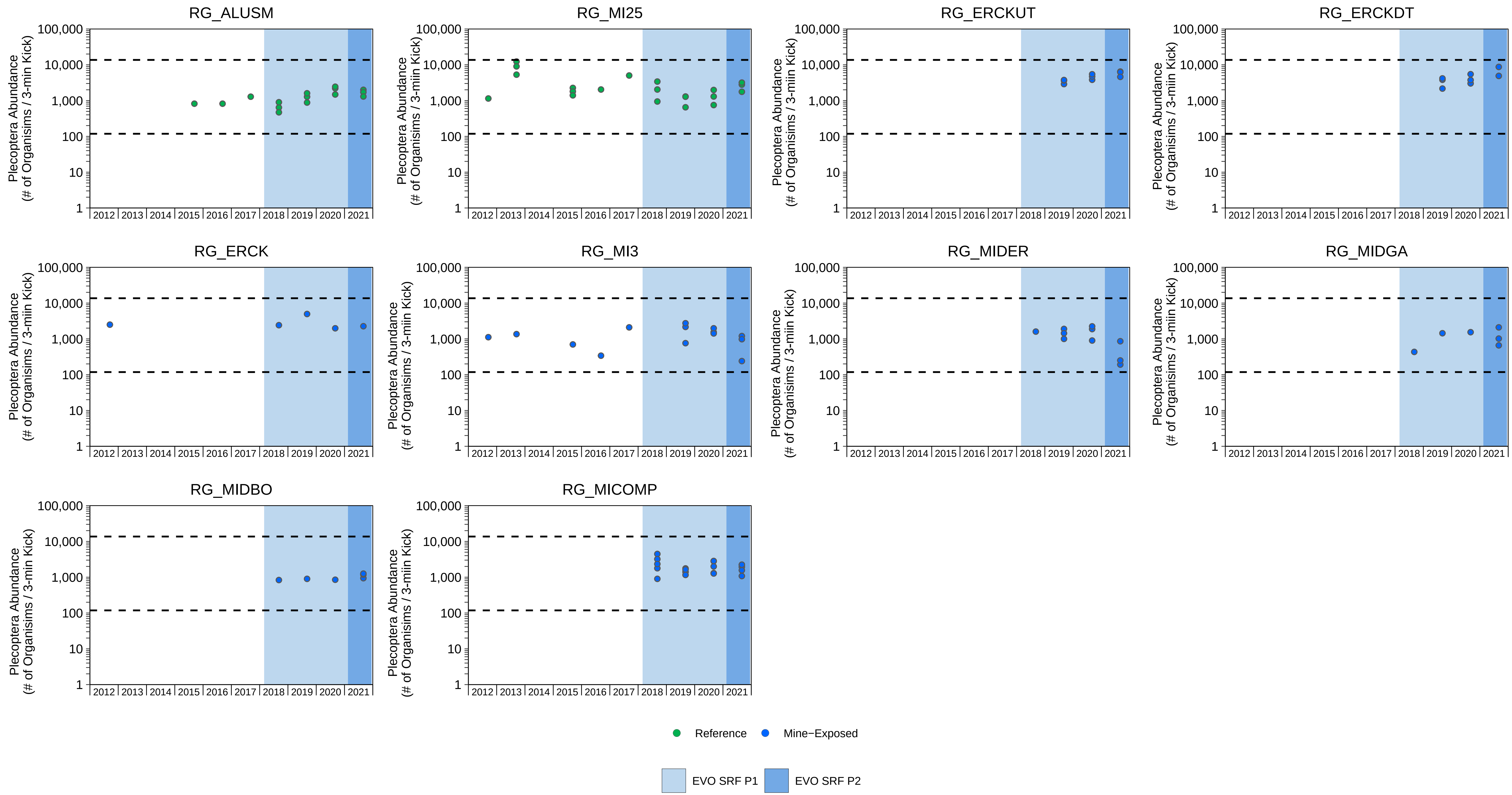

Figure F.8: **Benthic Invertebrate Community Plecoptera Abundance (# of Organisms / 3-Minute Kick and Sweep Sampling) from EVO LAEMP Sampling Areas, September 2012 to 2021**

Notes: Site specific normal ranges using regression models shown with grey shading and black rectangle (when available). Dashed horizontal lines represent the normal range defined as the 2.5th and 97.5 percentiles of the 2012 to 2019 reference area data from the Regional Aquatic Environmental Monitoring Program (RAEMP).

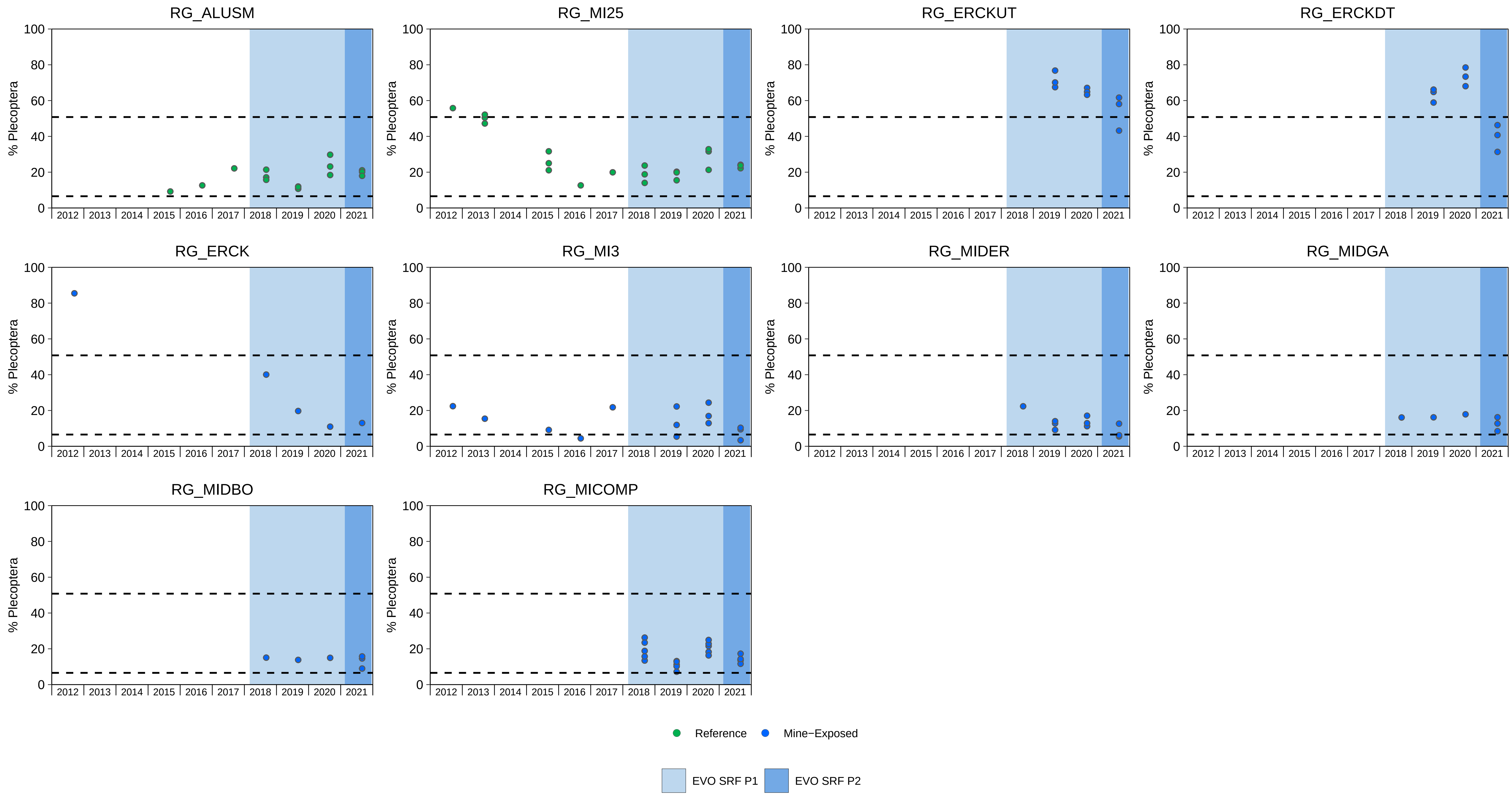

Figure F.9: Benthic Invertebrate Community Relative Plecoptera Abundance (%Plecoptera; 3-Minute Kick and Sweep Sampling) from EVO LAEMP Sampling Areas, September 2012 to 2021

Notes: Site specific normal ranges using regression models shown with grey shading and black rectangle (when available). Normal ranges using percentiles of reference areas from 2012 to 2019 shown as dashed horizontal lines.
Dashed horizontal lines represent the normal range defined as the 2.5th and 97.5 percentiles of the 2012 to 2019 reference area data from the Regional Aquatic Environmental Monitoring Program (RAEMP).

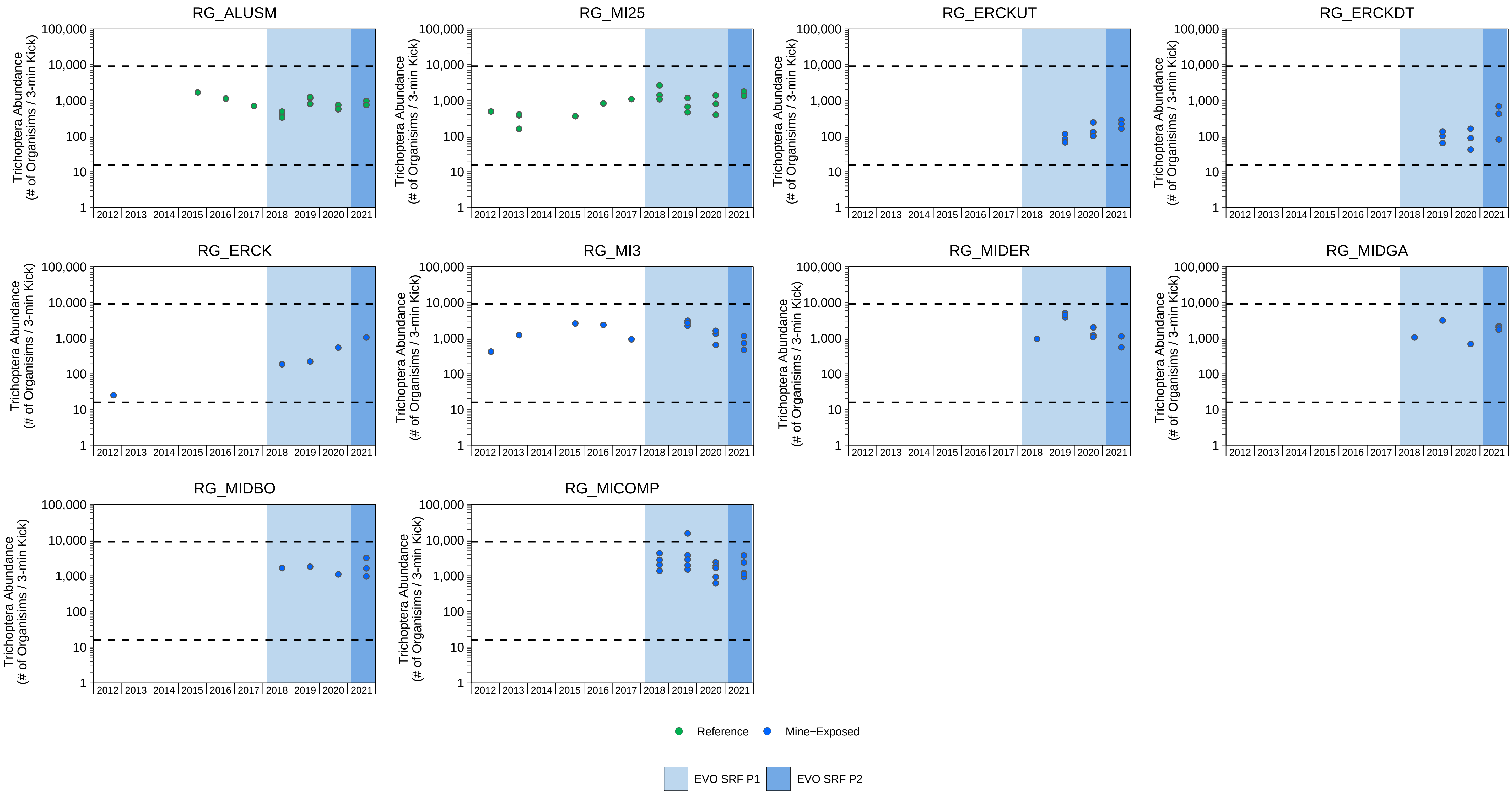

Figure F.10: Benthic Invertebrate Community Trichoptera Abundance (# of Organisms / 3-Minute Kick and Sweep Sampling) from EVO LAEMP Sampling Areas, September 201, September 2012 to 2021

Notes: Site specific normal ranges using regression models shown with grey shading and black rectangle (when available). Dashed horizontal lines represent the normal range defined as the 2.5th and 97.5 percentiles of the 2012 to 2019 reference area data from the Regional Aquatic Environmental Monitoring Program (RAEMP).

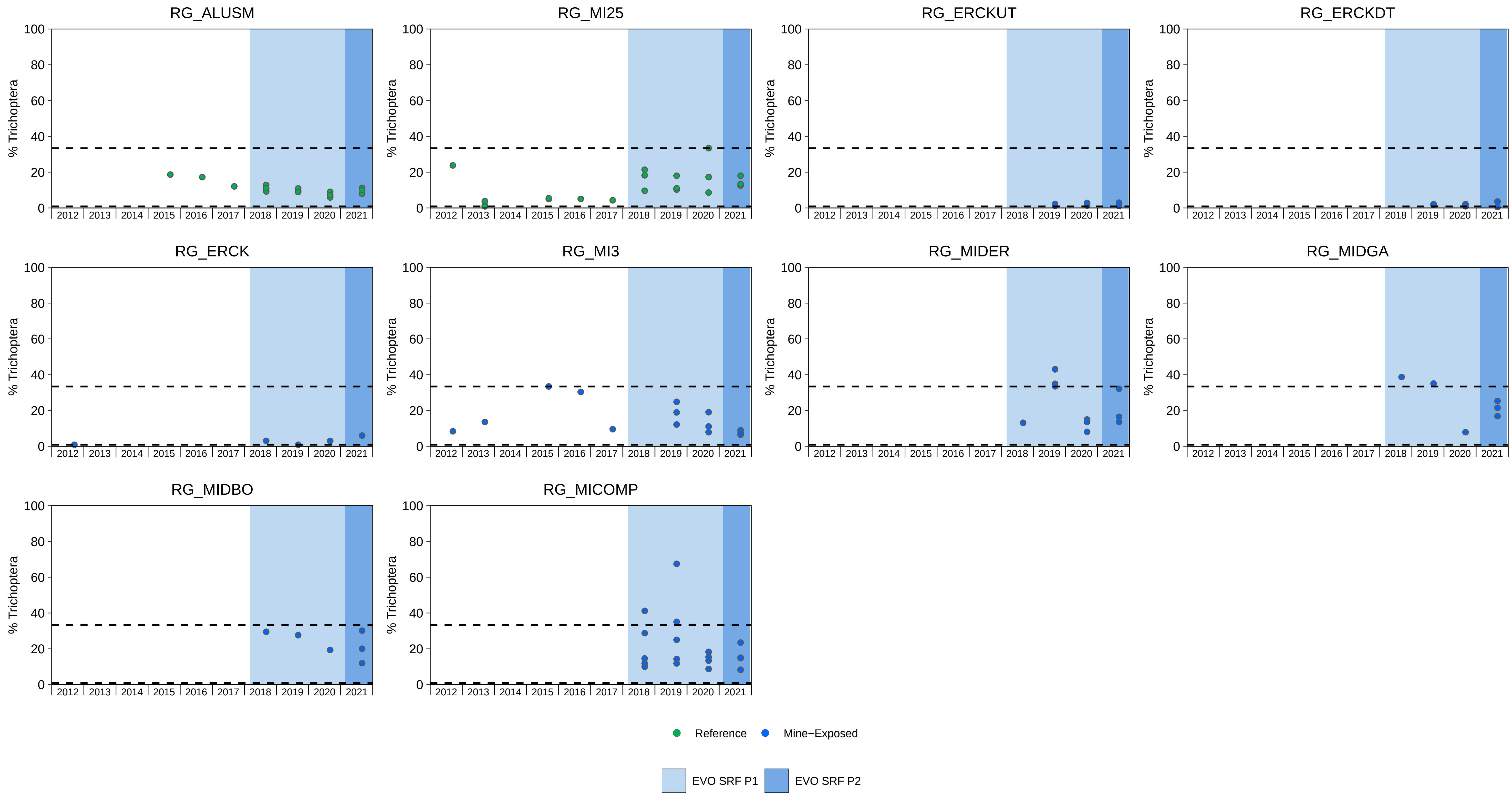

Figure F.11: Benthic Invertebrate Community Relative Trichoptera Abundance (%Trichoptera; 3-Minute Kick and Sweep Sampling) from EVO LAEMP Sampling Areas, September 2012 to 2021

Notes: Site specific normal ranges using regression models shown with grey shading and black rectangle (when available). Dashed horizontal lines represent the normal range defined as the 2.5th and 97.5 percentiles of the 2012 to 2019 reference area data from the Regional Aquatic Environmental Monitoring Program (RAEMP).

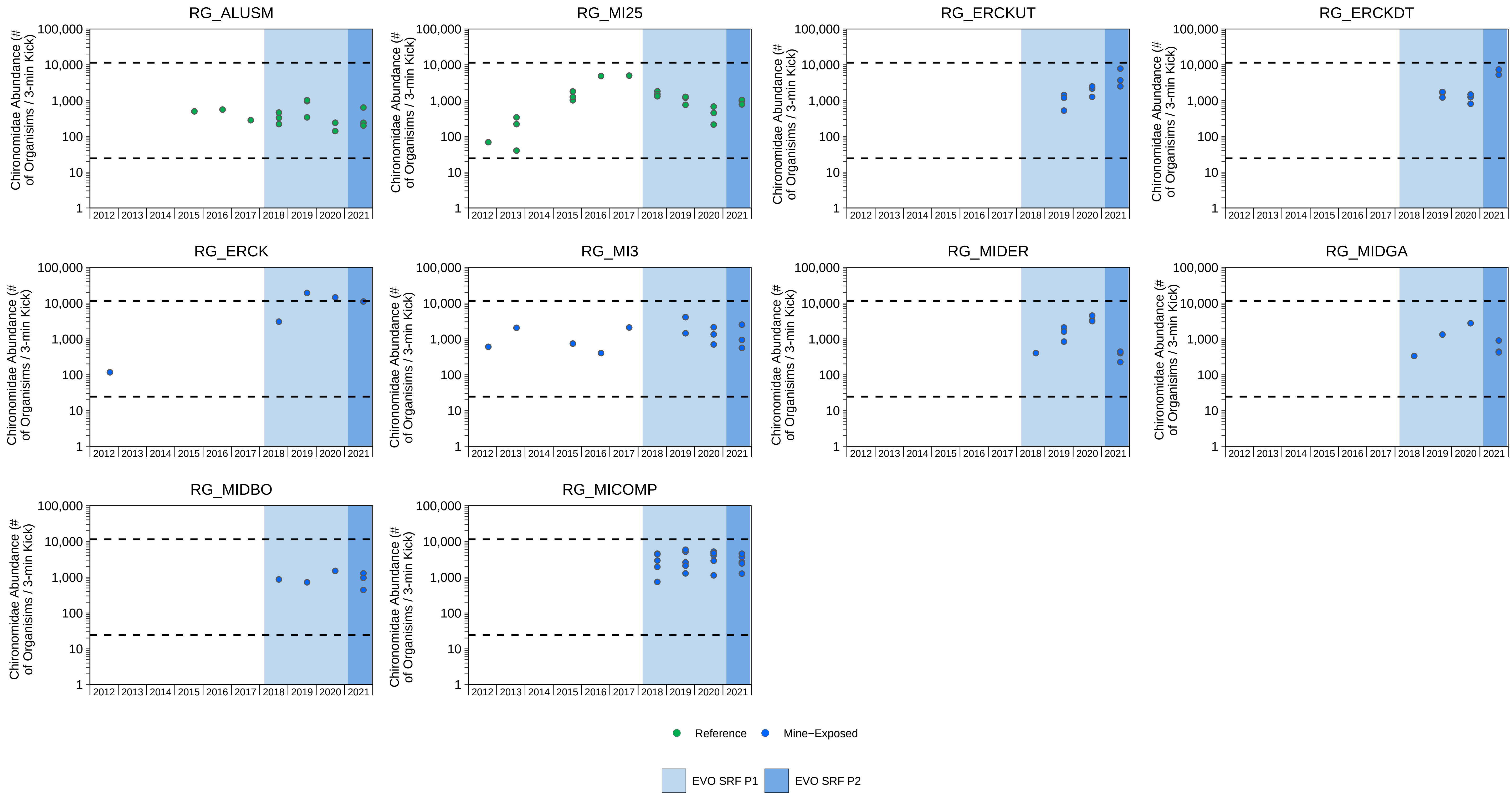

Figure F.12: Benthic Invertebrate Community Chironomidae Abundance (# of Organisms / 3-Minute Kick and Sweep Sampling) from EVO LAEMP Sampling Areas, September 2012 to 2021

Notes: Site specific normal ranges using regression models shown with grey shading and black rectangle (when available). Dashed horizontal lines represent the normal range defined as the 2.5th and 97.5 percentiles of the 2012 to 2019 reference area data from the Regional Aquatic Environmental Monitoring Program (RAEMP).

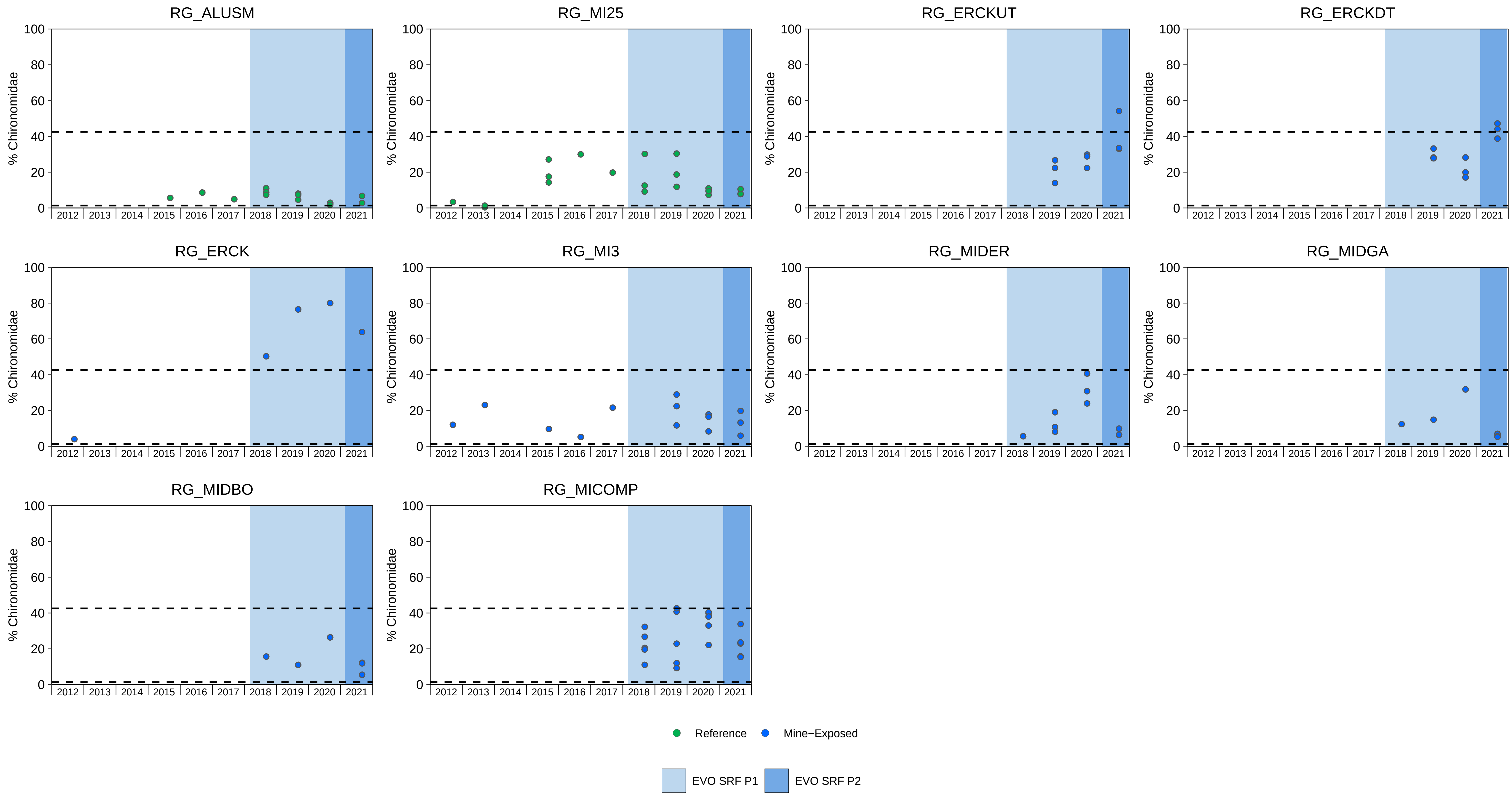

Figure F.13: Benthic Invertebrate Community Relative Chironomidae Abundance (%Chironomidae; 3-Minute Kick and Sweep Sampling) from EVO LAEMP Sampling Areas, September 2012 to 2021

Notes: Site specific normal ranges using regression models shown with grey shading and black rectangle (when available). Dashed horizontal lines represent the normal range defined as the 2.5th and 97.5 percentiles of the 2012 to 2019 reference area data from the Regional Aquatic Environmental Monitoring Program (RAEMP).

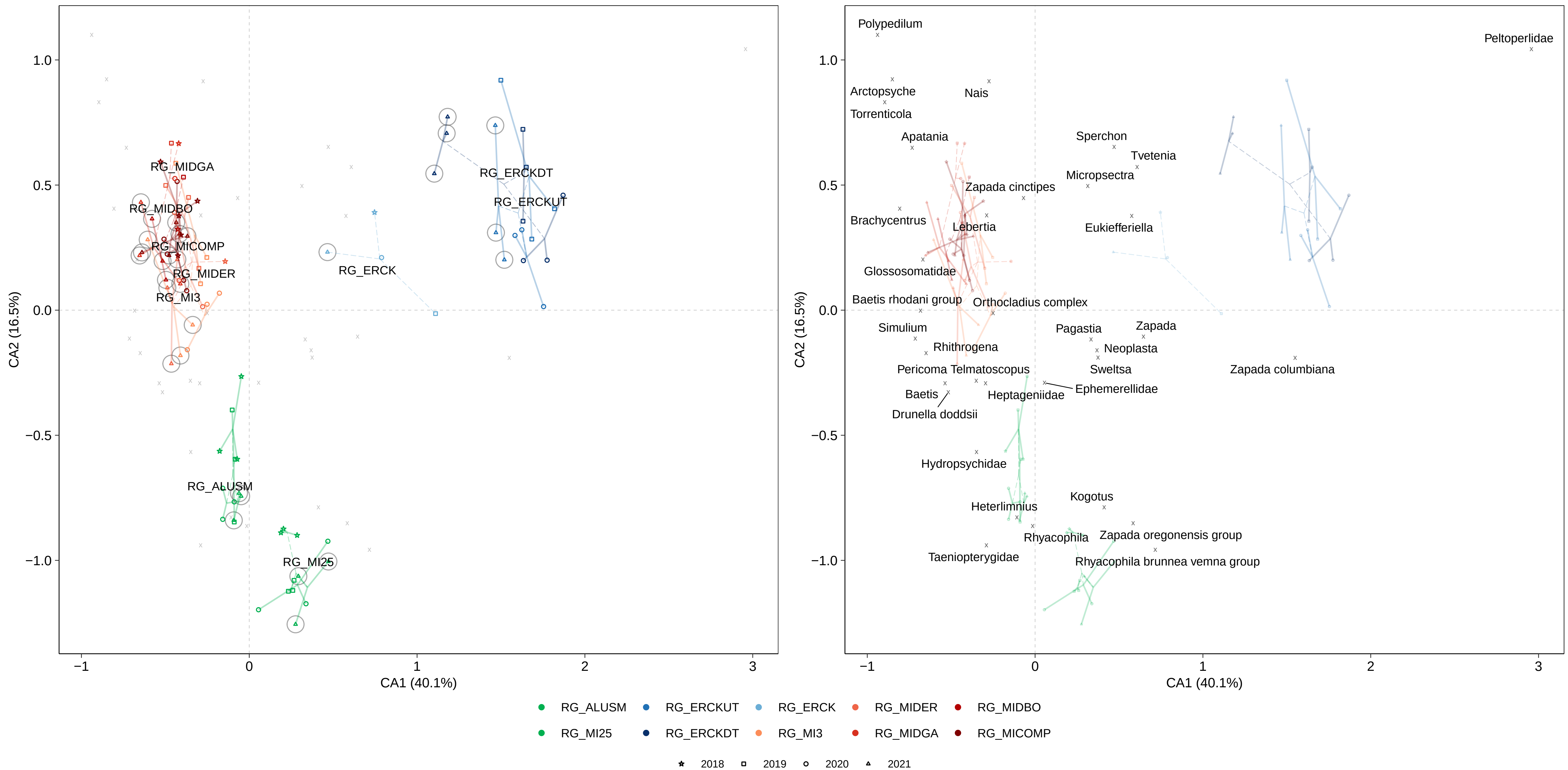

Figure F.14: Correspondence Analysis of Benthic Invertebrate Communities in September, EVO LAEMP, 2018 to 2021

Notes: Green symbols represent reference stations and other colours represents mine−exposed stations. Lowest Practical Level taxon abundances were $\ln_{(x+1)}$-transformed prior to analysis. Taxa that made up less than 1% of total abundance (on the $\ln_{(x+1)}$ scale) and occurred in fewer than 10% of samples were excluded from analysis. Samples from 2021 are circled in grey.

Table F.1: **Selenium Tissue Concentration Summary Table, EVO LAEMP, 2019 to 2021**

Biological Station Code	Description	Teck Water Station Code	Replicate	BIT Selenium Concentration (mg/kg dw)			
				2019	2020	2021	
						September	December
RG_ALUSM	Alexander Creek	EV_AC2	1	6.4	5.5	5	-
			2	5.8	5.4	6.1	-
			3	4.9	6.1	5.4	-
RG_MI25	Michel Creek (u/s of Coal Mountain Operations)	CM_MC1	1	5.6	2.9	3.3	-
			2	4.4	4.4	2.5	-
			3	3.9	4.1	2.3	-
RG_ERCKUT	Erickson Creek (u/s of outfall)	FC_ECIN	1	4.6	4.8	5.8	3.9
			2	5.3	3.9	4.1	3.8
			3	5.2	5.3	4.8	4.4
			4	-	-	6.4	4.0
			5	-	-	5.6	-
RG_ERCKDT	Erickson Creek d/s of SRF Outfall	EV_ECOUT	1	7.8	8.8	12	13
			2	7.0	6.7	17	15
			3	7.4	8.8	16	21
			4	-	-	20	20
			5			18	22
			6	-	-	-	-
RG_ ERCKMD (EV_EC_FLOW2)	Midway between RG_ERCKDT and RG_ERCK (also location of temperature logger)	-	1	-	-	-	8.2
			2	-	-	-	9.0
			3	-	-	-	8.8
			4	-	-	-	15
			5	-	-	-	14
RG_ERCK	Erickson Creek at Mouth (discharge to Michel Creek)	EV_EC1	1	5.5	5.4	3.3	4.6
			2	-	-	-	5.2
			3	-	-	-	5.9
RG_GATE	Gate Creek (u/s of settling pond)	-	1	-	12.0	34	-
			2	-	-	21	-
			3	-	-	24	-
RG_GATEDP	Gate Creek Sedimentation Pond Decant	EV_GT1	1	12.0	-	18[a]	-
			2	-	-	8.7	-
			3	-	-	20	-
RG_BOCK	Bodie Creek Sedimentation Pond Decant	EV_BC1	1	78	67	92[a]	-
			2	-	-	49	-
			3	-	-	69	-
RG_MI3	Michel Creek u/s of Erickson Creek	EV_MC3	1	4.9	6.8	4.5	-
			2	4.6	7.9	5.9	-
			3	4.6	9.7	3	-
RG_MIDER	Michel Creek d/s of Erickson Creek	-	1	5.7	6.6	5.8	-
			2	5.8	11	6.9	-
			3	5.0	6.8	5	-
RG_MIDGA	Michel Creek d/s of Gate Creek	-	1	8.2	1.5	5.8	-
			2	-	-	5.7	-
			3	-	-	9.9	-
RG_MIDBO	Michel Creek d/s of Bodie Creek	-	1	6.9	10.0	7.0	-
			2	-	-	6.0	-
			3	-	-	5.1	-
RG_MICOMP	Michel Creek d/s of Hwy #3 Bridge (Compliance Point)	EV_MC2	1	5.4	10	4.5	-
			2	5.0	12	5.1	-
			3	5.3	11	2.7	-
			4	6.3	7.8	4.3	-
			5	5.6	9.3	3.5	-

Tissue concentrations in Benthic Invertebrates exceed the level 1 benchmark for growth, reproduction, and survival of benthic invertebrates (13 mg/kg dw).

Tissue concentrations in Benthic Invertebrates exceed the level 2 benchmark for growth, reproduction, and survival of benthic invertebrates (20 mg/kg dw).

Tissue concentrations in Benthic Invertebrates exceed the level 3 benchmark for growth, reproduction, and survival of benthic invertebrates (27 mg/kg dw).

Notes: " - " indicates no sample collected or not applicable. BIT = benthic invertebrate tissue. d/s = downstream. u/s = upstream. SRF = saturated rock fill. mg/kg dw = milligrams per kilogram dry weight.

[a] Annelids were found at a proportion of greater than 5% of the sample in a replicate for both RG_GATE and RG_BOCK. The annelid only samples tissue selenium concentration was 138 and 240 mg/kg dw for these two samples, respectively.

Table F.2: Changes in Selenium Concentrations in Benthic Invertebrate Composite-Taxa Tissue Samples for Mine Exposed Areas Relative to Reference Areas (RG_ALUSM and RG_MI25) between SRF P1 (2018 to 2020) and SRF P2 (2021)

Exposed Area	Reference Area	ANOVA Terms (P-value)					Magnitude of Difference[a]		
		BA	CI	Year(BA)	BAxCI	Year(BA)xCI	2018 vs 2021	2019 vs 2021	2020 vs 2021
RG_ERCKUT	RG_ALUSM	0.543	0.081	0.598	0.340	0.609	-	ns	ns
	RG_MI25	0.116	<0.001	0.178	0.006	0.556	-	70	
RG_ERCKDT	RG_ALUSM	<0.001	<0.001	0.616	<0.001	0.604	-	119	
	RG_MI25	0.009	<0.001	0.570	<0.001	0.185	-	230	
RG_ERCK	RG_ALUSM	<0.001	0.001	<0.001	0.047	0.029	0.44	-38	-37
	RG_MI25	0.002	0.037	0.444	0.775	0.829	ns	ns	ns
RG_GATE	RG_ALUSM	0.388	<0.001	0.002	<0.001	0.071	183	-	183
	RG_MI25	0.937	<0.001	0.351	0.001	0.808	214	-	214
RG_GATEDP	RG_ALUSM	0.821	0.003	-	0.579	-	-	ns	-
	RG_MI25	0.195	<0.001	-	0.135	-	-	ns	-
RG_BOCK	RG_ALUSM	0.638	<0.001	0.841	0.004	<0.001	673	-10	4.4
	RG_MI25	0.391	<0.001	0.059	0.003	0.002	599	49	42
RG_MI3	RG_ALUSM	0.045	0.759	0.020	0.087	0.020	-	-5.3	-45
	RG_MI25	0.003	0.001	0.195	0.704	0.010	-	57	-25
RG_MIDER	RG_ALUSM	0.013	0.128	<0.001	0.703	0.110	ns		
	RG_MI25	0.003	<0.001	0.279	0.196	0.033	-3.4	83	3.8
RG_MIDGA	RG_ALUSM	0.974	0.270	<0.001	0.011	<0.001	26	-13	374
	RG_MI25	0.224	0.002	0.005	0.006	0.001	14	44	544
RG_MIDBO	RG_ALUSM	0.001	0.040	<0.001	0.496	0.004	40	-10	-38
	RG_MI25	0.002	<0.001	0.866	0.441	0.185	ns	ns	ns
RG_MICOMP	RG_ALUSM	<0.001	0.806	<0.001	0.001	<0.001	-17	-26	-59
	RG_MI25	<0.001	<0.001	0.005	0.145	<0.001	-25	23	-44

P-value for Relevant BACI Term < 0.05.

Significantly Increased Relative to Reference in 2021.

Significantly Decreased Relative to Reference in 2021.

Notes: "-" indicates no data. Unshaded magnitudes of difference (MOD) were not significant in the post-hoc analysis (α= 0.05) corrected for the number of tests using a Tukey's Honestly Significant Difference Test. ANOVA = analysis of variance.

[a] Magnitude of difference (MOD) calculated as Observed$_{Exposed\ 2021}$ - Predicted$_{Exposed2021}$/Predicted$_{Exposed2021}$, where the predicted concentration was calculated as: Observed$_{Reference2021}$ + Observed$_{Exposed\ year_i}$ - Observed$_{Reference\ year_i}$ and year$_i$ is the earlier year in the comparison. This MOD represents how much the difference in 2021 has changed from the difference observed in the earlier year.

Table F.3: Selenium Species Bioaccumulation Tool[a] Predicted Benthic Invertebrate Tissue Selenium Concentrations Compared with Field Measurements, EVO LAEMP, 2021

Area	B-tool Prediction		Field Measurements	
	Date	Predicted Benthic Invertebrate Tissue Selenium Concentration (µg/g dw)	Date	Mean Benthic Invertebrate Tissue Selenium Concentration (µg/g dw)
RG_ALUSM	12-Sep-21	5.87	12-Sep-21	5.50
RG_MI25	13-Sep-21	4.69	13-Sep-21	2.70
RG_ERCKUT	15-Sep-21	5.20	15-Sep-21	5.34
RG_ERCKUT	14-Dec-21	5.44	15-Dec-21	4.03
RG_ERCKDT	15-Sep-21	5.61	14-Sep-21	16.6
RG_ERCKDT	15-Dec-21	5.15	15-Dec-21	18.2
RG_ERCKMD	15-Dec-21	5.82	15-Dec-21	11.0
RG_ERCK	10-Sep-21	9.99	10-Sep-21	3.30
RG_ERCK	14-Dec-21	6.80	14-Dec-21	5.23
RG_GATE	16-Sep-21	10.7	16-Sep-21	26.3
RG_GATEDP	27-Aug-21	11.8	27-Aug-21	39.3
RG_GATEDP	16-Sep-21	14.1	16-Sep-21	15.6
RG_BOCK	16-Sep-21	25.3	16-Sep-21	70.0
RG_BOCK	27-Aug-21	10.2	27-Aug-21	48.7
RG_MI3	10-Sep-21	5.17	10-Sep-21	4.47
RG_MIDER	9-Sep-21	5.17	9-Sep-21	5.90
RG_MIDGA	11-Sep-21	4.46	11-Sep-21	7.13
RG_MIDBO	11-Sep-21	6.84	11-Sep-21	6.03
RG_MICOMP	13-Sep-21	6.93	13-Sep-21	4.02
F2_BPO	20-Sep-21	8.10	14-Sep-21	16.6
F2_BPO	16-Dec-21	6.37	15-Dec-21	18.2

Notes: B-tool = bioaccumulation tool, µg/g dw = micrograms per gram dry weight.

[a] Values derived from Bruyn and Luoma (2021) using selenium speciation data and sulphate concentrations for each area on each date to predict benthic invertebrate tissue selenium concentrations.

Table F.4: Spatial Comparisons for Benthic Invertebrate Endpoints Collected by Hess Sampling Upstream (RG_ERCKUT) and Downstream (RG_ERCKDT) of the SRF Discharge, EVO LAEMP, September 2021

Metrics	Transformed	Statistical Test[b]	P-value	Magnitude of Different	Statistical Summary				
					Areas	Mean	Standard Deviation	Minimum	Maximum
Total Density (org/m^2)[a]	none	tunequal	0.008	3.8	RG_ERCKUT	25,065	22,270	3,140	64,650
					RG_ERCKDT	110,625	78,752	11,480	216,000
Biomass (g/m^2 ww)[a]	log10	tequal	0.146	0.63	RG_ERCKUT	37.9	24.7	9.25	79.6
					RG_ERCKDT	57.5	36.7	13.1	147
EPT Density (org/m^2)	none	tequal	0.053	1.5	RG_ERCKUT	9,245	7,335	1,480	20,320
					RG_ERCKDT	19,883	14,513	2,000	41,280
Ephemeroptera Density (org/m^2)	rank	M-W	<0.001	-	RG_ERCKUT	-	-	-	-
					RG_ERCKDT	638	363	40.0	960
Plecoptera Density (org/m^2)	none	tequal	0.074	1.2	RG_ERCKUT	8,884	7,226	1,320	19,840
					RG_ERCKDT	17,699	12,799	1,840	38,080
Trichoptera Density (org/m^2)	rank	M-W	0.570	2.1	RG_ERCKUT	361	309	40.0	1,040
					RG_ERCKDT	2,012	2,338	90.0	7,210
Chironomidae Density (org/m^2)	none	tunequal	0.001	4.7	RG_ERCKUT	9,082	7,653	1,360	24,800
					RG_ERCKDT	45,013	25,523	6,600	76,160

Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

Blue shaded values indicate significant difference (ANOVA p-value ≤ 0.10) that was also outside of a Critical Effect Size of ±2 SD$_{Upstream}$, indicating that the difference between the downstream area and upstream area was ecologically meaningful.

Notes: "-" = no data available; org = organism; ww = wet weight; EPT = Ephemeroptera, Plecoptera, Trichoptera.

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

[b] Statistical tests include t-test for equal variables (tequal) or unequal variables (tunequal)

[c] Magnitude of Difference = (MCT$_{Downstream}$ - MCT$_{Upstream}$)/SD$_{Upstream}$. MCT = Measure of Central Tendency; MCT reported as geometric mean for log10-transformed data, median for rank-transformed data, means for untransformed data.

Table F.5: Summary of Benthic Invertebrate Community Endpoints from Hess Sampling, EVO LAEMP, September 2021

Biological Area Code	Sample Code	Total Density (org/m^2)	Biomass (g/m^2 ww)	EPT Density (org/m^2)	Ephemeroptera Density (org/m^2)	Plecoptera Density (org/m^2)	Trichoptera Density (org/m^2)	Chironomidae Density (org/m^2)
RG_ERCKUT	RG_ERCKUT_HESS-1	8,320	63	4,840	0	3,800	1,040	2,320
	RG_ERCKUT_HESS-2	16,920	26	6,080	0	5,960	120	8,160
	RG_ERCKUT_HESS-3	6,920	20	3,480	0	3,360	120	2,480
	RG_ERCKUT_HESS-4	58,400	56	20,320	0	19,840	480	24,800
	RG_ERCKUT_HESS-5	3,140	9.2	1,480	0	1,320	160	1,360
	RG_ERCKUT_HESS-6	16,000	18	5,480	0	5,280	200	7,360
	RG_ERCKUT_HESS-7	7,320	12	3,140	0	3,100	40	3,300
	RG_ERCKUT_HESS-8	39,680	58	17,440	0	17,120	320	18,080
	RG_ERCKUT_HESS-9	64,650	80	20,170	0	19,520	650	12,320
	RG_ERCKUT_HESS-10	29,300	37	10,020	0	9,540	480	10,640
RG_ERCKDT	RG_ERCKDT_HESS-1	71,429	42	13,651	952	12,698	0	39,048
	RG_ERCKDT_HESS-2	128,889	59	26,984	952	23,492	2,540	74,286
	RG_ERCKDT_HESS-3	47,040	34	17,120	480	15,200	1,440	14,080
	RG_ERCKDT_HESS-4	127,550	41	34,520	640	26,670	7,210	60,960
	RG_ERCKDT_HESS-5	214,340	67	37,480	640	34,590	2,250	67,520
	RG_ERCKDT_HESS-6	203,840	67	41,280	960	38,080	2,240	56,640
	RG_ERCKDT_HESS-7	11,480	13	2,000	40	1,840	120	6,600
	RG_ERCKDT_HESS-8	37,950	33	5,350	120	5,140	90	22,280
	RG_ERCKDT_HESS-9	216,000	147	17,280	960	16,320	0	76,160
	RG_ERCKDT_HESS-10	47,730	72	3,170	0	2,960	210	32,560

Notes: org/m^2 = organisms per metre squared. g/m^2 ww = grams per metre squared wet weight. EPT = Ephemeroptera, Plecoptera, Trichoptera.

Table F.6: Summary of Benthic Invertebrate Endpoints from 3-Minute Kick and Sweep Sampling, EVO LAEMP, September 2021

Area	Biological Area Code	Sample Code	Abundance (# org/ 3-min kick)	LPL Richness (# of taxa)	Family Richness	EPT		Ephemeroptera		Plecoptera		Trichoptera		Chironomidae	
						Abundance (# org/ 3-min kick)	Relative Abundance (%)	Abundance (# org/ 3-min kick)	Relative Abundance (%)	Abundance (# org/ 3-min kick)	Relative Abundance (%)	Abundance (# org/ 3-min kick)	Relative Abundance (%)	Abundance (# org/ 3-min kick)	Relative Abundance (%)
Reference	RG_ALUSM	RG_ALUSM_01	9,500	40	22	7,180	76	4,420	46	2,000	21	760	8	640	6.7
		RG_ALUSM_02	8,540	41	22	6,920	81	4,240	50	1,720	20	960	11	240	2.8
		RG_ALUSM_03	7,240	42	23	5,160	71	3,120	43	1,300	18	740	10	200	2.8
	RG_MI25	RG_MI25_01	12,620	42	20	11,320	90	6,940	55	2,800	22	1,580	12	980	7.8
		RG_MI25_02	13,180	39	20	11,980	91	7,040	53	3,180	24	1,760	13	1,040	7.9
		RG_MI25_03	7,420	36	17	6,520	88	3,420	46	1,760	24	1,340	18	780	10
Mine-Exposed	RG_ERCKUT	RG_ERCKUT_01	11,120	24	16	6,800	61	60	0.54	6,460	58	280	2.5	3,680	33
		RG_ERCKUT_02	14,440	23	14	6,420	44	20	0.14	6,240	43	160	1.1	7,820	54
		RG_ERCKUT_03	7,460	19	12	4,820	65	0	0	4,600	62	220	2.9	2,500	34
	RG_ERCKDT	RG_ERCKDT_01	18,840	30	17	9,780	52	380	2	8,720	46	680	3.6	7,300	39
		RG_ERCKDT_02	11,980	26	15	5,580	47	280	2.3	4,880	41	420	3.5	5,280	44
		RG_ERCKDT_03	15,640	25	13	5,140	33	160	1	4,900	31	80	0.51	7,380	47
	RG_ERCK	RG_ERCK_01	17,360	34	23	3,480	20	180	1	2,260	13	1,040	6	11,080	64
	RG_MI3	RG_MI3_01	7,120	29	20	4,640	65	3940	55	240	3.4	460	6.5	940	13
		RG_MI3_02	12,660	46	26	8,900	70	6560	52	1,200	9.5	1140	9	2,500	20
		RG_MI3_03	9,480	39	24	7,920	84	6220	66	980	10	720	7.6	560	5.9
	RG_MIDER	RG_MIDER_01	3,475	30	23	2,742	79	1433	41	192	5.5	1117	32	225	6.5
		RG_MIDER_02	4,050	31	21	3,100	76	2300	57	250	6.2	550	14	400	9.9
		RG_MIDER_03	6,800	37	23	5,360	79	3380	50	860	13	1120	16	440	6.5
	RG_MIDGA	RG_MIDGA_01	12,940	40	27	11,060	86	6780	52	2,100	16	2180	17	900	7
		RG_MIDGA_02	7,820	33	24	6,720	86	4080	52	660	8.4	1980	25	440	5.6
		RG_MIDGA_03	8,000	36	24	6,680	84	3940	49	1,020	13	1720	22	420	5.2
	RG_MIDBO	RG_MIDBO_01	10,480	38	24	8,500	81	4400	42	940	9	3160	30	1,280	12
		RG_MIDBO_02	8,080	38	28	6,420	80	3620	45	1,180	15	1620	20	960	12
		RG_MIDBO_03	8,000	33	22	6,860	86	4640	58	1,260	16	960	12	440	5.5
	RG_MICOMP	RG_MICOMP_01	16,000	46	26	11,500	72	6,940	43	2,200	14	2,360	15	3,680	23
		RG_MICOMP_02	7,980	43	28	5,800	73	3,520	44	1,080	14	1,200	15	1,260	16
		RG_MICOMP_03	11,220	37	25	6,960	62	4,100	36	1,940	17	920	8.2	2,640	24
		RG_MICOMP_04	13,420	46	28	7,640	57	4,960	37	1,560	12	1,120	8.3	4,540	34
		RG_MICOMP_05	15,680	41	25	12,120	77	6,200	40	2,240	14	3,680	24	2,420	15

Notes: LPL= Lowest Practical Level. EPT= Ephemeroptera, Plecoptera, and Trichoptera.
[a] Total density and biomass are reported for all organism in the sample.

APPENDIX G
BIOLOGICAL TRIGGERS

APPENDIX G BIOLOGICAL TRIGGERS

G1 INTRODUCTION

G1.1 Background

Biological triggers were developed and implemented to assist with identifying and communicating unexpected and potentially important changes in aquatic ecosystem conditions and are required as part of Teck's Adaptive Management Plan (AMP; Teck 2018). Biological triggers were developed in consultation with the EMC for a subset of the biological monitoring endpoints that are effective indicators of changes at the ecosystem level. The purpose of the biological triggers is to quickly identify biological monitoring areas where unexpected biological conditions may be occurring that may require management action. Additionally, information provided from the analysis of biological triggers may lead to responses under the AMP response framework.

Draft biological triggers were developed in the 2018 AMP (Teck 2018) under Management Question 5, with these initially reported on in 2021 in the 2020 LAEMP reports and RAEMP data package, and summarized in the 2020 Annual AMP Report (Teck 2021a). When the 2018 AMP was approved, there was an expectation that the 2018 AMP draft/interim biological triggers would be finalized, through engagement with the EMC, prior to December 15, 2021 AMP Update. The biological triggers were finalized in 2021 (Teck 2021b) and the methods applied in this report reflect the finalized biological triggers (Teck 2021b). It is important to note that the process and/or biological triggers may adjust over time as the purpose of the biological triggers is to be reflective of not only changes in the Elk Valley, but also the current state of knowledge in the area.

The finalized biological triggers (Teck 2021b) include three measurement endpoints:

- Percent EPT (% EPT; Ephemeroptera, Plecoptera, and Trichoptera) – based on travelling kick samples (CABIN protocol), generally three replicates per location per sampling event.
- Benthic invertebrate tissue selenium (BIT Se) – generally several replicates collected per location per sampling event, where each replicate is a composite sample of invertebrates (i.e., composite-taxa sample).
- Westslope cutthroat trout muscle tissue selenium (WCT Se) – generally 8 replicates collected per location per sampling event, where each replicate corresponds to a sample from a single fish.

Evaluation of these three biological trigger endpoints is complementary to the fulsome evaluation of biological endpoints that is integrated into the Local Aquatic Effects

Monitoring Program (LAEMP) and the Regional Aquatic Effects Monitoring Program (RAEMP) data evaluations. The more fulsome evaluation of biological endpoints is used to support answering the specific LAEMP and RAEMP study questions through the consideration of not only the endpoints used in the biological trigger evaluation, but also a full suite of additional biological, chemical, and physical endpoints. Biological triggers do not provide information on cause and effect, report on trends, or feed directly into decision-making processes. Instead, the biological triggers act to flag areas for further evaluation, which would then take place under existing monitoring programs, through the development of supporting studies or through the response framework, as necessary.

Biological monitoring data are compared to triggers annually, and summaries of the LAEMP and RAEMP trigger evaluations and responses are summarized within annual AMP reports.

G2 METHODS

G2.1 Overview

As outlined in Section G1.1, analyses for biological triggers are meant to be complementary to other analyses conducted in the LAEMPs and RAEMP. Biological trigger analyses included two of three trigger endpoints (%EPT and BIT Se [collected under the 2021 EVO LAEMP], as WCT were not sampled as part of the EVO LAEMP.

For the purpose of application of the biological triggers, expectations for the endpoints evaluated (%EPT and BIT Se) were based on projected water quality, not on measured water quality. Thus, the triggers should detect biological results that were unexpected, regardless of whether those results are due to unexpected water quality or due to unexpected relationships between water quality and biological endpoints. Biological triggers were therefore only applied at locations where water quality projections were available. Specifically, five of the mine-exposed areas (RG_ERCK, RG_GATE, RG_BOCK, RG_MI3, and RG_MICOMP) included in the EVO LAEMP were evaluated for benthic invertebrate tissue selenium trigger events and three mine-exposed areas (RG_ERCK, RG_MI3 and RG_MICOMP) were evaluated for the percent EPT biological trigger. Data for other areas studied under the EVO LAEMP were not evaluated relative to biological triggers but were assessed elsewhere as part of the main EVO LAEMP report.

Methodological details are discussed for each of the biological trigger metrics below.

G2.2 Percent EPT

Data for percent EPT were compared to:

- Normal range: The lower limit of habitat-adjusted normal range (2.5th percentile). Up-to-date limits of normal ranges[1] are provided in the RAEMP and LAEMPs, where they are recalculated as needed as new data become available (Teck 2019). The derivation of habitat-adjusted normal ranges is described in Appendix J of the 2020 RAEMP, and was based on consideration of more than 30 habitat, substrate, GIS, and land cover variables (Minnow 2020).
- Expectations: The lower limit of the range of %EPT corresponds to the predicted aquatic data integration tool (ADIT) score. The predicted ADIT scores correspond to potential effects on benthic invertebrate community (BIC) endpoints, based on

[1] The normal range will be updated as part of the three-year reporting cycle of the RAEMP (Minnow 2021b).

relationships between water quality projections (for nitrate, sulphate and cadmium)[2] and invertebrate toxicity endpoints originally developed for the EVWQP (Teck 2014; Golder 2020a). A predicted ADIT score of 3 corresponds to 50% or greater effects to reproduction of the water flea *Ceriodaphnia dubia*, 2 corresponds to 20 to 50% effects, 1 corresponds to 10 to 20% effects, and 0 corresponds to effect levels of 10% or less. Once %EPT is actually measured, the measured results are converted to a measured ADIT score in relation to the habitat adjusted normal range as follows: An ADIT score of 0 corresponds to expected %EPT ≥ the 10th percentile of the habitat-adjusted normal range; an ADIT score of 1 corresponds to expected %EPT between the 10th percentile and the 2.5th percentile of the habitat-adjusted normal range (and is therefore identical in application to the lower limit of normal range); an ADIT score of 2 corresponds to expected %EPT between the 2.5th percentile and half of the 2.5th percentile of the habitat-adjusted normal range; finally, an ADIT score of 3 corresponds to expected %EPT ≤ half of the 2.5th percentile and ≥ 0. Individual replicate habitat-adjusted normal ranges were used at each location for establishing the %EPT limits associated with each ADIT score. In summary, this component of the biological trigger for %EPT asks whether the measured ADIT score – calculated based on measured %EPT relative to normal ranges – is greater than the ADIT score that was predicted based on water quality projections.

Benthic invertebrate community data for %EPT collected in the fall (September) for the 2021 EVO LAEMP were included in the biological trigger analysis.

G2.3 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) for individual replicates. Up-to-date limits of normal ranges[3] are provided in the RAEMP and LAEMPs, where they are recalculated as needed as new data become available (Teck 2019).
- Expectations: The upper limit of the 95% prediction interval based on the water to BIT bioaccumulation model for lotic environments. The model originally developed in the EVWQP (Golder 2014) was updated (Golder 2020b) and the updated data set was used to calculate prediction intervals for individual replicates. Methodology for estimating the upper limit of the 95% prediction for BIT Se (given any projected value

[2] Selenium was not included because selenium effects on BIC endpoints are not expected. Projections were based on the highest maximum monthly mean across all flow scenarios (low, average, and high).

[3] The normal range will be updated as part of the three-year reporting cycle of the RAEMP (Minnow 2021b).

of aqueous selenium) is discussed further in the Biological Trigger Development for the Elk Valley Adaptive Management Plan (Azimuth 2021 [In Preparation]).

Benthic invertebrate tissue selenium data from sampling events completed throughout 2021 for the EVO LAEMP (August [RG_BOCK], September [RG_ERCK, RG_GATE, RG_BOCK, RG_MI3, RG_MICOMP]), and December [RG_ERCK] 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).

G3 RESULTS

G3.1 Percent EPT

Individual replicates for the %EPT endpoint for each of the three mine-exposed areas (RG_ERCK, RG_MI3, and RG_MICOMP) were each assessed against their respective biological triggers for the September sampling period (Appendix Table G.1 and Appendix Figure G.1). The mine-exposed area, RG_ERCK, had a % EPT of 20.1%, which was lower than the biological trigger value of 66.2%. However, only one replicate was measured at this location. RG_ERCK is located just upstream of the confluence of Erickson Creek and Michel Creek and downstream from the saturated rock fille (SRF). The two other mine-exposed areas in Michel Creek, RG_MI3 (which is above the confluence of Erickson and Michel Creek) and RG_MICOMP (which is downstream of the confluences of Erickson, Gate, and Bodie Creeks with Michel Creek) had results above their biological trigger value in all replicates and the lower 2.5th percentile of habitat-adjusted normal range.

G3.2 Benthic Invertebrate Tissue Selenium (BIT Se)

Benthic invertebrate tissue selenium concentrations for each mine-exposed area was assessed against their respective biological trigger for individual replicate samples from each of the three sampling events in 2021 (August, September, and December; Appendix Table G.2 and Appendix Figure G.2). At RG_GATE, benthic invertebrate tissue selenium concentrations for all three replicates in September exceeded the biological trigger value, ranging from 21 to 34 mg/kg. These values were higher than both the upper 95% prediction limit of 15.2 mg/kg (as based on predicted water quality) and the upper 97.5th percentile of normal range, which was 8.7 mg/kg. At RG_BOCK, all replicates had benthic invertebrate tissue selenium concentrations which exceeded the biological trigger values in August (reported concentrations of 41 to 58 mg/kg) and September (reported concentrations of 49 to 92 mg/kg). Benthic invertebrate tissue selenium concentrations, however, did not exceed the biological trigger value at RG_ERCK (the confluence of Erickson Creek and Michel Creek) in either sampling event (September or December), as concentrations of benthic invertebrate tissue selenium ranged from 3.3 to 5.9 mg/kg in 2021. Benthic invertebrate tissue selenium concentrations in Michel Creek, specifically RG_MI3 (3.0 to 5.9 mg/kg) and RG_MICOMP (2.7 to 5.1 mg/kg), were also all below their respective biological trigger value.

G4 SUMMARY

A single replicate from RG_ERCK exceeded the %EPT biological trigger by 42.1%. The %EPT results for these mine-exposed areas was consistent with results classified as 'unexpected' in the most recent RAEMP (Minnow 2020). Additionally, the biological trigger for benthic invertebrate tissue selenium concentrations was exceeded in all replicates from both RG_BOCK and RG_GATE (during the August and September sampling events). The BIT selenium concentration at RG_ERCK in Erickson Creek (in both September and December) and the two areas evaluated in Michel Creek (in September), RG_MI3 and RG_MICOMP, were below the biological trigger threshold.

The results from the biological triggers evaluation are consistent with the findings of the EVO 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. 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. Uncertainties are expected to be reduced through these efforts, and additional monitoring or potential management responses will continue to be assessed through Teck's adaptive management framework.

G5 REFERENCES

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

Golder (Golder Associates). 2014. Benchmark Derivation Report for Selenium. Annex E of the Elk Valley Water Quality Plan. Prepared for Teck Coal Limited. July.

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

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Teck. 2021a. Water Quality Adaptive Management Plan for Teck Coal Operations in the Elk Valley – 2020 Annual Report. Prepared by Teck Coal Limited. July 31, 2021.

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Table G.1: Biological Trigger Analysis for %EPT in EVO LAEMP, September 2021

Exposure	Area	Type	Replicate	Reported Value	ADIT Value[a]	Lower 2.5th Percentile of the Habitat Adjusted Normal Range
Mine-exposed	RG_ERCK	T	1	20.1	66.2	66.2
	RG_MI3	M	1	65.2	62.6	56.2
	RG_MI3	M	2	70.3	64.4	58.3
	RG_MI3	M	3	83.5	58.6	51.8
	RG_MICOMP	M	1	71.9	63.1	56.6
	RG_MICOMP	M	2	72.7	61.5	54.9
	RG_MICOMP	M	3	62.0	62.1	55.5
	RG_MICOMP	M	4	56.9	56.6	49.5
	RG_MICOMP	M	5	77.3	60.2	53.9

Shaded cells signify those individual replicates that were associated with a biological trigger (i.e., lower than both the Aquatic Data Integration Tool (ADIT) value [as based on predicted water quality] and the lower 2.5th percentile of habitat-adjusted normal range).

Notes: M= Mainstem and T = Tributary. %EPT = percent Ephemeroptera, Plecoptera, Trichoptera.

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

Table G.2: Summary of Biotriggers in Benthic Invertebrate Tissue, EVO LAEMP, 2021

Waterbody		Stream Type	Area	Date	Predicted Selenium Water Concentration (mg/L)	Benthic Invertebrate Selenium Tissue		
						Upper 95% Prediction Limit (mg/kg dw)	Upper 97.5th Percentile of Normal Range (mg/kg dw)	Reported Concentration (mg/kg dw)
Michel Creek	Mine-Exposed	T	RG_ERCK (T)	10-Sep-21	155	15.2	8.7	3.3
		T	RG_ERCK (T)	14-Dec-21	155	15.2	8.7	4.6
		T	RG_ERCK (T)	14-Dec-21	155	15.2	8.7	5.2
		T	RG_ERCK (T)	14-Dec-21	155	15.2	8.7	5.9
		T	RG_GATE (T)	16-Sep-21	211	15.5	8.7	34
		T	RG_GATE (T)	16-Sep-21	211	15.5	8.7	21
		T	RG_GATE (T)	16-Sep-21	211	15.5	8.7	24
		T	RG_BOCK (T)	27-Aug-21	351	16.1	8.7	58
		T	RG_BOCK (T)	27-Aug-21	351	16.1	8.7	47
		T	RG_BOCK (T)	27-Aug-21	351	16.1	8.7	41
		T	RG_BOCK (T)	16-Sep-21	351	16.1	8.7	92
		T	RG_BOCK (T)	16-Sep-21	351	16.1	8.7	49
		T	RG_BOCK (T)	16-Sep-21	351	16.1	8.7	69
		M	RG_MI3 (M)	10-Sep-21	2.24	11.2	8.7	4.5
		M	RG_MI3 (M)	10-Sep-21	2.24	11.2	8.7	5.9
		M	RG_MI3 (M)	10-Sep-21	2.24	11.2	8.7	3.0
		M	RG_MICOMP (M)	13-Sep-21	23	13.2	8.7	4.5
		M	RG_MICOMP (M)	13-Sep-21	23	13.2	8.7	5.1
		M	RG_MICOMP (M)	13-Sep-21	23	13.2	8.7	2.7
		M	RG_MICOMP (M)	13-Sep-21	23	13.2	8.7	4.3
		M	RG_MICOMP (M)	13-Sep-21	23	13.2	8.7	3.5

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. mg/kg dw = milligrams per kilogram dry weight.

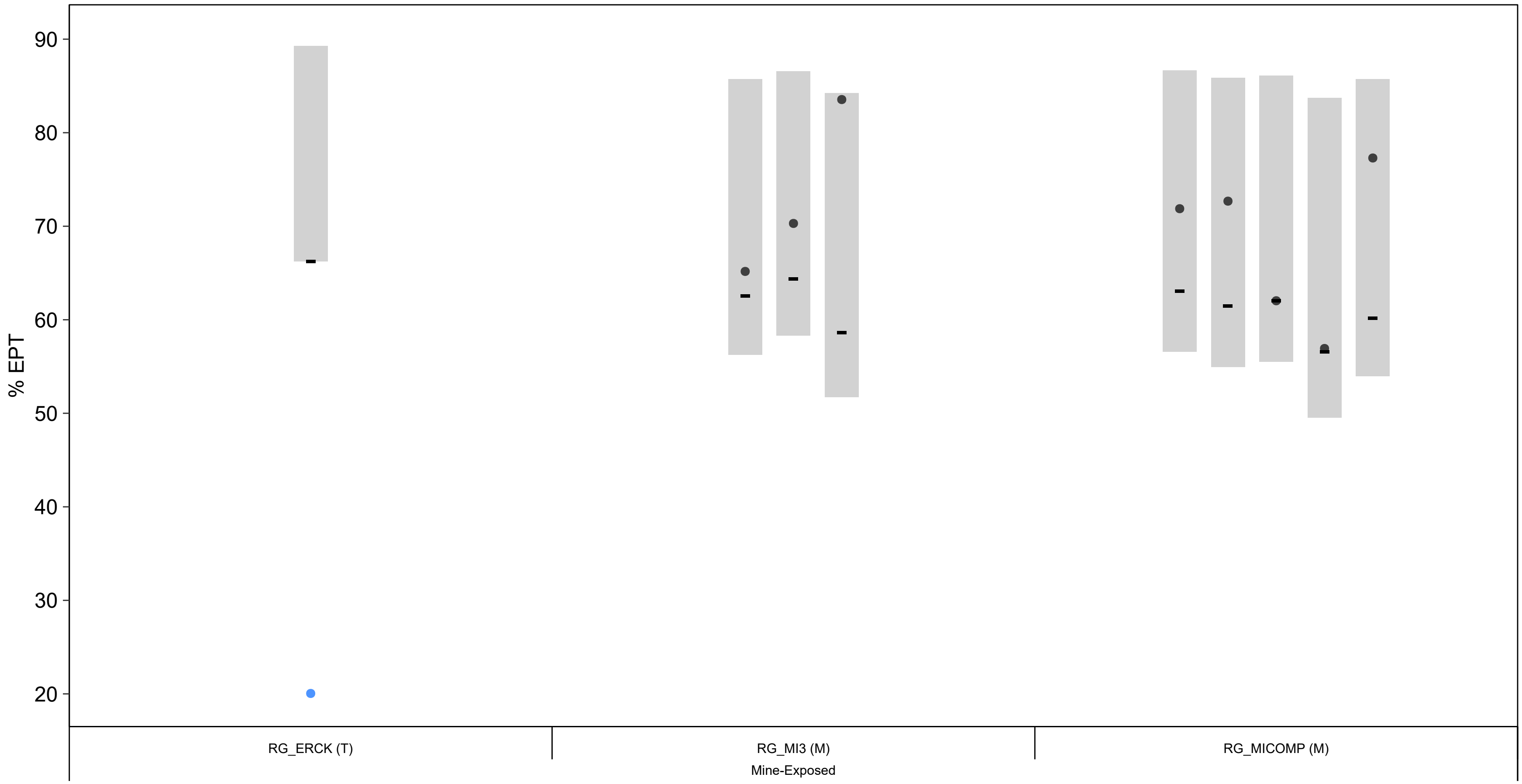

Figure G.1: Percent EPT (%EPT) Compared to Predicted Values, EVO LAEMP, 2021

Notes: Black bars indicate the lower limit of the predicted Aquatic Data Integration Tool (ADIT) score for the location. Blue dots represent values exceeding the trigger (below 2.5th percentile of NR and below lower limit of predicted ADIT score). Gray shading represents the habitat-adjusted normal range for each replicate. Black dots represent values that did not reach the biological trigger (i.e., were higher than the trigger value). T = Tributary, M = Mainstem.

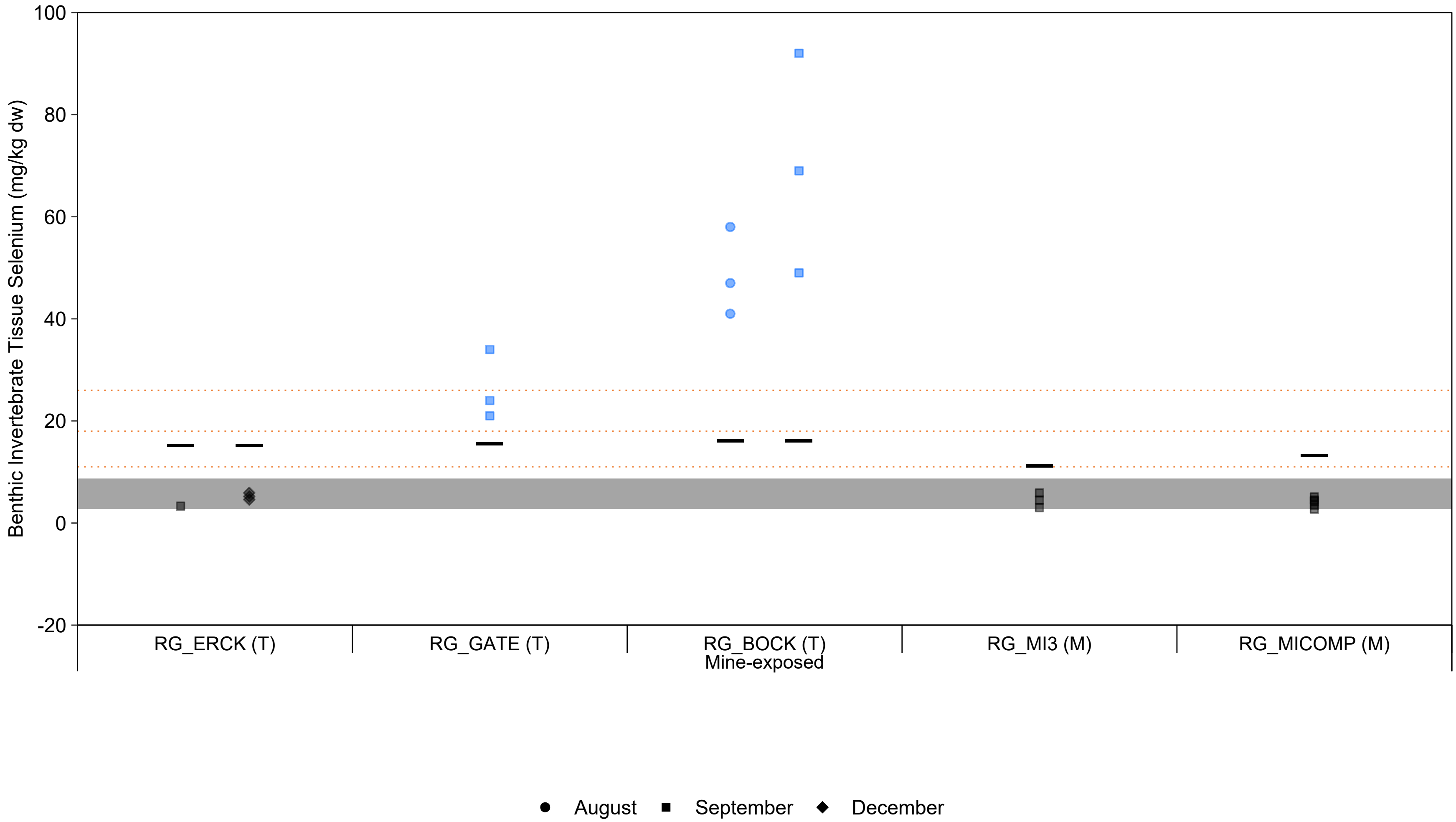

Figure G.2: Selenium Concentrations in Benthic Invertebrate Composite-Taxa Samples Compared to Predicted Values, EVO LAEMP, 2021

Notes: Black bars indicate the upper 95th prediction interval of the bioaccumulation model. Blue dots represent values exceeding the trigger (above the 97.5th percentile of normal range and above upper 95% prediction interval). Dotted lines indicate EVWQP benchmarks (11, 18, and 26 mg/kg respectively) for juvenile fish. Gray shading represents the reference area normal range defined as the 2.5th and 97.5th percentiles of the distribution of reference area data (pooled 1996 to 2019 data) reported in the RAEMP.

APPENDIX H

LABORATORY REPORTS

WATER CHEMISTRY

ALS Laboratory Report CG2104077

(Finalized September 30, 2021)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2104077**	Page	: 1 of 7
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Allie Ferguson	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Avenue Sparwood BC Canada V0B 2G0	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 14-Sep-2021 10:30
PO	: VPO00750546	Date Analysis Commenced	: 15-Sep-2021
C-O-C number	: September EVO LAEMP 2021	Issue Date	: 30-Sep-2021 12:55
Sampler	: JI		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 3		
No. of samples analysed	: 3		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
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General Comments

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

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

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

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

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

Unit	*Description*
-	No Unit
%	percent
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
meq/L	milliequivalents per litre
mg/L	milligrams per litre
mV	millivolts
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	----	----
Client sampling date / time					11-Sep-2021 11:30	11-Sep-2021 15:30	12-Sep-2021 13:00	----	----
					CG2104077-001	CG2104077-002	CG2104077-003	--------	--------
					Result	Result	Result	----	----
Physical Tests									
acidity (as CaCO3)	----	E283	2.0	mg/L	<2.0	<2.0	<2.0	----	----
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	171	169	143	----	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	10.8	13.4	8.0	----	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	----	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	182	182	151	----	----
conductivity	----	E100	2.0	μS/cm	546	646	308	----	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L	274	377	160	----	----
oxidation-reduction potential [ORP]	----	E125	0.10	mV	508	467	468	----	----
pH	----	E108	0.10	pH units	8.38	8.43	8.38	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L	374	454	189	----	----
solids, total suspended [TSS]	----	E160-L	1.0	mg/L	1.2	2.1	<1.0	----	----
turbidity	----	E121	0.10	NTU	0.51	1.17	0.20	----	----
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L	208	206	174	----	----
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L	6.5	8.0	4.8	----	----
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L	<1.0	<1.0	<1.0	----	----
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0268	0.0183	0.0086	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.050	<0.050	----	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L	2.42	3.26	0.79	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L	0.160	0.168	0.163	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.144	0.280	<0.050	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	1.02	2.72	0.0069	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0016	0.0059	<0.0010	----	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	<0.0010	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0051	0.0048	0.0022	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	123	170	16.6	----	----
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	1.78	1.70	1.52	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	----	----
				Client sampling date / time	11-Sep-2021 11:30	11-Sep-2021 15:30	12-Sep-2021 13:00	----	----
					CG2104077-001	CG2104077-002	CG2104077-003	--------	--------
					Result	Result	Result	----	----
Organic / Inorganic Carbon									
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	1.63	1.87	1.43	----	----
Ion Balance									
anion sum	----	EC101	0.10	meq/L	6.35	7.47	3.39	----	----
cation sum	----	EC101	0.10	meq/L	5.69	7.77	3.28	----	----
ion balance (cations/anions ratio)	----	EC101	0.010	%	89.6	104	96.8	----	----
ion balance (cation-anion difference)	----	EC101	0.010	%	5.48	1.97	1.65	----	----
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0052	0.0083	0.0084	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00013	0.00035	<0.00010	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00021	0.00023	0.00015	----	----
barium, total	7440-39-3	E420	0.00010	mg/L	0.121	0.138	0.0699	----	----
beryllium, total	7440-41-7	E420	0.020	µg/L	<0.020	<0.020	<0.020	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
boron, total	7440-42-8	E420	0.010	mg/L	0.015	0.018	<0.010	----	----
cadmium, total	7440-43-9	E420	0.0050	µg/L	0.0257	0.0416	0.0083	----	----
calcium, total	7440-70-2	E420	0.050	mg/L	67.4	87.0	44.2	----	----
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00013	0.00014	0.00019	----	----
cobalt, total	7440-48-4	E420	0.10	µg/L	<0.10	0.14	<0.10	----	----
copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----
iron, total	7439-89-6	E420	0.010	mg/L	0.014	0.024	0.015	----	----
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0135	0.0351	0.0031	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	26.6	42.6	12.0	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L	0.00296	0.00453	0.00171	----	----
mercury, total	7439-97-6	E508-L	0.00050	µg/L	<0.00050	<0.00050	<0.00050	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00188	0.00276	0.000644	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L	0.00251	0.00657	<0.00050	----	----
potassium, total	7440-09-7	E420	0.050	mg/L	1.12	1.83	0.435	----	----
selenium, total	7782-49-2	E420	0.050	µg/L	8.18	33.9	0.621	----	----

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	----	----
				Client sampling date / time	11-Sep-2021 11:30	11-Sep-2021 15:30	12-Sep-2021 13:00	----	----
					CG2104077-001	CG2104077-002	CG2104077-003	--------	--------
					Result	Result	Result	----	----
Total Metals									
silicon, total	7440-21-3	E420	0.10	mg/L	2.27	2.29	2.14	----	----
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
sodium, total	17341-25-2	E420	0.050	mg/L	4.03	4.60	1.49	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L	0.181	0.284	0.111	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L	38.5	71.3	5.29	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	0.000010	<0.000010	----	----
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	<0.00030	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L	0.00164	0.00286	0.000590	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	0.0034	<0.0030	----	----
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0014	<0.0010	<0.0010	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00013	0.00029	<0.00010	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00015	0.00017	0.00011	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.115	0.122	0.0670	----	----
beryllium, dissolved	7440-41-7	E421	0.020	µg/L	<0.020	<0.020	<0.020	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.013	0.016	<0.010	----	----
cadmium, dissolved	7440-43-9	E421	0.0050	µg/L	0.0207	0.0279	<0.0050	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	64.6	81.7	43.8	----	----
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00012	0.00011	0.00019	----	----
cobalt, dissolved	7440-48-4	E421	0.10	µg/L	<0.10	<0.10	<0.10	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	<0.00020	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	<0.010	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0123	0.0292	0.0034	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	27.5	42.0	12.3	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00166	0.00280	0.00106	----	----

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	----	----
				Client sampling date / time	11-Sep-2021 11:30	11-Sep-2021 15:30	12-Sep-2021 13:00	----	----
					CG2104077-001	CG2104077-002	CG2104077-003	--------	--------
					Result	Result	Result	----	----
Dissolved Metals									
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00189	0.00272	0.000630	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00235	0.00540	<0.00050	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	1.04	1.60	0.380	----	----
selenium, dissolved	7782-49-2	E421	0.050	µg/L	8.55	30.5	0.551	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.27	2.34	2.15	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
sodium, dissolved	17341-25-2	E421	0.050	mg/L	4.05	4.60	1.59	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.181	0.264	0.113	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	40.5	67.1	5.42	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	0.000011	<0.000010	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	<0.00030	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00144	0.00226	0.000512	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0012	0.0021	<0.0010	----	----
dissolved mercury filtration location	----	EP509	-	-	Field	Field	Field	----	----
dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: CG2104077	Page	: 1 of 17
Client	: Teck Coal Limited	Laboratory	: Calgary - Environmental
Contact	: Allie Ferguson	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Avenue Sparwood BC Canada V0B 2G0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 14-Sep-2021 10:30
PO	: VPO00750546	Issue Date	: 30-Sep-2021 12:56
C-O-C number	: September EVO LAEMP 2021		
Sampler	: JI		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 3		
No. of samples analysed	: 3		

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

Key

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

CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	E298	12-Sep-2021	24-Sep-2021	----	----		24-Sep-2021	28 days	12 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	E298	11-Sep-2021	24-Sep-2021	----	----		24-Sep-2021	28 days	13 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	E298	11-Sep-2021	24-Sep-2021	----	----		24-Sep-2021	28 days	13 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	E235.Br-L	12-Sep-2021	----	----	----		15-Sep-2021	28 days	3 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	E235.Br-L	11-Sep-2021	----	----	----		15-Sep-2021	28 days	4 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	E235.Br-L	11-Sep-2021	----	----	----		15-Sep-2021	28 days	4 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	E235.Cl-L	12-Sep-2021	----	----	----		15-Sep-2021	28 days	3 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	E235.Cl-L	11-Sep-2021	----	----	----		15-Sep-2021	28 days	4 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	E235.Cl-L	11-Sep-2021	----	----	----		15-Sep-2021	28 days	4 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	E378-U	12-Sep-2021	----	----	----		15-Sep-2021	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	E378-U	11-Sep-2021	----	----	----		15-Sep-2021	3 days	4 days	✖ EHTL
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	E378-U	11-Sep-2021	----	----	----		15-Sep-2021	3 days	4 days	✖ EHTL
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	E235.F	12-Sep-2021	----	----	----		15-Sep-2021	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	E235.F	11-Sep-2021	----	----	----		15-Sep-2021	28 days	4 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	E235.F	11-Sep-2021	----	----	----		15-Sep-2021	28 days	4 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	E235.NO3-L	12-Sep-2021	----	----	----		15-Sep-2021	3 days	3 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	E235.NO3-L	11-Sep-2021	----	----	----		15-Sep-2021	3 days	4 days	× EHTL
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	E235.NO3-L	11-Sep-2021	----	----	----		15-Sep-2021	3 days	4 days	× EHTL
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	E235.NO2-L	12-Sep-2021	----	----	----		15-Sep-2021	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	E235.NO2-L	11-Sep-2021	----	----	----		15-Sep-2021	3 days	4 days	× EHTL
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	E235.NO2-L	11-Sep-2021	----	----	----		15-Sep-2021	3 days	4 days	× EHTL
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	E235.SO4	12-Sep-2021	----	----	----		15-Sep-2021	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	E235.SO4	11-Sep-2021	----	----	----		15-Sep-2021	28 days	4 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	E235.SO4	11-Sep-2021	----	----	----		15-Sep-2021	28 days	4 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	E318	11-Sep-2021	20-Sep-2021	----	----		21-Sep-2021	28 days	10 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	E318	11-Sep-2021	20-Sep-2021	----	----		21-Sep-2021	28 days	10 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	E318	12-Sep-2021	20-Sep-2021	----	----		21-Sep-2021	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	E372-U	12-Sep-2021	17-Sep-2021	----	----		17-Sep-2021	28 days	5 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	E372-U	11-Sep-2021	17-Sep-2021	----	----		17-Sep-2021	28 days	6 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	E372-U	11-Sep-2021	17-Sep-2021	----	----		17-Sep-2021	28 days	6 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid) RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	E421.Cr-L	12-Sep-2021	20-Sep-2021	----	----		20-Sep-2021	180 days	8 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid) RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	E421.Cr-L	11-Sep-2021	20-Sep-2021	----	----		20-Sep-2021	180 days	9 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid) RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	E421.Cr-L	11-Sep-2021	20-Sep-2021	----	----		20-Sep-2021	180 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	E509	12-Sep-2021	20-Sep-2021	----	----		20-Sep-2021	28 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	E509	11-Sep-2021	20-Sep-2021	----	----		20-Sep-2021	28 days	9 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	E509	11-Sep-2021	20-Sep-2021	----	----		20-Sep-2021	28 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	E421	12-Sep-2021	20-Sep-2021	----	----		20-Sep-2021	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	E421	11-Sep-2021	20-Sep-2021	----	----		20-Sep-2021	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	E421	11-Sep-2021	20-Sep-2021	----	----		20-Sep-2021	180 days	9 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	E358-L	12-Sep-2021	21-Sep-2021	----	----		24-Sep-2021	28 days	12 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	E358-L	11-Sep-2021	21-Sep-2021	----	----		24-Sep-2021	28 days	13 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	E358-L	11-Sep-2021	21-Sep-2021	----	----		24-Sep-2021	28 days	13 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	E355-L	12-Sep-2021	21-Sep-2021	----	----		24-Sep-2021	28 days	12 days	✓

Matrix: **Water**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	E355-L	11-Sep-2021	21-Sep-2021	----	----		24-Sep-2021	28 days	13 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	E355-L	11-Sep-2021	21-Sep-2021	----	----		24-Sep-2021	28 days	13 days	✓
Physical Tests : Acidity by Titration										
HDPE RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	E283	11-Sep-2021	----	----	----		21-Sep-2021	14 days	10 days	✓
Physical Tests : Acidity by Titration										
HDPE RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	E283	11-Sep-2021	----	----	----		21-Sep-2021	14 days	10 days	✓
Physical Tests : Acidity by Titration										
HDPE RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	E283	12-Sep-2021	----	----	----		21-Sep-2021	14 days	9 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	E290	12-Sep-2021	----	----	----		22-Sep-2021	14 days	10 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	E290	11-Sep-2021	----	----	----		22-Sep-2021	14 days	11 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	E290	11-Sep-2021	----	----	----		22-Sep-2021	14 days	11 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	E100	12-Sep-2021	----	----	----		22-Sep-2021	28 days	10 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Physical Tests : Conductivity in Water										
HDPE RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	E100	11-Sep-2021	----	----	----		22-Sep-2021	28 days	11 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	E100	11-Sep-2021	----	----	----		22-Sep-2021	28 days	11 days	✓
Physical Tests : ORP by Electrode										
HDPE RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	E125	12-Sep-2021	----	----	----		21-Sep-2021	0.34 hrs	219 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	E125	11-Sep-2021	----	----	----		21-Sep-2021	0.34 hrs	240 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	E125	11-Sep-2021	----	----	----		21-Sep-2021	0.34 hrs	244 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	E108	12-Sep-2021	----	----	----		22-Sep-2021	0.25 hrs	238 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	E108	11-Sep-2021	----	----	----		22-Sep-2021	0.25 hrs	260 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	E108	11-Sep-2021	----	----	----		22-Sep-2021	0.25 hrs	264 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	E162	12-Sep-2021	----	----	----		17-Sep-2021	7 days	5 days	✓

Matrix: **Water**

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

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TDS by Gravimetry										
HDPE RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	E162	11-Sep-2021	----	----	----		17-Sep-2021	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	E162	11-Sep-2021	----	----	----		17-Sep-2021	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	E160-L	12-Sep-2021	----	----	----		16-Sep-2021	7 days	4 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	E160-L	11-Sep-2021	----	----	----		16-Sep-2021	7 days	5 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	E160-L	11-Sep-2021	----	----	----		16-Sep-2021	7 days	5 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	E121	12-Sep-2021	----	----	----		15-Sep-2021	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	E121	11-Sep-2021	----	----	----		15-Sep-2021	3 days	4 days	× EHTL
Physical Tests : Turbidity by Nephelometry										
HDPE RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	E121	11-Sep-2021	----	----	----		15-Sep-2021	3 days	4 days	× EHTL
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	E420.Cr-L	12-Sep-2021	----	----	----		18-Sep-2021	180 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	E420.Cr-L	11-Sep-2021	----	----	----		18-Sep-2021	180 days	7 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	E420.Cr-L	11-Sep-2021	----	----	----		18-Sep-2021	180 days	7 days	✓
Total Metals : Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)										
Pre-cleaned amber glass - total (lab preserved) RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	E508-L	11-Sep-2021	----	----	----		21-Sep-2021	28 days	10 days	✓
Total Metals : Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)										
Pre-cleaned amber glass - total (lab preserved) RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	E508-L	11-Sep-2021	----	----	----		21-Sep-2021	28 days	10 days	✓
Total Metals : Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)										
Pre-cleaned amber glass - total (lab preserved) RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	E508-L	12-Sep-2021	----	----	----		21-Sep-2021	28 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	E420	12-Sep-2021	----	----	----		18-Sep-2021	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	E420	11-Sep-2021	----	----	----		18-Sep-2021	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	E420	11-Sep-2021	----	----	----		18-Sep-2021	180 days	7 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

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

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

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

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Acidity by Titration	E283	298054	1	13	7.6	5.0	✓
Alkalinity Species by Titration	E290	299359	1	19	5.2	5.0	✓
Ammonia by Fluorescence	E298	301690	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	292676	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	292677	1	20	5.0	5.0	✓
Conductivity in Water	E100	299361	1	19	5.2	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	297293	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	297273	2	40	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	297294	2	20	10.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	298734	1	17	5.8	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	292600	1	10	10.0	5.0	✓
Fluoride in Water by IC	E235.F	292674	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	292678	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	292679	1	20	5.0	5.0	✓
ORP by Electrode	E125	297941	1	15	6.6	5.0	✓
pH by Meter	E108	299360	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	292675	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	294151	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	295737	1	20	5.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	296970	1	17	5.8	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	298052	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	295738	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	298742	1	7	14.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	293779	1	18	5.5	5.0	✓
Turbidity by Nephelometry	E121	292635	1	10	10.0	5.0	✓
Laboratory Control Samples (LCS)							
Acidity by Titration	E283	298054	1	13	7.6	5.0	✓
Alkalinity Species by Titration	E290	299359	1	19	5.2	5.0	✓
Ammonia by Fluorescence	E298	301690	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	292676	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	292677	1	20	5.0	5.0	✓
Conductivity in Water	E100	299361	1	19	5.2	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	297293	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	297273	2	40	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	297294	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	298734	1	17	5.8	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	292600	1	10	10.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Fluoride in Water by IC	E235.F	292674	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	292678	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	292679	1	20	5.0	5.0	✓
ORP by Electrode	E125	297941	1	15	6.6	5.0	✓
pH by Meter	E108	299360	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	292675	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	294151	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	295737	1	20	5.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	296970	1	17	5.8	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	298052	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	295738	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	298742	1	7	14.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	293779	1	18	5.5	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	292790	1	17	5.8	5.0	✓
Turbidity by Nephelometry	E121	292635	1	10	10.0	5.0	✓
Method Blanks (MB)							
Acidity by Titration	E283	298054	1	13	7.6	5.0	✓
Alkalinity Species by Titration	E290	299359	1	19	5.2	5.0	✓
Ammonia by Fluorescence	E298	301690	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	292676	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	292677	1	20	5.0	5.0	✓
Conductivity in Water	E100	299361	1	19	5.2	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	297293	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	297273	2	40	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	297294	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	298734	1	17	5.8	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	292600	1	10	10.0	5.0	✓
Fluoride in Water by IC	E235.F	292674	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	292678	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	292679	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	292675	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	294151	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	295737	1	20	5.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	296970	1	17	5.8	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	298052	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	295738	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	298742	1	7	14.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	293779	1	18	5.5	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	292790	1	17	5.8	5.0	✓
Turbidity by Nephelometry	E121	292635	1	10	10.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	301690	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	292676	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	292677	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	297293	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	297273	2	40	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	297294	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	298734	1	17	5.8	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	292600	1	10	10.0	5.0	✓
Fluoride in Water by IC	E235.F	292674	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	292678	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	292679	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	292675	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	295737	1	20	5.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	296970	1	17	5.8	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	298052	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	295738	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	298742	1	7	14.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	293779	1	18	5.5	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Calgary - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Calgary - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Calgary - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
ORP by Electrode	E125 Calgary - Environmental	Water	ASTM D1498 (mod)	Oxidation redution potential is reported as the oxidation-reduction potential of the platinum metal-reference electrode employed, measured in mV. For high accuracy test results, it is recommended that this analysis be conducted in the field.
TSS by Gravimetry (Low Level)	E160-L Calgary - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Calgary - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Acidity by Titration	E283 Calgary - Environmental	Water	APHA 2310 B (mod)	Acidity is determined by potentiometric titration to pH 8.3

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Calgary - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Total Kjeldahl Nitrogen is determined using block digestion followed by flow-injection analysis with fluorescence detection.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Calgary - Environmental	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U Calgary - Environmental	Water	APHA 4500-P E (mod)	Dissolved Orthophosphate is determined colourimetrically on a water sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L Vancouver - Environmental	Water	APHA 3030 B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAFS.
Dissolved Mercury in Water by CVAAS	E509 Vancouver - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as $CaCO_3$), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in $CaCO_3$ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 Calgary - Environmental	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested using block digestion with Copper Sulfate Digestion Reagent.
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Preparation for Dissolved Organic Carbon for Combustion	EP358 Calgary - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO_3.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

QUALITY CONTROL REPORT

Work Order	: **CG2104077**		
Client	: Teck Coal Limited	Laboratory	: Calgary - Environmental
Contact	: Allie Ferguson	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Avenue Sparwood BC Canada V0B 2G0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 14-Sep-2021 10:30
PO	: VPO00750546	Date Analysis Commenced	: 15-Sep-2021
C-O-C number	: September EVO LAEMP 2021	Issue Date	: 30-Sep-2021 12:56
Sampler	: JI		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 3		
No. of samples analysed	: 3		

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
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Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia
Vladka Stamenova	Analyst	Inorganics, Calgary, Alberta

General Comments

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

Key :

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 292635)											
CG2104076-001	Anonymous	turbidity	----	E121	0.10	NTU	<0.10	<0.10	0	Diff <2x LOR	----
Physical Tests (QC Lot: 294151)											
CG2104062-008	Anonymous	solids, total dissolved [TDS]	----	E162	10	mg/L	<10	<10	0	Diff <2x LOR	----
Physical Tests (QC Lot: 297941)											
CG2104065-002	Anonymous	oxidation-reduction potential [ORP]	----	E125	0.10	mV	451	442	1.88%	15%	----
Physical Tests (QC Lot: 298054)											
CG2104076-003	Anonymous	acidity (as CaCO3)	----	E283	2.0	mg/L	<2.0	<2.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 299359)											
CG2104069-018	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	223	237	5.83%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	10.4	8.6	1.8	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	234	245	4.84%	20%	----
Physical Tests (QC Lot: 299360)											
CG2104069-018	Anonymous	pH	----	E108	0.10	pH units	8.38	8.37	0.119%	4%	----
Physical Tests (QC Lot: 299361)											
CG2104069-018	Anonymous	conductivity	----	E100	1.0	µS/cm	2640	2600	1.53%	10%	----
Anions and Nutrients (QC Lot: 292600)											
CG2104077-001	RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 292674)											
CG2104067-001	Anonymous	fluoride	16984-48-8	E235.F	0.020	mg/L	0.173	0.170	0.004	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 292675)											
CG2104067-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	335	335	0.0609%	20%	----
Anions and Nutrients (QC Lot: 292676)											
CG2104067-001	Anonymous	bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 292677)											
CG2104067-001	Anonymous	chloride	16887-00-6	E235.Cl-L	0.10	mg/L	1.63	1.60	1.75%	20%	----
Anions and Nutrients (QC Lot: 292678)											
CG2104067-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	20.9	20.9	0.198%	20%	----
Anions and Nutrients (QC Lot: 292679)											
CG2104067-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0092	0.0104	0.0012	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 293779)											

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Anions and Nutrients (QC Lot: 293779) - continued											
CG2104076-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 296970)											
CG2104048-009	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.292	0.270	0.022	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 301690)											
CG2104066-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0096	0.0097	0.0001	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 298734)											
CG2104064-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	1.45	1.72	0.27	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 298742)											
CG2104077-001	RG_MIDBO_WS_LAEMP_ EVO_2021-09-11_NP	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	1.63	1.53	0.10	Diff <2x LOR	----
Total Metals (QC Lot: 295737)											
CG2104064-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 295738)											
CG2104064-001	Anonymous	aluminum, total	7429-90-5	E420	0.0060	mg/L	<0.0060	<0.0060	0	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00020	mg/L	0.00208	0.00212	1.81%	20%	----
		arsenic, total	7440-38-2	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00020	mg/L	0.0169	0.0176	4.09%	20%	----
		beryllium, total	7440-41-7	E420	0.040	mg/L	<0.040 µg/L	<0.000040	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.020	mg/L	0.102	0.104	0.002	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0100	mg/L	2.77 µg/L	0.00288	3.69%	20%	----
		calcium, total	7440-70-2	E420	0.100	mg/L	589	606	2.89%	20%	----
		cobalt, total	7440-48-4	E420	0.20	mg/L	88.4 µg/L	0.0889	0.519%	20%	----
		copper, total	7440-50-8	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.020	mg/L	0.221	0.226	2.14%	20%	----
		lead, total	7439-92-1	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0020	mg/L	0.941	0.933	0.806%	20%	----
		magnesium, total	7439-95-4	E420	0.0100	mg/L	263	267	1.41%	20%	----
		manganese, total	7439-96-5	E420	0.00020	mg/L	0.719	0.735	2.15%	20%	----
		molybdenum, total	7439-98-7	E420	0.000100	mg/L	0.00425	0.00442	3.73%	20%	----
		nickel, total	7440-02-0	E420	0.00100	mg/L	0.456	0.466	2.26%	20%	----
		potassium, total	7440-09-7	E420	0.100	mg/L	17.4	17.0	2.03%	20%	----
		selenium, total	7782-49-2	E420	0.100	mg/L	89.1 µg/L	0.0908	1.93%	20%	----
		silicon, total	7440-21-3	E420	0.20	mg/L	2.84	2.93	3.30%	20%	----
		silver, total	7440-22-4	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		sodium, total	17341-25-2	E420	0.100	mg/L	16.3	16.4	0.592%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 295738) - continued											
CG2104064-001	Anonymous	strontium, total	7440-24-6	E420	0.00040	mg/L	1.03	1.04	0.806%	20%	----
		sulfur, total	7704-34-9	E420	1.00	mg/L	409	420	2.82%	20%	----
		thallium, total	7440-28-0	E420	0.000020	mg/L	0.000372	0.000371	0.188%	20%	----
		tin, total	7440-31-5	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00060	mg/L	<0.00060	<0.00060	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000020	mg/L	0.0411	0.0430	4.46%	20%	----
		vanadium, total	7440-62-2	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0060	mg/L	0.185	0.189	2.08%	20%	----
Total Metals (QC Lot: 298052)											
CG2104048-008	Anonymous	mercury, total	7439-97-6	E508-L	0.00050	ng/L	<0.00050 µg/L	<0.50	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 297273)											
CG2104048-008	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 297274)											
CG2104077-002	RG_MIDGA_WS_LAEMP_ EVO_2021-09-11_NP	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 297293)											
CG2104064-001	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 297294)											
CG2104064-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
CG2104064-001	Anonymous	antimony, dissolved	7440-36-0	E421	0.00020	mg/L	0.00205	0.00211	3.18%	20%	----
		arsenic, dissolved	7440-38-2	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00020	mg/L	0.0166	0.0169	1.53%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.040	mg/L	<0.040 µg/L	<0.000040	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.020	mg/L	0.096	0.097	0.001	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0100	mg/L	2.69 µg/L	0.00273	1.47%	20%	----
		calcium, dissolved	7440-70-2	E421	0.100	mg/L	580	598	3.06%	20%	----
		cobalt, dissolved	7440-48-4	E421	0.20	mg/L	83.8 µg/L	0.0838	0.0551%	20%	----
		copper, dissolved	7440-50-8	E421	0.00040	mg/L	<0.00040	<0.00040	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.020	mg/L	0.216	0.213	1.21%	20%	----
		lead, dissolved	7439-92-1	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0020	mg/L	0.868	0.884	1.88%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0100	mg/L	273	271	0.672%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00020	mg/L	0.710	0.705	0.742%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000100	mg/L	0.00425	0.00425	0.0486%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00100	mg/L	0.432	0.432	0.225%	20%	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 297294) - continued											
CG2104064-001	Anonymous	potassium, dissolved	7440-09-7	E421	0.100	mg/L	16.8	16.5	1.91%	20%	----
		selenium, dissolved	7782-49-2	E421	0.100	mg/L	92.3 µg/L	0.0899	2.63%	20%	----
		silicon, dissolved	7440-21-3	E421	0.100	mg/L	2.86	2.77	3.19%	20%	----
		silver, dissolved	7440-22-4	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		sodium, dissolved	17341-25-2	E421	0.100	mg/L	16.7	16.7	0.151%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00040	mg/L	1.02	1.05	2.90%	20%	----
		sulfur, dissolved	7704-34-9	E421	1.00	mg/L	445	430	3.51%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000020	mg/L	0.000377	0.000372	1.23%	20%	----
		tin, dissolved	7440-31-5	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00060	mg/L	<0.00060	<0.00060	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000020	mg/L	0.0378	0.0378	0.0967%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0020	mg/L	0.182	0.178	1.88%	20%	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 292635)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 292790)						
solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 294151)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 298054)						
acidity (as CaCO3)	----	E283	2	mg/L	<2.0	----
Physical Tests (QCLot: 299359)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 299361)						
conductivity	----	E100	1	µS/cm	<1.0	----
Anions and Nutrients (QCLot: 292600)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 292674)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 292675)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 292676)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 292677)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 292678)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 292679)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 293779)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 296970)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 301690)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 301690) - continued						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 298734)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 298742)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 295737)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Total Metals (QCLot: 295738)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	17341-25-2	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 295738) - continued						
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Total Metals (QCLot: 298052)						
mercury, total	7439-97-6	E508-L	0.5	ng/L	<0.50	----
Dissolved Metals (QCLot: 297273)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 297274)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 297293)						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	----
Dissolved Metals (QCLot: 297294)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 297294) - continued						
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 292635)									
turbidity	----	E121	0.1	NTU	200 NTU	99.4	85.0	115	----
Physical Tests (QCLot: 292790)									
solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	100	85.0	115	----
Physical Tests (QCLot: 294151)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	100	85.0	115	----
Physical Tests (QCLot: 297941)									
oxidation-reduction potential [ORP]	----	E125	----	mV	220 mV	100	95.4	104	----
Physical Tests (QCLot: 298054)									
acidity (as CaCO3)	----	E283	2	mg/L	50 mg/L	106	85.0	115	----
Physical Tests (QCLot: 299359)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	101	85.0	115	----
Physical Tests (QCLot: 299360)									
pH	----	E108	----	pH units	7 pH units	100	98.6	101	----
Physical Tests (QCLot: 299361)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	99.3	90.0	110	----
Anions and Nutrients (QCLot: 292600)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.02 mg/L	97.1	80.0	120	----
Anions and Nutrients (QCLot: 292674)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 292675)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 292676)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	99.2	85.0	115	----
Anions and Nutrients (QCLot: 292677)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 292678)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 292679)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 293779)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	8.32 mg/L	97.6	80.0	120	----
Anions and Nutrients (QCLot: 296970)									

Sub-Matrix: **Water**

Laboratory Control Sample (LCS) Report

Analyte	CAS Number	Method	LOR	Unit	Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Anions and Nutrients (QCLot: 296970) - continued									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	94.7	75.0	125	----
Anions and Nutrients (QCLot: 301690)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	101	85.0	115	----
Organic / Inorganic Carbon (QCLot: 298734)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	10 mg/L	99.6	80.0	120	----
Organic / Inorganic Carbon (QCLot: 298742)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	10 mg/L	109	80.0	120	----
Total Metals (QCLot: 295737)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	99.4	80.0	120	----
Total Metals (QCLot: 295738)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	99.4	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	101	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	100	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	99.7	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	99.4	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	100	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	95.8	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	96.1	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	99.1	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	91.4	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	99.0	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	97.7	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	97.0	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	99.9	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	99.0	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	98.8	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	104	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	92.9	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	98.8	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	95.8	80.0	120	----
sodium, total	17341-25-2	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	96.6	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	93.5	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 295738) - continued									
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	102	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	97.5	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	105	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	107	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	101	80.0	120	----
Total Metals (QCLot: 298052)									
mercury, total	7439-97-6	E508-L	0.5	ng/L	5 ng/L	94.4	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	99.0	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	118	80.0	120	----
Dissolved Metals (QCLot: 297293)									
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	97.5	80.0	120	----
Dissolved Metals (QCLot: 297294)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	100	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	102	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	99.4	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	99.8	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	95.4	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	100	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	91.3	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	94.8	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	94.5	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	98.9	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	95.6	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	95.6	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	100	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	92.6	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	99.2	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	97.8	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	100	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	95.3	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	98.8	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	99.9	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	91.9	80.0	120	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	50 mg/L	105	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 297294) - continued									
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	103	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	104	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	101	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	94.5	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	93.4	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	98.3	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	99.3	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	95.6	80.0	120	----

Matrix Spike (MS) Report

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

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 292600)										
CG2104077-002	RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0587 mg/L	0.05 mg/L	117	70.0	130	----
Anions and Nutrients (QCLot: 292674)										
CG2104067-002	Anonymous	fluoride	16984-48-8	E235.F	0.902 mg/L	1 mg/L	90.2	75.0	125	----
Anions and Nutrients (QCLot: 292675)										
CG2104067-002	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	ND mg/L	100 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 292676)										
CG2104067-002	Anonymous	bromide	24959-67-9	E235.Br-L	0.470 mg/L	0.5 mg/L	93.9	75.0	125	----
Anions and Nutrients (QCLot: 292677)										
CG2104067-002	Anonymous	chloride	16887-00-6	E235.Cl-L	108 mg/L	100 mg/L	108	75.0	125	----
Anions and Nutrients (QCLot: 292678)										
CG2104067-002	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	ND mg/L	2.5 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 292679)										
CG2104067-002	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.541 mg/L	0.5 mg/L	108	75.0	125	----
Anions and Nutrients (QCLot: 293779)										
CG2104076-002	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0535 mg/L	0.0676 mg/L	79.1	70.0	130	----
Anions and Nutrients (QCLot: 296970)										
CG2104048-011	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.51 mg/L	2.5 mg/L	100	70.0	130	----
Anions and Nutrients (QCLot: 301690)										
CG2104067-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0988 mg/L	0.1 mg/L	98.8	75.0	125	----
Organic / Inorganic Carbon (QCLot: 298734)										
CG2104064-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	24.8 mg/L	23.9 mg/L	104	70.0	130	----
Organic / Inorganic Carbon (QCLot: 298742)										
CG2104077-001	RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	carbon, total organic [TOC]	----	E355-L	23.5 mg/L	23.9 mg/L	98.2	70.0	130	----
Total Metals (QCLot: 295737)										
CG2104077-001	RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	chromium, total	7440-47-3	E420.Cr-L	0.0376 mg/L	0.04 mg/L	94.1	70.0	130	----
Total Metals (QCLot: 295738)										

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*Concentration*	*Target*	*MS*	*Low*	*High*	*Qualifier*
Total Metals (QCLot: 295738) - continued										
CG2104077-001	RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	aluminum, total	7429-90-5	E420	0.189 mg/L	0.2 mg/L	94.3	70.0	130	----
		antimony, total	7440-36-0	E420	0.0194 mg/L	0.02 mg/L	97.0	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0198 mg/L	0.02 mg/L	98.8	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0382 mg/L	0.04 mg/L	95.4	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00946 mg/L	0.01 mg/L	94.6	70.0	130	----
		boron, total	7440-42-8	E420	0.095 mg/L	0.1 mg/L	95.4	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00386 mg/L	0.004 mg/L	96.5	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0189 mg/L	0.02 mg/L	94.7	70.0	130	----
		copper, total	7440-50-8	E420	0.0185 mg/L	0.02 mg/L	92.3	70.0	130	----
		iron, total	7439-89-6	E420	1.78 mg/L	2 mg/L	88.8	70.0	130	----
		lead, total	7439-92-1	E420	0.0187 mg/L	0.02 mg/L	93.5	70.0	130	----
		lithium, total	7439-93-2	E420	0.1000 mg/L	0.1 mg/L	100.0	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.0194 mg/L	0.02 mg/L	97.2	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0195 mg/L	0.02 mg/L	97.4	70.0	130	----
		nickel, total	7440-02-0	E420	0.0376 mg/L	0.04 mg/L	94.0	70.0	130	----
		potassium, total	7440-09-7	E420	3.92 mg/L	4 mg/L	98.1	70.0	130	----
		selenium, total	7782-49-2	E420	0.0374 mg/L	0.04 mg/L	93.6	70.0	130	----
		silicon, total	7440-21-3	E420	8.62 mg/L	10 mg/L	86.2	70.0	130	----
		silver, total	7440-22-4	E420	0.00376 mg/L	0.004 mg/L	94.0	70.0	130	----
		sodium, total	17341-25-2	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		thallium, total	7440-28-0	E420	0.00381 mg/L	0.004 mg/L	95.3	70.0	130	----
		tin, total	7440-31-5	E420	0.0194 mg/L	0.02 mg/L	97.1	70.0	130	----
		titanium, total	7440-32-6	E420	0.0402 mg/L	0.04 mg/L	101	70.0	130	----
		uranium, total	7440-61-1	E420	0.00431 mg/L	0.004 mg/L	108	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0997 mg/L	0.1 mg/L	99.7	70.0	130	----
		zinc, total	7440-66-6	E420	0.395 mg/L	0.4 mg/L	98.7	70.0	130	----
Total Metals (QCLot: 298052)										
CG2104048-009	Anonymous	mercury, total	7439-97-6	E508-L	4.29 ng/L	5 ng/L	85.8	70.0	130	----
Dissolved Metals (QCLot: 297273)										
CG2104058-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000975 mg/L	0.0001 mg/L	97.5	70.0	130	----
Dissolved Metals (QCLot: 297274)										

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 297274) - continued										
CG2104077-003	RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	mercury, dissolved	7439-97-6	E509	0.0000978 mg/L	0.0001 mg/L	97.8	70.0	130	----
Dissolved Metals (QCLot: 297293)										
CG2104067-001	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.0390 mg/L	0.04 mg/L	97.4	70.0	130	----
Dissolved Metals (QCLot: 297294)										
CG2104067-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.198 mg/L	0.2 mg/L	99.1	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0197 mg/L	0.02 mg/L	98.6	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0372 mg/L	0.04 mg/L	93.0	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00882 mg/L	0.01 mg/L	88.2	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.097 mg/L	0.1 mg/L	96.8	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00381 mg/L	0.004 mg/L	95.3	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0182 mg/L	0.02 mg/L	91.2	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0180 mg/L	0.02 mg/L	90.3	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.84 mg/L	2 mg/L	91.8	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0190 mg/L	0.02 mg/L	95.2	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0890 mg/L	0.1 mg/L	89.0	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.0193 mg/L	0.02 mg/L	96.3	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0354 mg/L	0.04 mg/L	88.6	70.0	130	----
		potassium, dissolved	7440-09-7	E421	3.91 mg/L	4 mg/L	97.7	70.0	130	----
		selenium, dissolved	7782-49-2	E421	ND mg/L	0.04 mg/L	ND	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.06 mg/L	10 mg/L	90.6	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00365 mg/L	0.004 mg/L	91.3	70.0	130	----
		sodium, dissolved	17341-25-2	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	ND mg/L	20 mg/L	ND	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00371 mg/L	0.004 mg/L	92.7	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0194 mg/L	0.02 mg/L	96.8	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0390 mg/L	0.04 mg/L	97.4	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00385 mg/L	0.004 mg/L	96.2	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.0995 mg/L	0.1 mg/L	99.5	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.372 mg/L	0.4 mg/L	93.1	70.0	130	----

Teck

COC ID: September EVO LAEMP 2021 | **TURNAROUND TIME:**

PROJECT/CLIENT INFO				LABORATORY			
Facility Name / Job#	REP			Lab Name	ALS Calgary		
Project Manager	Allie Ferguson			Lab Contact	Lyudmyla Shvets		
Email	[illegible]			Email	lyudmyla.shvets@alsglobal.com		
Address	421 Pine Avenue			Address	2559 29 Street NE		
City	Sparwood	Province	BC	City	Calgary	Province	AB
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada
Phone Number	250-425-8202			Phone Number	1 403 407 1794		

Report recipient	Excel	PDF	EDD
[illegible]	x	x	x
teckcoal@equisonline.com			x
[illegible]	x	x	x
[illegible]	x		x
[illegible]	x		x

4077

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.	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
Filtered								N	F	N	N	F	N	F
Preserved									H2SO4	H2SO4		HCL	HNO3	HNO3
RG_MIDBO_WS_LAEMP_EVO_2021-09-11_NP	RG_MIDBO	WS	No	9/11/2021	1130	G	7	X	X	X	X	X	X	X
RG_MIDGA_WS_LAEMP_EVO_2021-09-11_NP	RG_MIDGA	WS	No	9/11/2021	1530	G	7	X	X	X	X	X	X	X
RG_ALUSM_WS_LAEMP_EVO_2021-09-12_NP	RG_ALUSM	WS	No	9/12/2021	1300	G	7	X	X	X	X	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
ALS PO 750546	Jennifer Ings/Minnow	################	[signature]	9/14 10:30

NO OF BOTTLES RETURNED/DESCRIPTION					
Regular (default)	x	Sampler's Name	Jennifer Ings	Mobile #	519-500-3444
Priority (2-3 business days) - 50% surcharge		Sampler's Signature	[signature]	Date/Time	September 13, 2021
Emergency (1 Business Day) - 100% surcharge					
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

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Environmental Division
Calgary
Work Order Reference
CG2104077

Telephone : +1 403 407 1800

WATER CHEMISTRY

ALS Laboratory Report CG2104194

(Finalized October 7, 2021)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2104194**	Page	: 1 of 6
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Allie Ferguson	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Avenue Sparwood BC Canada V0B 2G0	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 17-Sep-2021 10:00
PO	: VPO00750546	Date Analysis Commenced	: 18-Sep-2021
C-O-C number	: September EVO LAEMP 2021	Issue Date	: 07-Oct-2021 17:25
Sampler	: Jennifer Ings		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 2		
No. of samples analysed	: 2		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Erin Sanchez		Inorganics, Calgary, Alberta
Hannah Phung	Lab Assistant	Inorganics, Calgary, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Monica Ko	Lab Assistant	Metals, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Parker Sgarbossa	Laboratory Analyst	Inorganics, Calgary, Alberta
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia

General Comments

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

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

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

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

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

Unit	*Description*
-	No Unit
%	percent
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
meq/L	milliequivalents per litre
mg/L	milligrams per litre
mV	millivolts
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
DLB	*Detection Limit Raised. Analyte detected at comparable level in Method Blank.*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
TKNI	*TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.*

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	----	----	----
				Client sampling date / time	15-Sep-2021 09:09	15-Sep-2021 15:30	----	----	----
					CG2104194-001	CG2104194-002	--------	--------	--------
					Result	Result	----	----	----
Physical Tests									
acidity (as CaCO3)	----	E283	2.0	mg/L	11.7	7.5	----	----	----
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	408	431	----	----	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	----	----	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	----	----	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	408	431	----	----	----
conductivity	----	E100	2.0	µS/cm	1920	1940	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L	1180	1140	----	----	----
oxidation-reduction potential [ORP]	----	E125	0.10	mV	472	467	----	----	----
pH	----	E108	0.10	pH units	8.18	8.25	----	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L	1540	1580	----	----	----
solids, total suspended [TSS]	----	E160-L	1.0	mg/L	<1.0	<1.0	----	----	----
turbidity	----	E121	0.10	NTU	0.19	0.17	----	----	----
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L	498	526	----	----	----
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L	<1.0	<1.0	----	----	----
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L	<1.0	<1.0	----	----	----
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0229	<0.0050	----	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.250 [DLDS]	<0.250 [DLDS]	----	----	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L	6.20	6.15	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L	0.129	0.118	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.349 [TKNI]	<0.050 [TKNI]	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	15.9	16.0	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0050 [DLDS]	<0.0050 [DLDS]	----	----	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0165	0.0209	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0147	0.0216 [DLM]	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	772	774	----	----	----
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	1.93	2.19	----	----	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	----	----	----
				Client sampling date / time	15-Sep-2021 09:09	15-Sep-2021 15:30	----	----	----
					CG2104194-001	CG2104194-002	--------	--------	--------
					Result	Result	----	----	----
Organic / Inorganic Carbon									
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	2.08	2.18	----	----	----
Ion Balance									
anion sum	----	EC101	0.10	meq/L	25.5	26.0	----	----	----
cation sum	----	EC101	0.10	meq/L	23.9	22.9	----	----	----
ion balance (cations/anions ratio)	----	EC101	0.010	%	93.7	88.1	----	----	----
ion balance (cation-anion difference)	----	EC101	0.010	%	3.24	6.34	----	----	----
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	<0.0030	<0.0030	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00020	0.00022	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L	<0.00040 DLB	<0.00040 DLB	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L	0.0638	0.0677	----	----	----
beryllium, total	7440-41-7	E420	0.020	µg/L	<0.020	<0.020	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L	0.012	0.013	----	----	----
cadmium, total	7440-43-9	E420	0.0050	µg/L	0.0950	0.0969	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L	255	268	----	----	----
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00022	0.00019	----	----	----
cobalt, total	7440-48-4	E420	0.10	µg/L	<0.10	<0.10	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0250	0.0257	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	159	159	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L	0.00017	<0.00010	----	----	----
mercury, total	7439-97-6	E508-L	0.00050	µg/L	<0.00050	<0.00050	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00116	0.00157	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L	0.00074	0.00072	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L	2.54	2.60	----	----	----
selenium, total	7782-49-2	E420	0.050	µg/L	156	155	----	----	----

Analytical Results

Sub-Matrix: Water

(Matrix: Water)

				Client sample ID	RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	----	----	----
				Client sampling date / time	15-Sep-2021 09:09	15-Sep-2021 15:30	----	----	----
Analyte	CAS Number	Method	LOR	Unit	CG2104194-001	CG2104194-002	--------	--------	--------
					Result	Result	----	----	----
Total Metals									
silicon, total	7440-21-3	E420	0.10	mg/L	3.93	3.91	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	----	----	----
sodium, total	17341-25-2	E420	0.050	mg/L	3.36	3.39	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L	0.224	0.234	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L	274	266	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L	0.00825	0.00890	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	----	----	----
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0010	<0.0010	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00019	0.00018	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00024	0.00021	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0642	0.0607	----	----	----
beryllium, dissolved	7440-41-7	E421	0.020	µg/L	<0.020	<0.020	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.012	0.011	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0050	µg/L	0.0855	0.0834	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	240	231	----	----	----
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00020	0.00018	----	----	----
cobalt, dissolved	7440-48-4	E421	0.10	µg/L	<0.10	<0.10	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0242	0.0227	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	142	136	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00012	<0.00010	----	----	----

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	----	----	----
				Client sampling date / time	15-Sep-2021 09:09	15-Sep-2021 15:30	----	----	----
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	**CG2104194-001**	**CG2104194-002**	--------	--------	--------
					Result	Result	----	----	----
Dissolved Metals									
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00103	0.00112	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00089	0.00081	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	2.61	2.53	----	----	----
selenium, dissolved	7782-49-2	E421	0.050	µg/L	164	156	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	3.61	3.44	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	----	----	----
sodium, dissolved	17341-25-2	E421	0.050	mg/L	3.40	3.33	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.236	0.226	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	258	238	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00937	0.00870	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0022	0.0022	----	----	----
dissolved mercury filtration location	----	EP509	-	-	Field	Field	----	----	----
dissolved metals filtration location	----	EP421	-	-	Field	Field	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2104194**	Page	: 1 of 16
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Allie Ferguson	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Avenue Sparwood BC Canada V0B 2G0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 17-Sep-2021 10:00
PO	: VPO00750546	Issue Date	: 07-Oct-2021 17:26
C-O-C number	: September EVO LAEMP 2021		
Sampler	: Jennifer Ings		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 2		
No. of samples analysed	: 2		

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

Key

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Method Blank (MB) Values								
Total Metals	QC-MRG2-298903001	----	arsenic, total	7440-38-2	E420	0.00010 mg/L MB-LOR	0.0001 mg/L	Blank result exceeds permitted value

Result Qualifiers

Qualifier	Description
MB-LOR	*Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.*

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Anions and Nutrients	CG2104194-001	RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	Kjeldahl nitrogen, total [TKN]	----	E318	0.299 % TKND	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).

Result Qualifiers

Qualifier	Description
TKND	*TKN duplication was poor due to interference from high nitrate, which causes negative bias on TKN.*

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	E298	15-Sep-2021	29-Sep-2021	----	----		29-Sep-2021	28 days	14 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	E298	15-Sep-2021	29-Sep-2021	----	----		29-Sep-2021	28 days	14 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	E235.Br-L	15-Sep-2021	----	----	----		18-Sep-2021	28 days	3 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	E235.Br-L	15-Sep-2021	----	----	----		18-Sep-2021	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	E235.Cl-L	15-Sep-2021	----	----	----		18-Sep-2021	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	E235.Cl-L	15-Sep-2021	----	----	----		18-Sep-2021	28 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	E378-U	15-Sep-2021	----	----	----		18-Sep-2021	3 days	3 days	✓

Matrix: **Water**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	E378-U	15-Sep-2021	----	----	----		18-Sep-2021	3 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	E235.F	15-Sep-2021	----	----	----		18-Sep-2021	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	E235.F	15-Sep-2021	----	----	----		18-Sep-2021	28 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	E235.NO3-L	15-Sep-2021	----	----	----		18-Sep-2021	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	E235.NO3-L	15-Sep-2021	----	----	----		18-Sep-2021	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	E235.NO2-L	15-Sep-2021	----	----	----		18-Sep-2021	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	E235.NO2-L	15-Sep-2021	----	----	----		18-Sep-2021	3 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	E235.SO4	15-Sep-2021	----	----	----		18-Sep-2021	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	E235.SO4	15-Sep-2021	----	----	----		18-Sep-2021	28 days	3 days	✓

Matrix: **Water**

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

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	E318	15-Sep-2021	24-Sep-2021	----	----		26-Sep-2021	28 days	11 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	E318	15-Sep-2021	24-Sep-2021	----	----		26-Sep-2021	28 days	11 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	E372-U	15-Sep-2021	22-Sep-2021	----	----		22-Sep-2021	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	E372-U	15-Sep-2021	22-Sep-2021	----	----		22-Sep-2021	28 days	7 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid) RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	E421.Cr-L	15-Sep-2021	23-Sep-2021	----	----		23-Sep-2021	180 days	8 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid) RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	E421.Cr-L	15-Sep-2021	23-Sep-2021	----	----		23-Sep-2021	180 days	8 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	E509	15-Sep-2021	23-Sep-2021	----	----		23-Sep-2021	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	E509	15-Sep-2021	23-Sep-2021	----	----		23-Sep-2021	28 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	E421	15-Sep-2021	23-Sep-2021	----	----		23-Sep-2021	180 days	8 days	✓

Matrix: **Water**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation Preparation Date	Extraction / Preparation Holding Times Rec	Extraction / Preparation Holding Times Actual	Extraction / Preparation Eval	Analysis Analysis Date	Analysis Holding Times Rec	Analysis Holding Times Actual	Analysis Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	E421	15-Sep-2021	23-Sep-2021	----	----		23-Sep-2021	180 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	E358-L	15-Sep-2021	27-Sep-2021	----	----		29-Sep-2021	28 days	14 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	E358-L	15-Sep-2021	27-Sep-2021	----	----		29-Sep-2021	28 days	14 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	E355-L	15-Sep-2021	27-Sep-2021	----	----		29-Sep-2021	28 days	14 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	E355-L	15-Sep-2021	27-Sep-2021	----	----		29-Sep-2021	28 days	14 days	✓
Physical Tests : Acidity by Titration										
HDPE RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	E283	15-Sep-2021	----	----	----		28-Sep-2021	14 days	13 days	✓
Physical Tests : Acidity by Titration										
HDPE RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	E283	15-Sep-2021	----	----	----		28-Sep-2021	14 days	13 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	E290	15-Sep-2021	----	----	----		28-Sep-2021	14 days	13 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	E290	15-Sep-2021	----	----	----		28-Sep-2021	14 days	13 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Water										
HDPE RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	E100	15-Sep-2021	----	----	----		28-Sep-2021	28 days	13 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	E100	15-Sep-2021	----	----	----		28-Sep-2021	28 days	13 days	✓
Physical Tests : ORP by Electrode										
HDPE RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	E125	15-Sep-2021	----	----	----		25-Sep-2021	0.34 hrs	239 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	E125	15-Sep-2021	----	----	----		25-Sep-2021	0.34 hrs	246 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	E108	15-Sep-2021	----	----	----		28-Sep-2021	0.25 hrs	307 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	E108	15-Sep-2021	----	----	----		28-Sep-2021	0.25 hrs	314 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	E162	15-Sep-2021	----	----	----		22-Sep-2021	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	E162	15-Sep-2021	----	----	----		22-Sep-2021	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE [TSS-WB] RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	E160-L	15-Sep-2021	----	----	----		22-Sep-2021	7 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE [TSS-WB] RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	E160-L	15-Sep-2021	----	----	----		22-Sep-2021	7 days	7 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	E121	15-Sep-2021	----	----	----		18-Sep-2021	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	E121	15-Sep-2021	----	----	----		18-Sep-2021	3 days	3 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	E420.Cr-L	15-Sep-2021	----	----	----		22-Sep-2021	180 days	7 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	E420.Cr-L	15-Sep-2021	----	----	----		22-Sep-2021	180 days	7 days	✓
Total Metals : Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)										
Pre-cleaned amber glass - total (lab preserved) RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	E508-L	15-Sep-2021	----	----	----		24-Sep-2021	28 days	9 days	✓
Total Metals : Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)										
Pre-cleaned amber glass - total (lab preserved) RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	E508-L	15-Sep-2021	----	----	----		24-Sep-2021	28 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	E420	15-Sep-2021	----	----	----		22-Sep-2021	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	E420	15-Sep-2021	----	----	----		22-Sep-2021	180 days	7 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

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

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Acidity by Titration	E283	304859	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	304723	1	15	6.6	5.0	✓
Ammonia by Fluorescence	E298	305707	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	296270	1	16	6.2	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	296271	1	16	6.2	5.0	✓
Conductivity in Water	E100	304722	1	15	6.6	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	300277	1	2	50.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	300043	1	10	10.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	300278	1	2	50.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	303820	1	19	5.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	296209	1	14	7.1	5.0	✓
Fluoride in Water by IC	E235.F	296268	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	296272	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	296273	1	16	6.2	5.0	✓
ORP by Electrode	E125	302476	1	20	5.0	5.0	✓
pH by Meter	E108	304721	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	296269	1	16	6.2	5.0	✓
TDS by Gravimetry	E162	298977	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	298903	1	11	9.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	302102	1	3	33.3	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	301411	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	298904	1	18	5.5	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	303828	1	19	5.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	297810	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	296171	1	2	50.0	5.0	✓
Laboratory Control Samples (LCS)							
Acidity by Titration	E283	304859	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	304723	1	15	6.6	5.0	✓
Ammonia by Fluorescence	E298	305707	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	296270	1	16	6.2	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	296271	1	16	6.2	5.0	✓
Conductivity in Water	E100	304722	1	15	6.6	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	300277	1	2	50.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	300043	1	10	10.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	300278	1	2	50.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	303820	1	19	5.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	296209	1	14	7.1	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Fluoride in Water by IC	E235.F	296268	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	296272	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	296273	1	16	6.2	5.0	✓
ORP by Electrode	E125	302476	1	20	5.0	5.0	✓
pH by Meter	E108	304721	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	296269	1	16	6.2	5.0	✓
TDS by Gravimetry	E162	298977	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	298903	1	11	9.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	302102	1	3	33.3	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	301411	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	298904	1	18	5.5	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	303828	1	19	5.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	297810	1	20	5.0	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	298276	1	13	7.6	5.0	✓
Turbidity by Nephelometry	E121	296171	1	2	50.0	5.0	✓
Method Blanks (MB)							
Acidity by Titration	E283	304859	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	304723	1	15	6.6	5.0	✓
Ammonia by Fluorescence	E298	305707	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	296270	1	16	6.2	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	296271	1	16	6.2	5.0	✓
Conductivity in Water	E100	304722	1	15	6.6	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	300277	1	2	50.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	300043	1	10	10.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	300278	1	2	50.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	303820	1	19	5.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	296209	1	14	7.1	5.0	✓
Fluoride in Water by IC	E235.F	296268	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	296272	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	296273	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	296269	1	16	6.2	5.0	✓
TDS by Gravimetry	E162	298977	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	298903	1	11	9.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	302102	1	3	33.3	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	301411	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	298904	1	18	5.5	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	303828	1	19	5.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	297810	1	20	5.0	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	298276	1	13	7.6	5.0	✓
Turbidity by Nephelometry	E121	296171	1	2	50.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	305707	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	296270	1	16	6.2	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	296271	1	16	6.2	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	300277	1	2	50.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	300043	1	10	10.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	300278	1	2	50.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	303820	1	19	5.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	296209	1	14	7.1	5.0	✓
Fluoride in Water by IC	E235.F	296268	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	296272	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	296273	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	296269	1	16	6.2	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	298903	1	11	9.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	302102	1	3	33.3	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	301411	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	298904	1	18	5.5	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	303828	1	19	5.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	297810	1	20	5.0	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Calgary - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Calgary - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Calgary - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
ORP by Electrode	E125 Calgary - Environmental	Water	ASTM D1498 (mod)	Oxidation redution potential is reported as the oxidation-reduction potential of the platinum metal-reference electrode employed, measured in mV. For high accuracy test results, it is recommended that this analysis be conducted in the field.
TSS by Gravimetry (Low Level)	E160-L Calgary - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Calgary - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Acidity by Titration	E283 Calgary - Environmental	Water	APHA 2310 B (mod)	Acidity is determined by potentiometric titration to pH 8.3

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Calgary - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Total Kjeldahl Nitrogen is determined using block digestion followed by flow-injection analysis with fluorescence detection.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Calgary - Environmental	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U Calgary - Environmental	Water	APHA 4500-P E (mod)	Dissolved Orthophosphate is determined colourimetrically on a water sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L Vancouver - Environmental	Water	APHA 3030 B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAFS.
Dissolved Mercury in Water by CVAAS	E509 Vancouver - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 Calgary - Environmental	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested using block digestion with Copper Sulfate Digestion Reagent.
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Preparation for Dissolved Organic Carbon for Combustion	EP358 Calgary - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **CG2104194**		
Client	: Teck Coal Limited	Laboratory	: Calgary - Environmental
Contact	: Allie Ferguson	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Avenue Sparwood BC Canada V0B 2G0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 17-Sep-2021 10:00
PO	: VPO00750546	Date Analysis Commenced	: 18-Sep-2021
C-O-C number	: September EVO LAEMP 2021	Issue Date	: 07-Oct-2021 17:25
Sampler	: Jennifer Ings		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 2		
No. of samples analysed	: 2		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
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Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia

General Comments

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

Key :

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

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

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percentage Difference

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 296171)											
CG2104194-001	RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	turbidity	----	E121	0.10	NTU	0.19	0.18	0.01	Diff <2x LOR	----
Physical Tests (QC Lot: 298977)											
CG2104186-002	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	248	252	1.80%	20%	----
Physical Tests (QC Lot: 302476)											
CG2104192-001	Anonymous	oxidation-reduction potential [ORP]	----	E125	0.10	mV	465	471	1.28%	15%	----
Physical Tests (QC Lot: 304721)											
CG2104186-002	Anonymous	pH	----	E108	0.10	pH units	8.48	8.53	0.588%	4%	----
Physical Tests (QC Lot: 304722)											
CG2104186-005	Anonymous	conductivity	----	E100	2.0	µS/cm	454	457	0.659%	10%	----
Physical Tests (QC Lot: 304723)											
CG2104186-005	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	136	136	0.0737%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	7.8	7.4	0.4	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	144	143	0.349%	20%	----
Physical Tests (QC Lot: 304859)											
CG2104186-005	Anonymous	acidity (as CaCO3)	----	E283	2.0	mg/L	<2.0	<2.0	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 296209)											
CG2104188-018	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0019	0.0024	0.0005	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 296268)											
CG2104186-007	Anonymous	fluoride	16984-48-8	E235.F	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 296269)											
CG2104186-007	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	<0.30	<0.30	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 296270)											
CG2104186-007	Anonymous	bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 296271)											
CG2104186-007	Anonymous	chloride	16887-00-6	E235.Cl-L	0.10	mg/L	<0.10	<0.10	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 296272)											
CG2104186-007	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	0.0061	0.0011	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 296273)											
CG2104186-007	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 297810)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 297810) - continued											
CG2104189-003	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 302102)											
CG2104194-001	RG_ERCKDT_WS_LAEMP _EVO_2021-09-15_NP	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.349	# <0.050	0.299	Diff <2x LOR	TKND
Anions and Nutrients (QC Lot: 305707)											
CG2104194-001	RG_ERCKDT_WS_LAEMP _EVO_2021-09-15_NP	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0229	0.0237	0.0008	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 303820)											
CG2104186-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	1.23	1.35	0.12	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 303828)											
CG2104186-001	Anonymous	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	1.45	1.30	0.14	Diff <2x LOR	----
Total Metals (QC Lot: 298903)											
CG2104189-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00012	<0.00010	0.00002	Diff <2x LOR	----
Total Metals (QC Lot: 298904)											
CG2104189-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0052	0.0076	0.0024	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00037	0.00038	0.0000006	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0839	0.0832	0.849%	20%	----
		beryllium, total	7440-41-7	E420	0.020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.011	0.011	0.0003	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0050	mg/L	0.0310 µg/L	0.0000299	0.0000011	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	112	111	1.27%	20%	----
		cobalt, total	7440-48-4	E420	0.10	mg/L	0.12 µg/L	0.00012	0.000006	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0482	0.0462	4.32%	20%	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	49.4	47.5	3.74%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00210	0.00201	4.55%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00192	0.00198	2.96%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00628	0.00603	4.00%	20%	----
		potassium, total	7440-09-7	E420	0.050	mg/L	1.85	1.79	3.13%	20%	----
		selenium, total	7782-49-2	E420	0.050	mg/L	54.6 µg/L	0.0526	3.80%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	2.01	1.99	0.889%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Total Metals (QC Lot: 298904) - continued											
CG2104189-001	Anonymous	sodium, total	17341-25-2	E420	0.050	mg/L	1.88	1.81	3.95%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.163	0.164	0.509%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	76.2	76.5	0.364%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	0.000010	<0.000010	0.0000002	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.00302	0.00305	1.02%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0032	<0.0030	0.0002	Diff <2x LOR	----
Total Metals (QC Lot: 301411)											
CG2104186-001	Anonymous	mercury, total	7439-97-6	E508-L	0.00050	ng/L	<0.00050 µg/L	<0.50	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 300043)											
CG2104189-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 300277)											
CG2104194-001	RG_ERCKDT_WS_LAEMP _EVO_2021-09-15_NP	chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00020	0.00020	0.0000009	Diff <2x LOR	----
Dissolved Metals (QC Lot: 300278)											
CG2104194-001	RG_ERCKDT_WS_LAEMP _EVO_2021-09-15_NP	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00019	0.00019	0.000005	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00024	0.00025	0.000009	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0642	0.0647	0.801%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.012	0.012	0.00006	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0050	mg/L	0.0855 µg/L	0.0000857	0.188%	20%	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	240	244	1.78%	20%	----
		cobalt, dissolved	7440-48-4	E421	0.10	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0242	0.0237	1.85%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	142	139	2.50%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00012	0.00011	0.00002	Diff <2x LOR	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00103	0.00110	6.35%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00089	0.00084	0.00005	Diff <2x LOR	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 300278) - continued											
CG2104194-001	RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	potassium, dissolved	7440-09-7	E421	0.050	mg/L	2.61	2.57	1.38%	20%	----
		selenium, dissolved	7782-49-2	E421	0.050	mg/L	164 µg/L	0.165	0.551%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	3.61	3.66	1.35%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	17341-25-2	E421	0.050	mg/L	3.40	3.47	1.90%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.236	0.241	2.24%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	258	257	0.377%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00937	0.00949	1.25%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0022	0.0018	0.0004	Diff <2x LOR	----

Qualifiers

Qualifier	*Description*
TKND	*TKN duplication was poor due to interference from high nitrate, which causes negative bias on TKN.*

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 296171)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 298276)						
solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 298977)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 304722)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 304723)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 304859)						
acidity (as CaCO3)	----	E283	2	mg/L	<2.0	----
Anions and Nutrients (QCLot: 296209)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 296268)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 296269)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 296270)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 296271)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 296272)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 296273)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 297810)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 302102)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 305707)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 305707) - continued						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 303820)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 303828)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 298903)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Total Metals (QCLot: 298904)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	# 0.00010	MB-LOR
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	17341-25-2	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 298904) - continued						
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Total Metals (QCLot: 301411)						
mercury, total	7439-97-6	E508-L	0.5	ng/L	<0.50	----
Dissolved Metals (QCLot: 300043)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 300277)						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	----
Dissolved Metals (QCLot: 300278)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 300278) - continued						
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----

Qualifiers

Qualifier	*Description*
MB-LOR	*Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.*

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 296171)									
turbidity	----	E121	0.1	NTU	200 NTU	99.6	85.0	115	----
Physical Tests (QCLot: 298276)									
solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	93.8	85.0	115	----
Physical Tests (QCLot: 298977)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	99.4	85.0	115	----
Physical Tests (QCLot: 302476)									
oxidation-reduction potential [ORP]	----	E125	----	mV	220 mV	101	95.4	104	----
Physical Tests (QCLot: 304721)									
pH	----	E108	----	pH units	7 pH units	100	98.6	101	----
Physical Tests (QCLot: 304722)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	101	90.0	110	----
Physical Tests (QCLot: 304723)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	99.6	85.0	115	----
Physical Tests (QCLot: 304859)									
acidity (as CaCO3)	----	E283	2	mg/L	50 mg/L	100	85.0	115	----
Anions and Nutrients (QCLot: 296209)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.02 mg/L	98.6	80.0	120	----
Anions and Nutrients (QCLot: 296268)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	106	90.0	110	----
Anions and Nutrients (QCLot: 296269)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 296270)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	107	85.0	115	----
Anions and Nutrients (QCLot: 296271)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 296272)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	105	90.0	110	----
Anions and Nutrients (QCLot: 296273)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	106	90.0	110	----
Anions and Nutrients (QCLot: 297810)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	8.32 mg/L	98.8	80.0	120	----
Anions and Nutrients (QCLot: 302102)									

Sub-Matrix: **Water**

Laboratory Control Sample (LCS) Report

Analyte	CAS Number	Method	LOR	Unit	Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Anions and Nutrients (QCLot: 302102) - continued									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	89.8	75.0	125	----
Anions and Nutrients (QCLot: 305707)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	110	85.0	115	----
Organic / Inorganic Carbon (QCLot: 303820)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	10 mg/L	102	80.0	120	----
Organic / Inorganic Carbon (QCLot: 303828)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	10 mg/L	106	80.0	120	----
Total Metals (QCLot: 298903)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	97.8	80.0	120	----
Total Metals (QCLot: 298904)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	97.9	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	105	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	101	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	101	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	98.5	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	90.8	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	96.4	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	97.7	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	98.6	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	95.1	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	96.0	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	101	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	99.6	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	105	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	99.4	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	100	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	97.3	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	99.3	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	102	80.0	120	----
sodium, total	17341-25-2	E420	0.05	mg/L	50 mg/L	103	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	97.4	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	100	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Total Metals (QCLot: 298904) - continued									
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	97.3	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	99.0	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	95.1	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	96.6	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	99.6	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	96.6	80.0	120	----
Total Metals (QCLot: 301411)									
mercury, total	7439-97-6	E508-L	0.5	ng/L	5 ng/L	97.6	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	92.2	80.0	120	----
Dissolved Metals (QCLot: 300277)									
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	97.8	80.0	120	----
Dissolved Metals (QCLot: 300278)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	102	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	102	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	98.6	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	98.9	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	91.4	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	107	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	88.9	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	98.5	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	92.0	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	99.6	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	98.0	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	98.2	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	103	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	91.6	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	93.0	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	97.5	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	100	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	98.4	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	97.3	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	101	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	94.6	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	96.2	80.0	120	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	98.4	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 300278) - continued									
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	86.1	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	107	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	96.5	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	92.1	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	111	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	99.3	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	98.4	80.0	120	----

Matrix Spike (MS) Report

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

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 296209)										
CG2104188-019	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0557 mg/L	0.05 mg/L	111	70.0	130	----
Anions and Nutrients (QCLot: 296268)										
CG2104186-007	Anonymous	fluoride	16984-48-8	E235.F	1.07 mg/L	1 mg/L	107	75.0	125	----
Anions and Nutrients (QCLot: 296269)										
CG2104186-007	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	104 mg/L	100 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 296270)										
CG2104186-007	Anonymous	bromide	24959-67-9	E235.Br-L	0.544 mg/L	0.5 mg/L	109	75.0	125	----
Anions and Nutrients (QCLot: 296271)										
CG2104186-007	Anonymous	chloride	16887-00-6	E235.Cl-L	105 mg/L	100 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 296272)										
CG2104186-007	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.63 mg/L	2.5 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 296273)										
CG2104186-007	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.538 mg/L	0.5 mg/L	108	75.0	125	----
Anions and Nutrients (QCLot: 297810)										
CG2104189-004	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0520 mg/L	0.0676 mg/L	76.9	70.0	130	----
Anions and Nutrients (QCLot: 302102)										
CG2104194-002	RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	Kjeldahl nitrogen, total [TKN]	----	E318	2.54 mg/L	2.5 mg/L	102	70.0	130	----
Anions and Nutrients (QCLot: 305707)										
CG2104196-003	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.105 mg/L	0.1 mg/L	105	75.0	125	----
Organic / Inorganic Carbon (QCLot: 303820)										
CG2104186-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	28.4 mg/L	23.9 mg/L	119	70.0	130	----
Organic / Inorganic Carbon (QCLot: 303828)										
CG2104186-001	Anonymous	carbon, total organic [TOC]	----	E355-L	27.8 mg/L	23.9 mg/L	116	70.0	130	----
Total Metals (QCLot: 298903)										
CG2104189-002	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.0376 mg/L	0.04 mg/L	94.0	70.0	130	----
Total Metals (QCLot: 298904)										
CG2104189-002	Anonymous	aluminum, total	7429-90-5	E420	0.190 mg/L	0.2 mg/L	95.2	70.0	130	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
					Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 298904) - continued										
CG2104189-002	Anonymous	antimony, total	7440-36-0	E420	0.0212 mg/L	0.02 mg/L	106	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0195 mg/L	0.02 mg/L	97.6	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0371 mg/L	0.04 mg/L	92.7	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00898 mg/L	0.01 mg/L	89.8	70.0	130	----
		boron, total	7440-42-8	E420	0.086 mg/L	0.1 mg/L	86.5	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00389 mg/L	0.004 mg/L	97.3	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0191 mg/L	0.02 mg/L	95.3	70.0	130	----
		copper, total	7440-50-8	E420	0.0184 mg/L	0.02 mg/L	91.8	70.0	130	----
		iron, total	7439-89-6	E420	1.90 mg/L	2 mg/L	95.2	70.0	130	----
		lead, total	7439-92-1	E420	0.0186 mg/L	0.02 mg/L	93.2	70.0	130	----
		lithium, total	7439-93-2	E420	0.0908 mg/L	0.1 mg/L	90.8	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.0186 mg/L	0.02 mg/L	93.2	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0214 mg/L	0.02 mg/L	107	70.0	130	----
		nickel, total	7440-02-0	E420	0.0371 mg/L	0.04 mg/L	92.8	70.0	130	----
		potassium, total	7440-09-7	E420	3.49 mg/L	4 mg/L	87.2	70.0	130	----
		selenium, total	7782-49-2	E420	ND mg/L	0.04 mg/L	ND	70.0	130	----
		silicon, total	7440-21-3	E420	8.78 mg/L	10 mg/L	87.8	70.0	130	----
		silver, total	7440-22-4	E420	0.00401 mg/L	0.004 mg/L	100	70.0	130	----
		sodium, total	17341-25-2	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		thallium, total	7440-28-0	E420	0.00370 mg/L	0.004 mg/L	92.4	70.0	130	----
		tin, total	7440-31-5	E420	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		titanium, total	7440-32-6	E420	0.0388 mg/L	0.04 mg/L	96.9	70.0	130	----
		uranium, total	7440-61-1	E420	ND mg/L	0.004 mg/L	ND	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0986 mg/L	0.1 mg/L	98.6	70.0	130	----
		zinc, total	7440-66-6	E420	0.371 mg/L	0.4 mg/L	92.7	70.0	130	----
Total Metals (QCLot: 301411)										
CG2104186-002	Anonymous	mercury, total	7439-97-6	E508-L	4.83 ng/L	5 ng/L	96.6	70.0	130	----
Dissolved Metals (QCLot: 300043)										
CG2104189-002	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000971 mg/L	0.0001 mg/L	97.1	70.0	130	----
Dissolved Metals (QCLot: 300277)										

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
					Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 300277) - continued										
CG2104194-002	RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	chromium, dissolved	7440-47-3	E421.Cr-L	0.0386 mg/L	0.04 mg/L	96.5	70.0	130	----
Dissolved Metals (QCLot: 300278)										
CG2104194-002	RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	aluminum, dissolved	7429-90-5	E421	0.193 mg/L	0.2 mg/L	96.6	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0201 mg/L	0.02 mg/L	101	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0201 mg/L	0.02 mg/L	101	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0345 mg/L	0.04 mg/L	86.2	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00890 mg/L	0.01 mg/L	89.0	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.088 mg/L	0.1 mg/L	87.7	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00386 mg/L	0.004 mg/L	96.5	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0184 mg/L	0.02 mg/L	92.1	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0183 mg/L	0.02 mg/L	91.5	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.89 mg/L	2 mg/L	94.5	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0187 mg/L	0.02 mg/L	93.7	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0884 mg/L	0.1 mg/L	88.4	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.0186 mg/L	0.02 mg/L	93.3	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0209 mg/L	0.02 mg/L	104	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0362 mg/L	0.04 mg/L	90.5	70.0	130	----
		potassium, dissolved	7440-09-7	E421	3.65 mg/L	4 mg/L	91.2	70.0	130	----
		selenium, dissolved	7782-49-2	E421	ND mg/L	0.04 mg/L	ND	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.15 mg/L	10 mg/L	91.5	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00375 mg/L	0.004 mg/L	93.9	70.0	130	----
		sodium, dissolved	17341-25-2	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	ND mg/L	20 mg/L	ND	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00383 mg/L	0.004 mg/L	95.7	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0195 mg/L	0.02 mg/L	97.7	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0385 mg/L	0.04 mg/L	96.3	70.0	130	----
		uranium, dissolved	7440-61-1	E421	ND mg/L	0.004 mg/L	ND	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.360 mg/L	0.4 mg/L	90.1	70.0	130	----

Page 1 of 1

Teck

COC ID: September EVO LAEMP 2021 | TURNAROUND TIME:

PROJECT/CLIENT INFO

Facility Name / Job#	REP
Project Manager	Allie Ferguson
Email	allie.ferguson@teck.com
Address	421 Pine Avenue
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Phone Number	250-425-8202

LABORATORY

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Postal Code	T1Y 7B5
Country	Canada
Phone Number	1 403 407 1794

	Excel	PDF	EDD

SAMPLE DETAILS / **ANALYSIS REQUESTED**

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	TECKCOAL-ROUTINE-VA (N)	ALS_Package-DOC (F, H2SO4)	ALS_Package-TKN/TOC (N, H2SO4)	HG-T-U-CVAF-VA (N)	HG-D-CVAF-VA (F, HCL)	TECKCOAL-MET-T-VA (N, HNO3)	TECKCOAL-MET-D-VA (F, HNO3)
RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_NP	RG_ERCKDT	WS	No	9/15/2021	909	G	7	X	X	X	X	X	X	X
RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_NP	RG_ERCKUT	WS	No	9/15/2021	1530	G	7	X	X	X	X	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

ALS PC

Environmental Division
Calgary
Work Order Reference
CG2104194

Telephone : +1 403 407 1800

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	
Jennifer Ings/Minnow	################		9/17 1000

NED/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	Jennifer Ings	Mobile #	519-500-3444
Sampler's Signature		Date/Time	September 16, 2021

WATER CHEMISTRY

ALS Laboratory Report CG2104005

(Finalized September 30, 2021)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2104005**	Page	: 1 of 11
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Allie Ferguson	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Avenue Sparwood BC Canada V0B 2G0	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 11-Sep-2021 10:15
PO	: VPO00750546	Date Analysis Commenced	: 12-Sep-2021
C-O-C number	: September EVO LAEMP 2021	Issue Date	: 30-Sep-2021 12:39
Sampler	: Jennifer Ings		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 6		
No. of samples analysed	: 6		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Erin Sanchez		Inorganics, Calgary, Alberta
Hannah Phung	Lab Assistant	Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Jay Jang	Lab Assistant	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Millicent Brentnall	Laboratory Analyst	Metals, Calgary, Alberta
Owen Cheng		Metals, Burnaby, British Columbia
Parker Sgarbossa	Laboratory Analyst	Inorganics, Calgary, Alberta
Ruby Pham	Lab Assistant	Metals, Burnaby, British Columbia
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Shirley Li		Metals, Calgary, Alberta
Vladka Stamenova	Analyst	Inorganics, Calgary, Alberta

General Comments

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

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

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

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

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

Unit	*Description*
-	No Unit
%	percent
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
meq/L	milliequivalents per litre
mg/L	milligrams per litre
mV	millivolts
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
HTD	*Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.*
RRV	*Reported result verified by repeat analysis.*
TKNI	*TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.*

Work Order : CG2104005
Client : Teck Coal Limited
Project : REGIONAL EFFECTS PROGRAM

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	RG_MIDER_WS_LAEMP_EVO_2021-09-09_NP	RG_RIVER_WS_2021-09-09_NP	RG_ERCK_WS_LAEMP_EVO_2021-09-10_NP	RG_FBLANK_WS_2021-09-10_NP	RG_TRIP_WS_2021-09-10_NP
Client sampling date / time					09-Sep-2021 14:35	09-Sep-2021 14:35	10-Sep-2021 11:30	10-Sep-2021 11:30	10-Sep-2021 11:30
					CG2104005-001	CG2104005-002	CG2104005-003	CG2104005-004	CG2104005-005
					Result	Result	Result	Result	Result
Physical Tests									
acidity (as CaCO3)	----	E283	2.0	mg/L	<2.0	<2.0	<2.0	2.0	2.3
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	149	147	385	<1.0	<1.0
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	11.8	12.4	9.8	<1.0	<1.0
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	161	160	394	<1.0	<1.0
conductivity	----	E100	2.0	µS/cm	398	402	1850	<2.0	<2.0
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L	214	210	1220	<0.50	<0.50
oxidation-reduction potential [ORP]	----	E125	0.10	mV	488	449	490	455	472
pH	----	E108	0.10	pH units	8.42	8.42	8.30	4.88	4.96
solids, total dissolved [TDS]	----	E162	10	mg/L	261	251	1490	<10	<10
solids, total suspended [TSS]	----	E160-L	1.0	mg/L	<1.0	<1.0	1.5	<1.0	<1.0
turbidity	----	E121	0.10	NTU	0.35	0.29	0.41	<0.10	<0.10
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L	182	179	469	<1.0	<1.0
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L	7.1	7.4	5.9	<1.0	<1.0
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0311	0.0162	<0.0050	0.0078 [RRV]	<0.0050
bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.050	<0.250 [DLDS]	<0.050	<0.050
chloride	16887-00-6	E235.Cl-L	0.10	mg/L	1.11	1.12	6.19	<0.10	<0.10
fluoride	16984-48-8	E235.F	0.020	mg/L	0.127	0.127	0.116	<0.020	<0.020
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.112	0.092	<0.050 [TKNI]	<0.050	<0.050
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.153	0.131	14.8 [HTD]	<0.0050	<0.0050
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0.0053 [HTD]	<0.0010	<0.0010
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0030	0.0027	0.0016	<0.0010	<0.0010
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0048	0.0058	<0.0020	<0.0020	<0.0020
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	62.4	62.0	768	<0.30	<0.30
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	1.75	1.81	1.77	<0.50	----
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	1.80	1.80	1.76	<0.50	<0.50

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	RG_MIDER_WS_LAEMP_EVO_2021-09-09_NP	RG_RIVER_WS_2021-09-09_NP	RG_ERCK_WS_LAEMP_EVO_2021-09-10_NP	RG_FBLANK_WS_2021-09-10_NP	RG_TRIP_WS_2021-09-10_NP
Client sampling date / time					09-Sep-2021 14:35	09-Sep-2021 14:35	10-Sep-2021 11:30	10-Sep-2021 11:30	10-Sep-2021 11:30
					CG2104005-001	CG2104005-002	CG2104005-003	CG2104005-004	CG2104005-005
					Result	Result	Result	Result	Result
Ion Balance									
anion sum	----	EC101	0.10	meq/L	4.56	4.54	25.1	<0.10	<0.10
cation sum	----	EC101	0.10	meq/L	4.47	4.40	24.7	<0.10	<0.10
ion balance (cations/anions ratio)	----	EC101	0.010	%	98.0	96.9	98.4	100 RRV	100
ion balance (cation-anion difference)	----	EC101	0.010	%	0.997	1.56	0.803	<0.010	<0.010
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0055	0.0075	<0.0030	<0.0030	<0.0030
antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0.00024	<0.00010	<0.00010
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00019	0.00018	0.00027	<0.00010	<0.00010
barium, total	7440-39-3	E420	0.00010	mg/L	0.113	0.114	0.0228	<0.00010	<0.00010
beryllium, total	7440-41-7	E420	0.020	µg/L	<0.020	<0.020	<0.020	<0.020	<0.020
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, total	7440-42-8	E420	0.010	mg/L	0.011	0.011	0.017	<0.010	<0.010
cadmium, total	7440-43-9	E420	0.0050	µg/L	0.0227	0.0192	0.0078	<0.0050	<0.0050
calcium, total	7440-70-2	E420	0.050	mg/L	53.7	55.0	233	<0.050	<0.050
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00012	0.00012	0.00014	<0.00010	<0.00010
cobalt, total	7440-48-4	E420	0.10	µg/L	<0.10	<0.10	1.22	<0.10	<0.10
copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0066	0.0067	0.0281	<0.0010	<0.0010
magnesium, total	7439-95-4	E420	0.0050	mg/L	16.3	16.6	143	<0.0050	<0.0050
manganese, total	7439-96-5	E420	0.00010	mg/L	0.00141	0.00144	0.0101	<0.00010	<0.00010
mercury, total	7439-97-6	E508-L	0.00050	µg/L	0.00053	0.00053	<0.00050	<0.00050	<0.00050
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000858	0.000877	0.00351	<0.000050	<0.000050
nickel, total	7440-02-0	E420	0.00050	mg/L	0.00070	0.00071	0.0247	<0.00050	<0.00050
potassium, total	7440-09-7	E420	0.050	mg/L	0.680	0.684	2.91	<0.050	<0.050
selenium, total	7782-49-2	E420	0.050	µg/L	2.03	1.90	144	<0.050	<0.050
silicon, total	7440-21-3	E420	0.10	mg/L	2.15	2.25	3.61	<0.10	<0.10
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, total	17341-25-2	E420	0.050	mg/L	3.58	3.59	3.53	<0.050	<0.050

Analytical Results

Sub-Matrix: Water

(Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	RG_MIDER_WS_LAEMP_EVO_2021-09-09_NP	RG_RIVER_WS_2021-09-09_NP	RG_ERCK_WS_LAEMP_EVO_2021-09-10_NP	RG_FBLANK_WS_2021-09-10_NP	RG_TRIP_WS_2021-09-10_NP
				Client sampling date / time	09-Sep-2021 14:35	09-Sep-2021 14:35	10-Sep-2021 11:30	10-Sep-2021 11:30	10-Sep-2021 11:30
					CG2104005-001	CG2104005-002	CG2104005-003	CG2104005-004	CG2104005-005
					Result	Result	Result	Result	Result
Total Metals									
strontium, total	7440-24-6	E420	0.00020	mg/L	0.159	0.164	0.261	<0.00020	<0.00020
sulfur, total	7704-34-9	E420	0.50	mg/L	21.0	21.6	269	<0.50	<0.50
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0.000030	<0.000010	<0.000010
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000841	0.000863	0.00958	<0.000010	<0.000010
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0.00022	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00017	0.00017	0.00026	<0.00010	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.108	0.110	0.0213	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.020	µg/L	<0.020	<0.020	<0.020	<0.020	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.010	0.010	0.017	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.0050	µg/L	0.0190	0.0173	0.0101	<0.0050	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	54.9	53.8	229	<0.050	<0.050
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00012	0.00015	0.00016	<0.00010	----
cobalt, dissolved	7440-48-4	E421	0.10	µg/L	<0.10	<0.10	1.21	<0.10	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	0.00022	<0.00020	<0.00020	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0066	0.0065	0.0302	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	18.7	18.5	158	<0.0050	<0.0050
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00094	0.00094	0.0106	<0.00010	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000895	0.000909	0.00339	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00096	0.00093	0.0255	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.701	0.714	2.88	<0.050	<0.050

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	RG_MIDER_WS_LAEMP_EVO_2021-09-09_NP	RG_RIVER_WS_2021-09-09_NP	RG_ERCK_WS_LAEMP_EVO_2021-09-10_NP	RG_FBLANK_WS_2021-09-10_NP	RG_TRIP_WS_2021-09-10_NP
				Client sampling date / time	09-Sep-2021 14:35	09-Sep-2021 14:35	10-Sep-2021 11:30	10-Sep-2021 11:30	10-Sep-2021 11:30
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	CG2104005-001	CG2104005-002	CG2104005-003	CG2104005-004	CG2104005-005
					Result	Result	Result	Result	Result
Dissolved Metals									
selenium, dissolved	7782-49-2	E421	0.050	µg/L	2.10	1.75	158	<0.050	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.23	2.21	3.57	<0.050	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, dissolved	17341-25-2	E421	0.050	mg/L	3.96	3.97	3.84	<0.050	<0.050
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.160	0.163	0.244	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	22.0	20.9	270	<0.50	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0.000032	<0.000010	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000786	0.000785	0.00888	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	0.0010	<0.0010	----
dissolved mercury filtration location	----	EP509	-	-	Field	Field	Field	Field	----
dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	Field	Laboratory

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

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	RG_MI3_LAEMP_EVO_2021-09-10_NP	----	----	----	----
				Client sampling date / time	10-Sep-2021 16:00	----	----	----	----
					CG2104005-006	--------	--------	--------	--------
					Result	----	----	----	----
Physical Tests									
acidity (as CaCO3)	----	E283	2.0	mg/L	<2.0	----	----	----	----
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	147	----	----	----	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	12.2	----	----	----	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	----	----	----	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	160	----	----	----	----
conductivity	----	E100	2.0	µS/cm	354	----	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L	180	----	----	----	----
oxidation-reduction potential [ORP]	----	E125	0.10	mV	483	----	----	----	----
pH	----	E108	0.10	pH units	8.41	----	----	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L	210	----	----	----	----
solids, total suspended [TSS]	----	E160-L	1.0	mg/L	<1.0	----	----	----	----
turbidity	----	E121	0.10	NTU	0.24	----	----	----	----
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L	180	----	----	----	----
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L	7.3	----	----	----	----
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L	<1.0	----	----	----	----
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	----	----	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	----	----	----	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L	1.17	----	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L	0.152	----	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.056	----	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.0594	----	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	----	----	----	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0024	----	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0029	----	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	40.0	----	----	----	----
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	1.46	----	----	----	----
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	1.54	----	----	----	----
Ion Balance									

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	RG_MI3_LAEMP_EVO_2021-09-10_NP	----	----	----	----
				Client sampling date / time	10-Sep-2021 16:00	----	----	----	----
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	**CG2104005-006**	--------	--------	--------	--------
					Result	----	----	----	----
Ion Balance									
anion sum	----	EC101	0.10	meq/L	4.08	----	----	----	----
cation sum	----	EC101	0.10	meq/L	3.74	----	----	----	----
ion balance (cations/anions ratio)	----	EC101	0.010	%	91.7	----	----	----	----
ion balance (cation-anion difference)	----	EC101	0.010	%	4.35	----	----	----	----
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0036	----	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	----	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00015	----	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L	0.0918	----	----	----	----
beryllium, total	7440-41-7	E420	0.020	µg/L	<0.020	----	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	----	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L	<0.010	----	----	----	----
cadmium, total	7440-43-9	E420	0.0050	µg/L	0.0157	----	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L	49.1	----	----	----	----
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00018	----	----	----	----
cobalt, total	7440-48-4	E420	0.10	µg/L	<0.10	----	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	----	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L	<0.010	----	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	----	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0050	----	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	13.9	----	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L	0.00086	----	----	----	----
mercury, total	7439-97-6	E508-L	0.00050	µg/L	<0.00050	----	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000737	----	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	----	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L	0.537	----	----	----	----
selenium, total	7782-49-2	E420	0.050	µg/L	1.06	----	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L	2.20	----	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	----	----	----	----
sodium, total	17341-25-2	E420	0.050	mg/L	2.56	----	----	----	----

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	RG_MI3_LAEMP_EVO_2021-09-10_NP	----	----	----	----
				Client sampling date / time	10-Sep-2021 16:00	----	----	----	----
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	**CG2104005-006**	--------	--------	--------	--------
					Result	----	----	----	----
Total Metals									
strontium, total	7440-24-6	E420	0.00020	mg/L	0.140	----	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L	13.0	----	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	----	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	----	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	----	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000700	----	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	----	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	----	----	----	----
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0010	----	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	----	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00014	----	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0906	----	----	----	----
beryllium, dissolved	7440-41-7	E421	0.020	µg/L	<0.020	----	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	----	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	----	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0050	µg/L	0.0105	----	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	47.4	----	----	----	----
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00015	----	----	----	----
cobalt, dissolved	7440-48-4	E421	0.10	µg/L	<0.10	----	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	----	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	----	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	----	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0048	----	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	15.1	----	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00056	----	----	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	----	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000726	----	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	----	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.541	----	----	----	----

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	RG_MI3_LAEMP_EVO_2021-09-10_NP	----	----	----	----
				Client sampling date / time	10-Sep-2021 16:00	----	----	----	----
					CG2104005-006	--------	--------	--------	--------
					Result	----	----	----	----
Dissolved Metals									
selenium, dissolved	7782-49-2	E421	0.050	µg/L	1.06	----	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.19	----	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	----	----	----	----
sodium, dissolved	17341-25-2	E421	0.050	mg/L	2.82	----	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.138	----	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	13.1	----	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	----	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	----	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	----	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000621	----	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	----	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0011	----	----	----	----
dissolved mercury filtration location	----	EP509	-	-	Field	----	----	----	----
dissolved metals filtration location	----	EP421	-	-	Field	----	----	----	----

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

WATER CHEMISTRY

ALS Laboratory Report CG2104214

(Finalized October 13, 2021)

CERTIFICATE OF ANALYSIS

Work Order	: **CG2104214**	Page	: 1 of 8
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Allie Ferguson	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Avenue Sparwood BC Canada V0B 2G0	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 18-Sep-2021 09:05
PO	: VPO00750546	Date Analysis Commenced	: 19-Sep-2021
C-O-C number	: SEPTEMBER EVO LAEMP 2021	Issue Date	: 13-Oct-2021 16:07
Sampler	: JI		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Aaron Yu	Laboratory Analyst	Inorganics, Burnaby, British Columbia
Anthony Calero	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Anthony Calero	Team Leader - Inorganics	Metals, Calgary, Alberta
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Dion Chan	Lab Assistant	Metals, Burnaby, British Columbia
Erin Sanchez		Inorganics, Calgary, Alberta
Hannah Phung	Lab Assistant	Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Ilnaz Badbezanchi	Team Leader - Metals preparation	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Millicent Brentnall	Laboratory Analyst	Metals, Calgary, Alberta
Oscar Ruiz	Lab Assistant	Inorganics, Calgary, Alberta
Owen Cheng		Metals, Burnaby, British Columbia
Parker Sgarbossa	Laboratory Analyst	Inorganics, Calgary, Alberta
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta

General Comments

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

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

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

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

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

Unit	*Description*
-	No Unit
%	percent
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
meq/L	milliequivalents per litre
mg/L	milligrams per litre
mV	millivolts
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Sample Comments

Sample	*Client Id*	*Comment*
CG2104214-001	RG_TRIP_WS_2021-09-16_NP	DID NOT RECEIVE D-METALS BOTTLE, D-Hg VIAL, OR DOC BOTTLE

Qualifiers

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

HTD	*Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.*
RRV	*Reported result verified by repeat analysis.*
TKNI	*TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.*

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit					
				Client sample ID	**RG_TRIP_WS_2021-09-16_NP**	**RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP**	**RG_GATE_WS_LAEMP_EVO_2021-09-16_NP**	**RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP**	----
				Client sampling date / time	16-Sep-2021 13:30	16-Sep-2021 09:20	16-Sep-2021 13:30	16-Sep-2021 11:00	----
					CG2104214-001	**CG2104214-002**	**CG2104214-003**	**CG2104214-004**	--------
					Result	Result	Result	Result	----
Physical Tests									
acidity (as CaCO3)	----	E283	2.0	mg/L	2.0	<2.0	<2.0	<2.0	----
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	214	248	232	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	12.6	8.2	7.6	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	<1.0	227	256	240	----
conductivity	----	E100	2.0	µS/cm	<2.0	1950	2010	1920	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L	<0.50	1210	1290	1200	----
oxidation-reduction potential [ORP]	----	E125	0.10	mV	499	450	463	465	----
pH	----	E108	0.10	pH units	4.95	8.37	8.32	8.32	----
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	1830	1860	1710	----
solids, total suspended [TSS]	----	E160-L	1.0	mg/L	<1.0	1.1	2.8	2.4	----
turbidity	----	E121	0.10	NTU	<0.10	0.54	1.59	1.15	----
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L	<1.0	262	302	283	----
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L	<1.0	7.6	4.9	4.6	----
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	----
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0082 RRV	0.0112	0.334 TKNI	0.0968 TKNI	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.250 DLDS	<0.250 DLDS	<0.250 DLDS	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L	<0.10	28.2	15.6	16.0	----
fluoride	16984-48-8	E235.F	0.020	mg/L	<0.020	0.230	0.229	0.242	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	<0.050	<0.050 TKNI	<0.050 TKNI	<0.050 TKNI	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050 HTD	29.8	26.1	27.1	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	0.0154	0.0825	0.0772	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0.0037	<0.0010	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	<0.0020	0.0028	0.0068	0.0029	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	<0.30	898	983	891	----
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	----	1.43	1.69	1.95	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	RG_TRIP_WS_2021-09-16_NP	RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	----
				Client sampling date / time	16-Sep-2021 13:30	16-Sep-2021 09:20	16-Sep-2021 13:30	16-Sep-2021 11:00	----
					CG2104214-001	CG2104214-002	CG2104214-003	CG2104214-004	--------
					Result	Result	Result	Result	----
Organic / Inorganic Carbon									
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	<0.50	1.48	2.39	2.06	----
Ion Balance									
anion sum	----	EC101	0.10	meq/L	<0.10	26.2	27.9	25.8	----
cation sum	----	EC101	0.10	meq/L	<0.10	24.7	26.2	24.6	----
ion balance (cations/anions ratio)	----	EC101	0.010	%	100	94.3	93.9	95.3	----
ion balance (cation-anion difference)	----	EC101	0.010	%	<0.010	2.95	3.14	2.38	----
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	<0.0030	0.0036	0.0250	0.0057	----
antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	0.00176	0.00133	0.00169	----
arsenic, total	7440-38-2	E420	0.00010	mg/L	<0.00010	0.00024	0.00034	0.00028	----
barium, total	7440-39-3	E420	0.00010	mg/L	<0.00010	0.0786	0.240	0.163	----
beryllium, total	7440-41-7	E420	0.020	µg/L	<0.020	<0.020	<0.020	<0.020	----
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	----
boron, total	7440-42-8	E420	0.010	mg/L	<0.010	0.054	0.045	0.048	----
cadmium, total	7440-43-9	E420	0.0050	µg/L	<0.0050	0.0132	0.187	0.104	----
calcium, total	7440-70-2	E420	0.050	mg/L	<0.050	215	225	210	----
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	----
cobalt, total	7440-48-4	E420	0.10	µg/L	<0.10	0.11	0.31	0.25	----
copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----
iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	0.144	0.058	----
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	----
lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	0.178	0.146	0.160	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	<0.0050	157	165	149	----
manganese, total	7439-96-5	E420	0.00010	mg/L	<0.00010	0.00034	0.0159	0.00771	----
mercury, total	7439-97-6	E508-L	0.00050	µg/L	<0.00050	<0.00050	<0.00050	<0.00050	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	<0.000050	0.00902	0.00772	0.00885	----
nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	0.0276	0.0264	0.0297	----
potassium, total	7440-09-7	E420	0.050	mg/L	<0.050	6.76	5.56	6.02	----
selenium, total	7782-49-2	E420	0.050	µg/L	<0.050	228	238	219	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	RG_TRIP_WS_2021-09-16_NP	RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	----
Client sampling date / time					16-Sep-2021 13:30	16-Sep-2021 09:20	16-Sep-2021 13:30	16-Sep-2021 11:00	----
					CG2104214-001	CG2104214-002	CG2104214-003	CG2104214-004	--------
					Result	Result	Result	Result	----
Total Metals									
silicon, total	7440-21-3	E420	0.10	mg/L	<0.10	2.04	2.66	2.40	----
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, total	17341-25-2	E420	0.050	mg/L	<0.050	9.29	7.08	8.27	----
strontium, total	7440-24-6	E420	0.00020	mg/L	<0.00020	1.10	0.940	0.945	----
sulfur, total	7704-34-9	E420	0.50	mg/L	<0.50	307	330	309	----
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	0.000043	0.000038	0.000037	----
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0.00041	<0.00060 DLM	----
uranium, total	7440-61-1	E420	0.000010	mg/L	<0.000010	0.00987	0.00961	0.00951	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0.0128	0.0104	----
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	----	<0.0010	<0.0020 DLA	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	----	0.00171	0.00126	0.00168	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	----	0.00020	0.00024	0.00024	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	----	0.0832	0.256	0.167	----
beryllium, dissolved	7440-41-7	E421	0.020	µg/L	----	<0.020	<0.040 DLA	<0.020	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	----	<0.000050	<0.000100 DLA	<0.000050	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	----	0.048	0.044	0.046	----
cadmium, dissolved	7440-43-9	E421	0.0050	µg/L	----	0.0153	0.148	0.0964	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	<0.050	208	224	208	----
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	----	<0.00010	<0.00020 DLA	<0.00010	----
cobalt, dissolved	7440-48-4	E421	0.10	µg/L	----	0.11	0.29	0.26	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	----	<0.00020	<0.00040 DLA	0.00024	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	----	<0.010	<0.020 DLA	0.018	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	----	<0.000050	<0.000100 DLA	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	----	0.164	0.139	0.156	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	<0.0050	167	177	166	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	----	0.00026	0.0147	0.00824	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

				Client sample ID	RG_TRIP_WS_2021-09-16_NP	RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	----
				Client sampling date / time	16-Sep-2021 13:30	16-Sep-2021 09:20	16-Sep-2021 13:30	16-Sep-2021 11:00	----
Analyte	CAS Number	Method	LOR	Unit	CG2104214-001	CG2104214-002	CG2104214-003	CG2104214-004	--------
					Result	Result	Result	Result	----
Dissolved Metals									
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	----	<0.0000050	<0.0000050	<0.0000050	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	----	0.00877	0.00761	0.00872	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	----	0.0292	0.0279	0.0321	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	<0.050	7.16	5.88	6.68	----
selenium, dissolved	7782-49-2	E421	0.050	µg/L	----	230	230	230	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	----	1.98	2.67	2.37	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	----	<0.000010	<0.000020 DLA	<0.000010	----
sodium, dissolved	17341-25-2	E421	0.050	mg/L	<0.050	9.94	7.33	8.79	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	----	1.10	0.912	0.932	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	----	294	339	309	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	----	0.000042	0.000041	0.000041	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L	----	<0.00010	<0.00020 DLA	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	----	<0.00030	<0.00060 DLA	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	----	0.0103	0.0100	0.0100	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	----	<0.00050	<0.00100 DLA	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	----	0.0024	0.0109	0.0079	----
dissolved mercury filtration location	----	EP509	-	-	----	Field	Field	Field	----
dissolved metals filtration location	----	EP421	-	-	Laboratory	Field	Field	Field	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2104214**	Page	: 1 of 20
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Allie Ferguson	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Avenue Sparwood BC Canada V0B 2G0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 18-Sep-2021 09:05
PO	: VPO00750546	Issue Date	: 13-Oct-2021 16:07
C-O-C number	: SEPTEMBER EVO LAEMP 2021		
Sampler	: JI		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

Key

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

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

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	E298	16-Sep-2021	29-Sep-2021	----	----		29-Sep-2021	28 days	13 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	E298	16-Sep-2021	29-Sep-2021	----	----		29-Sep-2021	28 days	13 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	E298	16-Sep-2021	29-Sep-2021	----	----		29-Sep-2021	28 days	13 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RG_TRIP_WS_2021-09-16_NP	E298	16-Sep-2021	29-Sep-2021	----	----		29-Sep-2021	28 days	13 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	E235.Br-L	16-Sep-2021	----	----	----		19-Sep-2021	28 days	3 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	E235.Br-L	16-Sep-2021	----	----	----		19-Sep-2021	28 days	3 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	E235.Br-L	16-Sep-2021	----	----	----		19-Sep-2021	28 days	3 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
RG_TRIP_WS_2021-09-16_NP	E235.Br-L	16-Sep-2021	----	----	----		19-Sep-2021	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	E235.Cl-L	16-Sep-2021	----	----	----		19-Sep-2021	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	E235.Cl-L	16-Sep-2021	----	----	----		19-Sep-2021	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	E235.Cl-L	16-Sep-2021	----	----	----		19-Sep-2021	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
RG_TRIP_WS_2021-09-16_NP	E235.Cl-L	16-Sep-2021	----	----	----		19-Sep-2021	28 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE										
RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	E378-U	16-Sep-2021	----	----	----		20-Sep-2021	3 days	4 days	× EHT
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE										
RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	E378-U	16-Sep-2021	----	----	----		20-Sep-2021	3 days	4 days	× EHT
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE										
RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	E378-U	16-Sep-2021	----	----	----		20-Sep-2021	3 days	4 days	× EHT
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE										
RG_TRIP_WS_2021-09-16_NP	E378-U	16-Sep-2021	----	----	----		20-Sep-2021	3 days	4 days	× EHT

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	E235.F	16-Sep-2021	----	----	----		19-Sep-2021	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	E235.F	16-Sep-2021	----	----	----		19-Sep-2021	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	E235.F	16-Sep-2021	----	----	----		19-Sep-2021	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_TRIP_WS_2021-09-16_NP	E235.F	16-Sep-2021	----	----	----		19-Sep-2021	28 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	E235.NO3-L	16-Sep-2021	----	----	----		19-Sep-2021	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	E235.NO3-L	16-Sep-2021	----	----	----		19-Sep-2021	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	E235.NO3-L	16-Sep-2021	----	----	----		19-Sep-2021	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RG_TRIP_WS_2021-09-16_NP	E235.NO3-L	16-Sep-2021	----	----	----		21-Sep-2021	3 days	5 days	× EHT
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	E235.NO2-L	16-Sep-2021	----	----	----		19-Sep-2021	3 days	3 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	E235.NO2-L	16-Sep-2021	----	----	----		19-Sep-2021	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	E235.NO2-L	16-Sep-2021	----	----	----		19-Sep-2021	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_TRIP_WS_2021-09-16_NP	E235.NO2-L	16-Sep-2021	----	----	----		19-Sep-2021	3 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	E235.SO4	16-Sep-2021	----	----	----		19-Sep-2021	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	E235.SO4	16-Sep-2021	----	----	----		19-Sep-2021	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	E235.SO4	16-Sep-2021	----	----	----		19-Sep-2021	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_TRIP_WS_2021-09-16_NP	E235.SO4	16-Sep-2021	----	----	----		19-Sep-2021	28 days	3 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	E318	16-Sep-2021	24-Sep-2021	----	----		28-Sep-2021	28 days	12 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	E318	16-Sep-2021	24-Sep-2021	----	----		28-Sep-2021	28 days	12 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	E318	16-Sep-2021	24-Sep-2021	----	----		28-Sep-2021	28 days	12 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) RG_TRIP_WS_2021-09-16_NP	E318	16-Sep-2021	24-Sep-2021	----	----		28-Sep-2021	28 days	12 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	E372-U	16-Sep-2021	23-Sep-2021	----	----		23-Sep-2021	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	E372-U	16-Sep-2021	23-Sep-2021	----	----		23-Sep-2021	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	E372-U	16-Sep-2021	23-Sep-2021	----	----		23-Sep-2021	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) RG_TRIP_WS_2021-09-16_NP	E372-U	16-Sep-2021	23-Sep-2021	----	----		23-Sep-2021	28 days	7 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid) RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	E421.Cr-L	16-Sep-2021	23-Sep-2021	----	----		24-Sep-2021	180 days	7 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid) RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	E421.Cr-L	16-Sep-2021	23-Sep-2021	----	----		24-Sep-2021	180 days	7 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid) RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	E421.Cr-L	16-Sep-2021	23-Sep-2021	----	----		24-Sep-2021	180 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	E509	16-Sep-2021	23-Sep-2021	----	----		23-Sep-2021	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	E509	16-Sep-2021	23-Sep-2021	----	----		23-Sep-2021	28 days	7 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	E509	16-Sep-2021	23-Sep-2021	----	----		23-Sep-2021	28 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_TRIP_WS_2021-09-16_NP	E421	16-Sep-2021	27-Sep-2021	----	----		27-Sep-2021	180 days	11 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	E421	16-Sep-2021	23-Sep-2021	----	----		24-Sep-2021	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	E421	16-Sep-2021	23-Sep-2021	----	----		24-Sep-2021	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	E421	16-Sep-2021	23-Sep-2021	----	----		24-Sep-2021	180 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	E358-L	16-Sep-2021	27-Sep-2021	----	----		30-Sep-2021	28 days	14 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	E358-L	16-Sep-2021	27-Sep-2021	----	----		30-Sep-2021	28 days	14 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	E358-L	16-Sep-2021	27-Sep-2021	----	----		30-Sep-2021	28 days	14 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	E355-L	16-Sep-2021	27-Sep-2021	----	----		30-Sep-2021	28 days	14 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	E355-L	16-Sep-2021	27-Sep-2021	----	----		30-Sep-2021	28 days	14 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	E355-L	16-Sep-2021	27-Sep-2021	----	----		30-Sep-2021	28 days	14 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_TRIP_WS_2021-09-16_NP	E355-L	16-Sep-2021	27-Sep-2021	----	----		30-Sep-2021	28 days	14 days	✓
Physical Tests : Acidity by Titration										
HDPE RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	E283	16-Sep-2021	----	----	----		29-Sep-2021	14 days	13 days	✓
Physical Tests : Acidity by Titration										
HDPE RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	E283	16-Sep-2021	----	----	----		29-Sep-2021	14 days	13 days	✓
Physical Tests : Acidity by Titration										
HDPE RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	E283	16-Sep-2021	----	----	----		29-Sep-2021	14 days	13 days	✓
Physical Tests : Acidity by Titration										
HDPE RG_TRIP_WS_2021-09-16_NP	E283	16-Sep-2021	----	----	----		29-Sep-2021	14 days	13 days	✓

Matrix: **Water**

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

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	E290	16-Sep-2021	----	----	----		28-Sep-2021	14 days	12 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	E290	16-Sep-2021	----	----	----		28-Sep-2021	14 days	12 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	E290	16-Sep-2021	----	----	----		28-Sep-2021	14 days	12 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_TRIP_WS_2021-09-16_NP	E290	16-Sep-2021	----	----	----		28-Sep-2021	14 days	12 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	E100	16-Sep-2021	----	----	----		28-Sep-2021	28 days	12 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	E100	16-Sep-2021	----	----	----		28-Sep-2021	28 days	12 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	E100	16-Sep-2021	----	----	----		28-Sep-2021	28 days	12 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_TRIP_WS_2021-09-16_NP	E100	16-Sep-2021	----	----	----		28-Sep-2021	28 days	12 days	✓
Physical Tests : ORP by Electrode										
HDPE RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	E125	16-Sep-2021	----	----	----		27-Sep-2021	0.25 hrs	264 hrs	✘ EHTR-FM

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : ORP by Electrode										
HDPE RG_TRIP_WS_2021-09-16_NP	E125	16-Sep-2021	----	----	----		27-Sep-2021	0.25 hrs	264 hrs	✗ EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	E125	16-Sep-2021	----	----	----		27-Sep-2021	0.25 hrs	267 hrs	✗ EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	E125	16-Sep-2021	----	----	----		27-Sep-2021	0.25 hrs	268 hrs	✗ EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	E108	16-Sep-2021	----	----	----		28-Sep-2021	0.25 hrs	286 hrs	✗ EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_TRIP_WS_2021-09-16_NP	E108	16-Sep-2021	----	----	----		28-Sep-2021	0.25 hrs	286 hrs	✗ EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	E108	16-Sep-2021	----	----	----		28-Sep-2021	0.25 hrs	289 hrs	✗ EHTR-FM
Physical Tests : pH by Meter										
HDPE RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	E108	16-Sep-2021	----	----	----		28-Sep-2021	0.25 hrs	291 hrs	✗ EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	E162	16-Sep-2021	----	----	----		23-Sep-2021	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	E162	16-Sep-2021	----	----	----		23-Sep-2021	7 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Physical Tests : TDS by Gravimetry										
HDPE RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	E162	16-Sep-2021	----	----	----		23-Sep-2021	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_TRIP_WS_2021-09-16_NP	E162	16-Sep-2021	----	----	----		23-Sep-2021	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE [TSS-WB] RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	E160-L	16-Sep-2021	----	----	----		23-Sep-2021	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE [TSS-WB] RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	E160-L	16-Sep-2021	----	----	----		23-Sep-2021	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE [TSS-WB] RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	E160-L	16-Sep-2021	----	----	----		23-Sep-2021	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE [TSS-WB] RG_TRIP_WS_2021-09-16_NP	E160-L	16-Sep-2021	----	----	----		23-Sep-2021	7 days	7 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	E121	16-Sep-2021	----	----	----		19-Sep-2021	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	E121	16-Sep-2021	----	----	----		19-Sep-2021	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	E121	16-Sep-2021	----	----	----		19-Sep-2021	3 days	3 days	✓

Matrix: **Water**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Turbidity by Nephelometry										
HDPE RG_TRIP_WS_2021-09-16_NP	E121	16-Sep-2021	----	----	----		19-Sep-2021	3 days	3 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	E420.Cr-L	16-Sep-2021	----	----	----		23-Sep-2021	180 days	7 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	E420.Cr-L	16-Sep-2021	----	----	----		23-Sep-2021	180 days	7 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	E420.Cr-L	16-Sep-2021	----	----	----		23-Sep-2021	180 days	7 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_TRIP_WS_2021-09-16_NP	E420.Cr-L	16-Sep-2021	----	----	----		23-Sep-2021	180 days	7 days	✓
Total Metals : Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)										
Pre-cleaned amber glass - total (lab preserved) RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	E508-L	16-Sep-2021	----	----	----		27-Sep-2021	28 days	11 days	✓
Total Metals : Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)										
Pre-cleaned amber glass - total (lab preserved) RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	E508-L	16-Sep-2021	----	----	----		27-Sep-2021	28 days	11 days	✓
Total Metals : Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)										
Pre-cleaned amber glass - total (lab preserved) RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	E508-L	16-Sep-2021	----	----	----		27-Sep-2021	28 days	11 days	✓
Total Metals : Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)										
Pre-cleaned amber glass - total (lab preserved) RG_TRIP_WS_2021-09-16_NP	E508-L	16-Sep-2021	----	----	----		27-Sep-2021	28 days	11 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	E420	16-Sep-2021	----	----	----		23-Sep-2021	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	E420	16-Sep-2021	----	----	----		23-Sep-2021	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	E420	16-Sep-2021	----	----	----		23-Sep-2021	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_TRIP_WS_2021-09-16_NP	E420	16-Sep-2021	----	----	----		23-Sep-2021	180 days	7 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

EHT: Exceeded ALS recommended hold time prior to analysis.

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

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

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Acidity by Titration	E283	306148	1	11	9.0	5.0	✓
Alkalinity Species by Titration	E290	304822	1	11	9.0	5.0	✓
Ammonia by Fluorescence	E298	306152	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	296854	1	16	6.2	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	296855	1	16	6.2	5.0	✓
Conductivity in Water	E100	304820	1	11	9.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	300105	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	300938	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	300106	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	303951	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	297211	2	38	5.2	5.0	✓
Fluoride in Water by IC	E235.F	296858	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	296856	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	296857	1	16	6.2	5.0	✓
ORP by Electrode	E125	303225	1	20	5.0	5.0	✓
pH by Meter	E108	304821	1	11	9.0	5.0	✓
Sulfate in Water by IC	E235.SO4	296853	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	300154	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	300529	1	20	5.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	302188	0	16	0.0	5.0	✗
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	303406	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	300530	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	303958	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	299081	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	296848	1	13	7.6	5.0	✓
Laboratory Control Samples (LCS)							
Acidity by Titration	E283	306148	1	11	9.0	5.0	✓
Alkalinity Species by Titration	E290	304822	1	11	9.0	5.0	✓
Ammonia by Fluorescence	E298	306152	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	296854	1	16	6.2	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	296855	1	16	6.2	5.0	✓
Conductivity in Water	E100	304820	1	11	9.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	300105	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	300938	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	300106	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	303951	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	297211	2	38	5.2	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Fluoride in Water by IC	E235.F	296858	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	296856	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	296857	1	16	6.2	5.0	✓
ORP by Electrode	E125	303225	1	20	5.0	5.0	✓
pH by Meter	E108	304821	1	11	9.0	5.0	✓
Sulfate in Water by IC	E235.SO4	296853	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	300154	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	300529	1	20	5.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	302188	1	16	6.2	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	303406	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	300530	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	303958	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	299081	1	20	5.0	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	300146	2	40	5.0	5.0	✓
Turbidity by Nephelometry	E121	296848	1	13	7.6	5.0	✓
Method Blanks (MB)							
Acidity by Titration	E283	306148	1	11	9.0	5.0	✓
Alkalinity Species by Titration	E290	304822	1	11	9.0	5.0	✓
Ammonia by Fluorescence	E298	306152	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	296854	1	16	6.2	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	296855	1	16	6.2	5.0	✓
Conductivity in Water	E100	304820	1	11	9.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	300105	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	300938	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	300106	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	303951	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	297211	2	38	5.2	5.0	✓
Fluoride in Water by IC	E235.F	296858	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	296856	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	296857	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	296853	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	300154	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	300529	1	20	5.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	302188	1	16	6.2	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	303406	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	300530	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	303958	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	299081	1	20	5.0	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	300146	2	40	5.0	5.0	✓
Turbidity by Nephelometry	E121	296848	1	13	7.6	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	306152	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	296854	1	16	6.2	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	296855	1	16	6.2	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	300105	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	300938	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	300106	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	303951	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	297211	2	38	5.2	5.0	✓
Fluoride in Water by IC	E235.F	296858	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	296856	1	16	6.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	296857	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	296853	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	300529	1	20	5.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	302188	1	16	6.2	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	303406	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	300530	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	303958	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	299081	1	20	5.0	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Calgary - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Calgary - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Calgary - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
ORP by Electrode	E125 Calgary - Environmental	Water	ASTM D1498 (mod)	Oxidation redution potential is reported as the oxidation-reduction potential of the platinum metal-reference electrode employed, measured in mV. For high accuracy test results, it is recommended that this analysis be conducted in the field.
TSS by Gravimetry (Low Level)	E160-L Calgary - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Calgary - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Acidity by Titration	E283 Calgary - Environmental	Water	APHA 2310 B (mod)	Acidity is determined by potentiometric titration to pH 8.3

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Calgary - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Total Kjeldahl Nitrogen is determined using block digestion followed by flow-injection analysis with fluorescence detection.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Calgary - Environmental	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U Calgary - Environmental	Water	APHA 4500-P E (mod)	Dissolved Orthophosphate is determined colourimetrically on a water sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L Vancouver - Environmental	Water	APHA 3030 B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAFS.
Dissolved Mercury in Water by CVAAS	E509 Vancouver - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 Calgary - Environmental	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested using block digestion with Copper Sulfate Digestion Reagent.
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Preparation for Dissolved Organic Carbon for Combustion	EP358 Calgary - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **CG2104214**	Page	:
Client	: Teck Coal Limited	Laboratory	: Calgary - Environmental
Contact	: Allie Ferguson	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Avenue Sparwood BC Canada V0B 2G0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 18-Sep-2021 09:05
PO	: VPO00750546	Date Analysis Commenced	: 19-Sep-2021
C-O-C number	: SEPTEMBER EVO LAEMP 2021	Issue Date	: 13-Oct-2021 16:07
Sampler	: JI		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
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General Comments

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

Key :

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 296848)											
CG2104213-001	Anonymous	turbidity	----	E121	0.10	NTU	<0.10	<0.10	0	Diff <2x LOR	----
Physical Tests (QC Lot: 300154)											
CG2104211-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	616	619	0.486%	20%	----
Physical Tests (QC Lot: 303225)											
CG2104213-001	Anonymous	oxidation-reduction potential [ORP]	----	E125	0.10	mV	506	510	0.945%	15%	----
Physical Tests (QC Lot: 304820)											
CG2104213-007	Anonymous	conductivity	----	E100	2.0	µS/cm	715	716	0.140%	10%	----
Physical Tests (QC Lot: 304821)											
CG2104213-007	Anonymous	pH	----	E108	0.10	pH units	8.37	8.39	0.239%	4%	----
Physical Tests (QC Lot: 304822)											
CG2104213-007	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	162	161	0.619%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	8.8	7.2	1.6	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	171	168	1.53%	20%	----
Physical Tests (QC Lot: 306148)											
CG2104213-007	Anonymous	acidity (as CaCO3)	----	E283	2.0	mg/L	<2.0	<2.0	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 296853)											
CG2104213-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	<0.30	<0.30	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 296854)											
CG2104213-001	Anonymous	bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 296855)											
CG2104213-001	Anonymous	chloride	16887-00-6	E235.Cl-L	0.10	mg/L	<0.10	<0.10	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 296856)											
CG2104213-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	0.0063	0.0013	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 296857)											
CG2104213-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 296858)											
CG2104213-001	Anonymous	fluoride	16984-48-8	E235.F	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 297211)											
CG2104209-001	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 297212)											

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Anions and Nutrients (QC Lot: 297212) - continued											
CG2104214-003	RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0037	0.0035	0.0002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 299081)											
CG2104213-006	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	<0.0020	0.0021	0.0001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 306152)											
CG2104213-005	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0163	0.0179	0.0016	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 303951)											
CG2104213-008	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 303958)											
CG2104213-006	Anonymous	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	1.55	1.18	0.37	Diff <2x LOR	----
Total Metals (QC Lot: 300529)											
CG2104211-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	<0.00010	0.00012	0.00002	Diff <2x LOR	----
Total Metals (QC Lot: 300530)											
CG2104211-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0031	0.0039	0.0008	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00036	0.00035	0.000002	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00013	0.00013	0.000006	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0666	0.0668	0.250%	20%	----
		beryllium, total	7440-41-7	E420	0.020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.019	0.020	0.0009	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0050	mg/L	0.308 µg/L	0.000293	4.79%	20%	----
		calcium, total	7440-70-2	E420	0.050	mg/L	101	103	2.45%	20%	----
		cobalt, total	7440-48-4	E420	0.10	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0566	0.0582	2.70%	20%	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	43.9	43.8	0.260%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00013	0.00013	0.00000010	Diff <2x LOR	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00172	0.00169	1.70%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00904	0.00903	0.0545%	20%	----
		potassium, total	7440-09-7	E420	0.050	mg/L	1.61	1.63	0.920%	20%	----
		selenium, total	7782-49-2	E420	0.050	mg/L	40.7 µg/L	0.0388	4.76%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	2.18	2.09	4.33%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	17341-25-2	E420	0.050	mg/L	8.29	8.15	1.73%	20%	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 300530) - continued											
CG2104211-001	Anonymous	strontium, total	7440-24-6	E420	0.00020	mg/L	0.213	0.212	0.550%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	76.1	73.7	3.27%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	0.000016	0.000014	0.000002	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.00332	0.00338	1.64%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0149	0.0154	0.0005	Diff <2x LOR	----
Total Metals (QC Lot: 303406)											
CG2104208-001	Anonymous	mercury, total	7439-97-6	E508-L	0.00050	ng/L	<0.00050 µg/L	<0.50	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 300105)											
CG2104202-001	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00012	0.00012	0.000006	Diff <2x LOR	----
Dissolved Metals (QC Lot: 300106)											
CG2104202-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0013	0.0011	0.0002	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0152	0.0152	0.550%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0050	mg/L	0.0129 µg/L	0.0000110	0.0000019	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	43.9	44.2	0.799%	20%	----
		cobalt, dissolved	7440-48-4	E421	0.10	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0021	0.0021	0.00002	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	12.4	12.6	1.38%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00102	0.000970	5.22%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.266	0.273	0.007	Diff <2x LOR	----
		selenium, dissolved	7782-49-2	E421	0.050	mg/L	1.32 µg/L	0.00134	1.93%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	1.57	1.56	0.623%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 300106) - continued											
CG2104202-001	Anonymous	sodium, dissolved	17341-25-2	E421	0.050	mg/L	0.478	0.482	0.004	Diff <2x LOR	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.123	0.120	2.51%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	17.8	18.1	1.97%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00149	0.00147	1.75%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0034	0.0038	0.0004	Diff <2x LOR	----
Dissolved Metals (QC Lot: 300938)											
CG2104188-014	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 303332)											
CG2104212-002	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	17341-25-2	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 303332) - continued											
CG2104212-002	Anonymous	strontium, dissolved	7440-24-6	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 296848)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 300146)						
solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 300147)						
solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 300154)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 304820)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 304822)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 306148)						
acidity (as CaCO3)	----	E283	2	mg/L	<2.0	----
Anions and Nutrients (QCLot: 296853)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 296854)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 296855)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 296856)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 296857)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 296858)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 297211)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 297212)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 299081)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 299081) - continued						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 302188)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 306152)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 303951)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 303958)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 300529)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Total Metals (QCLot: 300530)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	17341-25-2	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 300530) - continued						
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Total Metals (QCLot: 303406)						
mercury, total	7439-97-6	E508-L	0.5	ng/L	<0.50	----
Dissolved Metals (QCLot: 300105)						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	----
Dissolved Metals (QCLot: 300106)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 300106) - continued						
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Dissolved Metals (QCLot: 300938)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 303332)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 303332) - continued						
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 296848)									
turbidity	----	E121	0.1	NTU	200 NTU	98.7	85.0	115	----
Physical Tests (QCLot: 300146)									
solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	93.8	85.0	115	----
Physical Tests (QCLot: 300147)									
solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	94.6	85.0	115	----
Physical Tests (QCLot: 300154)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	98.1	85.0	115	----
Physical Tests (QCLot: 303225)									
oxidation-reduction potential [ORP]	----	E125	----	mV	220 mV	101	95.4	104	----
Physical Tests (QCLot: 304820)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	100	90.0	110	----
Physical Tests (QCLot: 304821)									
pH	----	E108	----	pH units	7 pH units	100	98.6	101	----
Physical Tests (QCLot: 304822)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	100.0	85.0	115	----
Physical Tests (QCLot: 306148)									
acidity (as CaCO3)	----	E283	2	mg/L	50 mg/L	101	85.0	115	----
Anions and Nutrients (QCLot: 296853)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	106	90.0	110	----
Anions and Nutrients (QCLot: 296854)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	105	85.0	115	----
Anions and Nutrients (QCLot: 296855)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	106	90.0	110	----
Anions and Nutrients (QCLot: 296856)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	110	90.0	110	----
Anions and Nutrients (QCLot: 296857)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 296858)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	95.1	90.0	110	----
Anions and Nutrients (QCLot: 297211)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.02 mg/L	100	80.0	120	----
Anions and Nutrients (QCLot: 297212)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 297212) - continued									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.02 mg/L	100	80.0	120	----
Anions and Nutrients (QCLot: 299081)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	8.32 mg/L	97.0	80.0	120	----
Anions and Nutrients (QCLot: 302188)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	90.6	75.0	125	----
Anions and Nutrients (QCLot: 306152)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	106	85.0	115	----
Organic / Inorganic Carbon (QCLot: 303951)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	10 mg/L	105	80.0	120	----
Organic / Inorganic Carbon (QCLot: 303958)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	10 mg/L	104	80.0	120	----
Total Metals (QCLot: 300529)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
Total Metals (QCLot: 300530)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	104	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	114	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	101	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	108	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	105	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	103	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	100	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	95.6	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	108	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	99.0	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	107	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	104	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	103	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	100	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	108	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	104	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	106	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	106	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
					Laboratory Control Sample (LCS) Report				
Total Metals (QCLot: 300530) - continued									
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	105	80.0	120	----
sodium, total	17341-25-2	E420	0.05	mg/L	50 mg/L	105	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	105	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	104	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	104	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	97.7	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	99.5	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	107	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	103	80.0	120	----
Total Metals (QCLot: 303406)									
mercury, total	7439-97-6	E508-L	0.5	ng/L	5 ng/L	93.2	80.0	120	----
Dissolved Metals (QCLot: 300105)									
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	99.0	80.0	120	----
Dissolved Metals (QCLot: 300106)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	102	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	103	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	99.0	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	95.5	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	96.4	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	93.2	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	103	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	97.6	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	98.7	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	97.4	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	102	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	95.5	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	95.8	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	104	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	96.7	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	102	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	96.2	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	105	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	106	80.0	120	----

Sub-Matrix: **Water**

Laboratory Control Sample (LCS) Report

Analyte	CAS Number	Method	LOR	Unit	Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Dissolved Metals (QCLot: 300106) - continued									
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	97.2	80.0	120	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	50 mg/L	99.2	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	97.2	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	104	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	97.0	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	101	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	93.8	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	98.4	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	99.1	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	98.0	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	93.1	80.0	120	----
Dissolved Metals (QCLot: 303332)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	92.0	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	103	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	95.2	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	97.1	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	103	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	96.0	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	97.2	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	96.1	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	96.7	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	96.5	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	92.9	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	102	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	96.1	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	103	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	93.4	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	94.0	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	95.7	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	95.2	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	96.9	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	97.2	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	95.6	60.0	140	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	105	80.0	120	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	50 mg/L	99.4	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	95.6	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	95.0	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 303332) - continued									
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	94.8	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	98.6	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	101	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	99.6	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	95.1	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	92.8	80.0	120	----

Matrix Spike (MS) Report

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

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 296853)										
CG2104213-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	91.5 mg/L	100 mg/L	91.5	75.0	125	----
Anions and Nutrients (QCLot: 296854)										
CG2104213-001	Anonymous	bromide	24959-67-9	E235.Br-L	0.486 mg/L	0.5 mg/L	97.2	75.0	125	----
Anions and Nutrients (QCLot: 296855)										
CG2104213-001	Anonymous	chloride	16887-00-6	E235.Cl-L	94.0 mg/L	100 mg/L	94.0	75.0	125	----
Anions and Nutrients (QCLot: 296856)										
CG2104213-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.39 mg/L	2.5 mg/L	95.7	75.0	125	----
Anions and Nutrients (QCLot: 296857)										
CG2104213-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.467 mg/L	0.5 mg/L	93.5	75.0	125	----
Anions and Nutrients (QCLot: 296858)										
CG2104213-001	Anonymous	fluoride	16984-48-8	E235.F	0.854 mg/L	1 mg/L	85.4	75.0	125	----
Anions and Nutrients (QCLot: 297211)										
CG2104210-001	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0582 mg/L	0.05 mg/L	116	70.0	130	----
Anions and Nutrients (QCLot: 297212)										
CG2104214-004	RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0565 mg/L	0.05 mg/L	113	70.0	130	----
Anions and Nutrients (QCLot: 299081)										
CG2104213-007	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0623 mg/L	0.0676 mg/L	92.2	70.0	130	----
Anions and Nutrients (QCLot: 302188)										
CG2104214-002	RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	Kjeldahl nitrogen, total [TKN]	----	E318	2.41 mg/L	2.5 mg/L	96.4	70.0	130	----
Anions and Nutrients (QCLot: 306152)										
CG2104213-008	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.106 mg/L	0.1 mg/L	106	75.0	125	----
Organic / Inorganic Carbon (QCLot: 303951)										
CG2104213-008	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	26.3 mg/L	23.9 mg/L	110	70.0	130	----
Organic / Inorganic Carbon (QCLot: 303958)										
CG2104213-006	Anonymous	carbon, total organic [TOC]	----	E355-L	24.0 mg/L	23.9 mg/L	100	70.0	130	----
Total Metals (QCLot: 300529)										
CG2104212-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.0388 mg/L	0.04 mg/L	96.9	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 300530)										
CG2104212-001	Anonymous	aluminum, total	7429-90-5	E420	0.194 mg/L	0.2 mg/L	96.9	70.0	130	----
		antimony, total	7440-36-0	E420	0.0203 mg/L	0.02 mg/L	101	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0195 mg/L	0.02 mg/L	97.5	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0408 mg/L	0.04 mg/L	102	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00944 mg/L	0.01 mg/L	94.4	70.0	130	----
		boron, total	7440-42-8	E420	0.106 mg/L	0.1 mg/L	106	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00390 mg/L	0.004 mg/L	97.4	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0188 mg/L	0.02 mg/L	93.9	70.0	130	----
		copper, total	7440-50-8	E420	0.0182 mg/L	0.02 mg/L	91.2	70.0	130	----
		iron, total	7439-89-6	E420	1.98 mg/L	2 mg/L	99.0	70.0	130	----
		lead, total	7439-92-1	E420	0.0189 mg/L	0.02 mg/L	94.7	70.0	130	----
		lithium, total	7439-93-2	E420	0.100 mg/L	0.1 mg/L	100	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.0189 mg/L	0.02 mg/L	94.3	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0206 mg/L	0.02 mg/L	103	70.0	130	----
		nickel, total	7440-02-0	E420	0.0368 mg/L	0.04 mg/L	91.9	70.0	130	----
		potassium, total	7440-09-7	E420	3.76 mg/L	4 mg/L	94.0	70.0	130	----
		selenium, total	7782-49-2	E420	ND mg/L	0.04 mg/L	ND	70.0	130	----
		silicon, total	7440-21-3	E420	9.79 mg/L	10 mg/L	97.9	70.0	130	----
		silver, total	7440-22-4	E420	0.00396 mg/L	0.004 mg/L	98.9	70.0	130	----
		sodium, total	17341-25-2	E420	1.95 mg/L	2 mg/L	97.6	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		thallium, total	7440-28-0	E420	0.00372 mg/L	0.004 mg/L	92.9	70.0	130	----
		tin, total	7440-31-5	E420	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		titanium, total	7440-32-6	E420	0.0394 mg/L	0.04 mg/L	98.6	70.0	130	----
		uranium, total	7440-61-1	E420	0.00383 mg/L	0.004 mg/L	95.7	70.0	130	----
		vanadium, total	7440-62-2	E420	0.100 mg/L	0.1 mg/L	100	70.0	130	----
		zinc, total	7440-66-6	E420	0.380 mg/L	0.4 mg/L	95.0	70.0	130	----
Total Metals (QCLot: 303406)										
CG2104209-001	Anonymous	mercury, total	7439-97-6	E508-L	4.51 ng/L	5 ng/L	90.1	70.0	130	----
Dissolved Metals (QCLot: 300105)										
CG2104202-002	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.0392 mg/L	0.04 mg/L	98.0	70.0	130	----
Dissolved Metals (QCLot: 300106)										

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 300106) - continued										
CG2104202-002	Anonymous	aluminum, dissolved	7429-90-5	E421	0.199 mg/L	0.2 mg/L	99.5	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0198 mg/L	0.02 mg/L	99.0	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0196 mg/L	0.02 mg/L	98.0	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0366 mg/L	0.04 mg/L	91.6	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00831 mg/L	0.01 mg/L	83.1	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.093 mg/L	0.1 mg/L	93.3	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00399 mg/L	0.004 mg/L	99.7	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0183 mg/L	0.02 mg/L	91.7	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0178 mg/L	0.02 mg/L	89.2	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.88 mg/L	2 mg/L	94.1	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0177 mg/L	0.02 mg/L	88.7	70.0	130	----
		lithium, dissolved	7439-93-2	E421	ND mg/L	0.1 mg/L	ND	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.0188 mg/L	0.02 mg/L	94.2	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0345 mg/L	0.04 mg/L	86.3	70.0	130	----
		potassium, dissolved	7440-09-7	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		selenium, dissolved	7782-49-2	E421	ND mg/L	0.04 mg/L	ND	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.71 mg/L	10 mg/L	97.1	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00370 mg/L	0.004 mg/L	92.6	70.0	130	----
		sodium, dissolved	17341-25-2	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	ND mg/L	20 mg/L	ND	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00354 mg/L	0.004 mg/L	88.5	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0373 mg/L	0.04 mg/L	93.3	70.0	130	----
		uranium, dissolved	7440-61-1	E421	ND mg/L	0.004 mg/L	ND	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.0996 mg/L	0.1 mg/L	99.6	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.355 mg/L	0.4 mg/L	88.6	70.0	130	----
Dissolved Metals (QCLot: 300938)										
CG2104188-015	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000993 mg/L	0.0001 mg/L	99.3	70.0	130	----
Dissolved Metals (QCLot: 303332)										
CG2104213-001	Anonymous	aluminum, dissolved	7429-90-5	E421	1.74 mg/L	2 mg/L	87.2	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.196 mg/L	0.2 mg/L	98.1	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 303332) - continued										
CG2104213-001	Anonymous	arsenic, dissolved	7440-38-2	E421	0.178 mg/L	0.2 mg/L	89.0	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.186 mg/L	0.2 mg/L	93.2	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.358 mg/L	0.4 mg/L	89.4	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.0937 mg/L	0.1 mg/L	93.7	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.903 mg/L	1 mg/L	90.3	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.0375 mg/L	0.04 mg/L	93.8	70.0	130	----
		calcium, dissolved	7440-70-2	E421	36.8 mg/L	40 mg/L	92.1	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.185 mg/L	0.2 mg/L	92.7	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.185 mg/L	0.2 mg/L	92.6	70.0	130	----
		iron, dissolved	7439-89-6	E421	18.5 mg/L	20 mg/L	92.3	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.189 mg/L	0.2 mg/L	94.7	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.943 mg/L	1 mg/L	94.3	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	8.80 mg/L	10 mg/L	88.0	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.182 mg/L	0.2 mg/L	90.9	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.182 mg/L	0.2 mg/L	90.9	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.372 mg/L	0.4 mg/L	92.9	70.0	130	----
		potassium, dissolved	7440-09-7	E421	38.7 mg/L	40 mg/L	96.8	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.382 mg/L	0.4 mg/L	95.6	70.0	130	----
		silicon, dissolved	7440-21-3	E421	88.9 mg/L	100 mg/L	88.9	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.0400 mg/L	0.04 mg/L	100	70.0	130	----
		sodium, dissolved	17341-25-2	E421	18.9 mg/L	20 mg/L	94.3	70.0	130	----
		strontium, dissolved	7440-24-6	E421	0.188 mg/L	0.2 mg/L	93.8	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	185 mg/L	200 mg/L	92.7	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.0381 mg/L	0.04 mg/L	95.3	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.185 mg/L	0.2 mg/L	92.5	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.380 mg/L	0.4 mg/L	95.1	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.0381 mg/L	0.04 mg/L	95.2	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.911 mg/L	1 mg/L	91.1	70.0	130	----
		zinc, dissolved	7440-66-6	E421	3.68 mg/L	4 mg/L	92.1	70.0	130	----

Teck

COC ID: September EVO LAEMP 2021 **TURNAROUND TIME:**

PROJECT/CLIENT INFO

Facility Name / Job#	REP
Project Manager	Allie Ferguson
Email	[illegible]
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

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.	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
Filtered								N	F	N	N	F	N	F
Preservative									H2SO4	H2SO4		HCL	HNO3	HNO3
RG_TRIP_WS_2021-09-16_NP	RG_TRIP	WS	No	9/16/2021	1330	G	7	X	X	X	X	X	X	X
RG_BOCK_WS_LAEMP_EVO_2021-09-16_NP	RG_BOCK	WS	No	9/16/2021	920	G	7	X	X	X	X	X	X	X
RG_GATE_WS_LAEMP_EVO_2021-09-16_NP	RG_GATE	WS	No	9/16/2021	1330	G	7	X	X	X	X	X	X	X
RG_GATEDP_WS_LAEMP_EVO_2021-09-16_NP	RG_GATEDP	WS	No	9/16/2021	1100	G	7	X	X	X	X	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

ALS PO 750546

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Jennifer Ings/Minnow	################	[signature]	18/09 9:25

NB OF BOTTLES RETURNED/DESCRIPTION

Regular (default)	x
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Jennifer Ings	Mobile #	519-500-3444
Sampler's Signature	[signature]	Date/Time	September 17, 2021

Environmental Division
Calgary
Work Order Reference
CG2104214

Telephone : +1 403 407 1800

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WATER CHEMISTRY

ALS Laboratory Report CG2104114

(Finalized October 13, 2021)

CERTIFICATE OF ANALYSIS

Work Order	: **CG2104114**	Page	: 1 of 7
Amendment	: **2**		
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Allie Ferguson	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Avenue Sparwood BC Canada V0B 2G0	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 15-Sep-2021 08:50
PO	: VPO00750546	Date Analysis Commenced	: 16-Sep-2021
C-O-C number	: ----	Issue Date	: 13-Oct-2021 17:27
Sampler	: ----		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 3		
No. of samples analysed	: 3		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Anthony Calero	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Erin Sanchez		Inorganics, Calgary, Alberta
Hannah Phung	Lab Assistant	Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Parker Sgarbossa	Laboratory Analyst	Inorganics, Calgary, Alberta
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta
Saron Kim	Analyst	Metals, Burnaby, British Columbia
Shaneel Dayal	Analyst	Metals, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia

General Comments

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

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

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

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

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

Unit	*Description*
-	No Unit
%	percent
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
meq/L	milliequivalents per litre
mg/L	milligrams per litre
mV	millivolts
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
DTC	*Dissolved concentration exceeds total. Results were confirmed by re-analysis.*
HTD	*Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.*
RRV	*Reported result verified by repeat analysis.*

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	RG_MICOMP_WS_LAEMP_EVO_2021-09-13_NP	RG_RIVER_WS_2021-09-13_NP	RG_FBLANK_WS_2021-09-13_NP	----	----
				Client sampling date / time	13-Sep-2021 16:00	13-Sep-2021 16:00	13-Sep-2021 16:00	----	----
					CG2104114-001	CG2104114-002	CG2104114-003	--------	--------
					Result	Result	Result	----	----
Physical Tests									
acidity (as CaCO3)	----	E283	2.0	mg/L	<2.0	<2.0	2.2 RRV	----	----
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	160	164	<1.0	----	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	9.0	12.0	<1.0	----	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	----	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	175	176	<1.0	----	----
conductivity	----	E100	2.0	µS/cm	529	536	<2.0	----	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L	271	284	<0.50	----	----
oxidation-reduction potential [ORP]	----	E125	0.10	mV	491	453	442	----	----
pH	----	E108	0.10	pH units	8.51	8.51	5.48	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L	348	337	<10	----	----
solids, total suspended [TSS]	----	E160-L	1.0	mg/L	2.5	1.6	<1.0	----	----
turbidity	----	E121	0.10	NTU	0.18	0.25	<0.10	----	----
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L	196	200	<1.0	----	----
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L	5.4	7.2	<1.0	----	----
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L	<1.0	<1.0	<1.0	----	----
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0172	0.0222	0.244 RRV	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.050	<0.050	----	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L	2.21	2.24	<0.10	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L	0.172	0.175	<0.020	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.156	0.291	<0.050	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.704 HTD	0.703 HTD	<0.0050 HTD	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0038 HTD	0.0048 HTD	<0.0010 HTD	----	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	0.0012	<0.0010	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0044	0.0032	<0.0020	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	116	117	<0.30	----	----
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	0.86	1.20	<0.50	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	RG_MICOMP_WS_LAEMP_EVO_2021-09-13_NP	RG_RIVER_WS_2021-09-13_NP	RG_FBLANK_WS_2021-09-13_NP	----	----
				Client sampling date / time	13-Sep-2021 16:00	13-Sep-2021 16:00	13-Sep-2021 16:00	----	----
					CG2104114-001	CG2104114-002	CG2104114-003	--------	--------
					Result	Result	Result	----	----
Organic / Inorganic Carbon									
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	0.98	1.00	<0.50	----	----
Ion Balance									
anion sum	----	EC101	0.10	meq/L	6.03	6.08	<0.10	----	----
cation sum	----	EC101	0.10	meq/L	5.60	5.88	<0.10	----	----
ion balance (cations/anions ratio)	----	EC101	0.010	%	92.9	96.7	100	----	----
ion balance (cation-anion difference)	----	EC101	0.010	%	3.70	1.67	<0.010	----	----
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0036	<0.0030	<0.0030	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00012	0.00012	<0.00010	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00020	0.00017	<0.00010	----	----
barium, total	7440-39-3	E420	0.00010	mg/L	0.116	0.115	<0.00010	----	----
beryllium, total	7440-41-7	E420	0.020	µg/L	<0.020	<0.020	<0.020	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
boron, total	7440-42-8	E420	0.010	mg/L	0.014	0.014	<0.010	----	----
cadmium, total	7440-43-9	E420	0.0050	µg/L	0.0263	0.0247	<0.0050	----	----
calcium, total	7440-70-2	E420	0.050	mg/L	69.2	68.4	<0.050	----	----
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00014	0.00012	<0.00010	----	----
cobalt, total	7440-48-4	E420	0.10	µg/L	<0.10	<0.10	<0.10	----	----
copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----
iron, total	7439-89-6	E420	0.010	mg/L	0.013	<0.010	<0.010	----	----
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0114	0.0114	<0.0010	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	26.8	26.7	<0.0050	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L	0.00322	0.00288	<0.00010	----	----
mercury, total	7439-97-6	E508-L	0.00050	µg/L	<0.00050	<0.00050	<0.00050	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00173	0.00179	<0.000050	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L	0.00191	0.00188	<0.00050	----	----
potassium, total	7440-09-7	E420	0.050	mg/L	1.06	1.07	<0.050	----	----
selenium, total	7782-49-2	E420	0.050	µg/L	7.28	7.14	<0.050	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	RG_MICOMP_WS_LAEMP_EVO_2021-09-13_NP	RG_RIVER_WS_2021-09-13_NP	RG_FBLANK_WS_2021-09-13_NP	----	----
Client sampling date / time					13-Sep-2021 16:00	13-Sep-2021 16:00	13-Sep-2021 16:00	----	----
					CG2104114-001	CG2104114-002	CG2104114-003	--------	--------
					Result	Result	Result	----	----
Total Metals									
silicon, total	7440-21-3	E420	0.10	mg/L	2.34	2.32	<0.10	----	----
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
sodium, total	17341-25-2	E420	0.050	mg/L	3.92	3.94	<0.050	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L	0.178	0.180	<0.00020	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L	39.3	39.0	<0.50	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	<0.00030	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L	0.00156	0.00157	<0.000010	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	<0.0030	----	----
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0010	<0.0010	<0.0010	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00011	0.00011	<0.00010	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00019	0.00018	<0.00010	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.112	0.117	<0.00010	----	----
beryllium, dissolved	7440-41-7	E421	0.020	µg/L	<0.020	<0.020	<0.020	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.012	0.013	<0.010	----	----
cadmium, dissolved	7440-43-9	E421	0.0050	µg/L	0.0191	0.0183	<0.0050	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	65.0	68.7	<0.050	----	----
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00012	0.00011	<0.00010	----	----
cobalt, dissolved	7440-48-4	E421	0.10	µg/L	<0.10	<0.10	<0.10	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	<0.00020	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	<0.010	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0111	0.0117	<0.0010	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	26.3	27.3	<0.0050	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00172	0.00170	<0.00010	----	----

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	RG_MICOMP_WS_LAEMP_EVO_2021-09-13_NP	RG_RIVER_WS_2021-09-13_NP	RG_FBLANK_WS_2021-09-13_NP	----	----
Client sampling date / time					13-Sep-2021 16:00	13-Sep-2021 16:00	13-Sep-2021 16:00	----	----
					CG2104114-001	CG2104114-002	CG2104114-003	--------	--------
					Result	Result	Result	----	----
Dissolved Metals									
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00169	0.00174	0.000145 DTC, RRV	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00178	0.00179	<0.00050	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.997	1.08	<0.050	----	----
selenium, dissolved	7782-49-2	E421	0.050	µg/L	7.52	7.61	<0.050	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.19	2.20	<0.050	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	----	----
sodium, dissolved	17341-25-2	E421	0.050	mg/L	3.84	4.00	<0.050	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.172	0.177	<0.00020	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	36.9	35.8	<0.50	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	0.000013	<0.000010	<0.000010	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	<0.00030	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00144	0.00146	<0.000010	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	<0.0010	----	----
dissolved mercury filtration location	----	EP509	-	-	Field	Field	Field	----	----
dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	----	----

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

QUALITY CONTROL REPORT

Work Order	: **CG2104114**	Page	: 1 of 19
Amendment	: **2**		
Client	: Teck Coal Limited	Laboratory	: Calgary - Environmental
Contact	: Allie Ferguson	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Avenue Sparwood BC Canada V0B 2G0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 15-Sep-2021 08:50
PO	: VPO00750546	Date Analysis Commenced	: 16-Sep-2021
C-O-C number	: ----	Issue Date	: 13-Oct-2021 17:27
Sampler	: ----		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 3		
No. of samples analysed	: 3		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Anthony Calero	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Erin Sanchez		Inorganics, Calgary, Alberta
Hannah Phung	Lab Assistant	Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
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Sara Niroomand		Inorganics, Calgary, Alberta
Saron Kim	Analyst	Metals, Burnaby, British Columbia
Shaneel Dayal	Analyst	Metals, Burnaby, British Columbia

Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia

General Comments

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

Key :

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 293634)											
CG2104114-001	RG_MICOMP_WS_LAEMP_EVO_2021-09-13_NP	turbidity	----	E121	0.10	NTU	0.18	0.19	0.007	Diff <2x LOR	----
Physical Tests (QC Lot: 294409)											
CG2104110-001	Anonymous	acidity (as CaCO3)	----	E283	2.0	mg/L	<2.0	<2.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 296875)											
CG2104111-004	Anonymous	solids, total dissolved [TDS]	----	E162	10	mg/L	<10	<10	0	Diff <2x LOR	----
Physical Tests (QC Lot: 299553)											
CG2104111-001	Anonymous	oxidation-reduction potential [ORP]	----	E125	0.10	mV	461	458	0.544%	15%	----
Physical Tests (QC Lot: 301626)											
CG2104110-003	Anonymous	pH	----	E108	0.10	pH units	8.39	8.39	0.00%	4%	----
Physical Tests (QC Lot: 301627)											
CG2104114-001	RG_MICOMP_WS_LAEMP_EVO_2021-09-13_NP	conductivity	----	E100	2.0	µS/cm	529	536	1.31%	10%	----
Physical Tests (QC Lot: 301628)											
CG2104114-001	RG_MICOMP_WS_LAEMP_EVO_2021-09-13_NP	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	160	166	3.67%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	9.0	10.6	1.6	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	175	178	1.81%	20%	----
Anions and Nutrients (QC Lot: 293811)											
CG2104110-001	Anonymous	fluoride	16984-48-8	E235.F	0.100	mg/L	0.221	0.218	0.003	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 293812)											
CG2104110-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	376	373	0.636%	20%	----
Anions and Nutrients (QC Lot: 293813)											
CG2104110-001	Anonymous	bromide	24959-67-9	E235.Br-L	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 293814)											
CG2104110-001	Anonymous	chloride	16887-00-6	E235.Cl-L	0.50	mg/L	1.87	1.82	0.05	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 293815)											
CG2104110-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	15.4	15.3	0.398%	20%	----
Anions and Nutrients (QC Lot: 293816)											
CG2104110-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0050	mg/L	0.0311	0.0304	0.0007	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 293964)											
CG2104110-004	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Anions and Nutrients (QC Lot: 298289)											
CG2104108-003	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 298650)											
CG2104110-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 302671)											
CG2104088-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0447	0.0541	0.0094	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 299651)											
CG2104113-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	1.06	1.07	0.004	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 299659)											
CG2104108-001	Anonymous	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	0.60	0.58	0.02	Diff <2x LOR	----
Total Metals (QC Lot: 295656)											
CG2104071-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0162	0.0157	0.0004	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00018	0.00019	0.00001	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0583	0.0586	0.375%	20%	----
		beryllium, total	7440-41-7	E420	0.020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0050	mg/L	0.0178 µg/L	0.0000173	0.0000005	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	78.7	80.8	2.54%	20%	----
		cobalt, total	7440-48-4	E420	0.10	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.020	0.021	0.0006	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0067	0.0068	0.00009	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	43.9	44.8	2.00%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00159	0.00148	7.50%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000831	0.000902	8.22%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00073	0.00074	0.000009	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	0.935	0.944	0.930%	20%	----
		selenium, total	7782-49-2	E420	0.050	mg/L	35.1 µg/L	0.0353	0.658%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	2.12	2.15	1.42%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	17341-25-2	E420	0.050	mg/L	1.48	1.49	0.956%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.118	0.122	3.12%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	68.1	67.3	1.11%	20%	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Total Metals (QC Lot: 295656) - continued											
CG2104071-001	Anonymous	thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.00242	0.00254	4.43%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
Total Metals (QC Lot: 295657)											
CG2104071-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00017	0.00017	0.000005	Diff <2x LOR	----
Total Metals (QC Lot: 299637)											
CG2104111-001	Anonymous	mercury, total	7439-97-6	E508-L	0.00050	ng/L	<0.00050 µg/L	<0.50	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 295658)											
CG2104110-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00035	0.00035	0.000003	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00014	0.00014	0.000005	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0655	0.0671	2.48%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.017	0.017	0.0003	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0050	mg/L	0.132 µg/L	0.000117	12.5%	20%	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	139	140	0.733%	20%	----
		cobalt, dissolved	7440-48-4	E421	0.10	mg/L	0.60 µg/L	0.00063	0.00002	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	0.00021	0.00001	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	0.012	0.012	0.0001	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0654	0.0648	0.970%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	74.2	76.9	3.53%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0215	0.0217	1.22%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00296	0.00278	6.22%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.0116	0.0119	3.02%	20%	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	2.70	2.78	2.86%	20%	----
		selenium, dissolved	7782-49-2	E421	0.050	mg/L	81.5 µg/L	0.0816	0.0936%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.06	2.02	2.03%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	17341-25-2	E421	0.050	mg/L	2.32	2.31	0.241%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.195	0.191	2.40%	20%	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 295658) - continued											
CG2104110-001	Anonymous	sulfur, dissolved	7704-34-9	E421	0.50	mg/L	120	114	4.86%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	0.000015	0.000014	0.000001	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00431	0.00441	2.28%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0068	0.0068	0.00003	Diff <2x LOR	----
Dissolved Metals (QC Lot: 295659)											
CG2104110-001	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 295812)											
CG2104086-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 293634)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 294409)						
acidity (as CaCO3)	----	E283	2	mg/L	<2.0	----
Physical Tests (QCLot: 296870)						
solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 296875)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 301627)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 301628)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 293811)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 293812)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 293813)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 293814)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 293815)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 293816)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 293964)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 298289)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 298650)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 302671)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 302671) - continued						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 299651)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 299659)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 295656)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	17341-25-2	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 295656) - continued						
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Total Metals (QCLot: 295657)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Total Metals (QCLot: 299637)						
mercury, total	7439-97-6	E508-L	0.5	ng/L	<0.50	----
Dissolved Metals (QCLot: 295658)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 295658) - continued						
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Dissolved Metals (QCLot: 295659)						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	----
Dissolved Metals (QCLot: 295812)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 293634)									
turbidity	----	E121	0.1	NTU	200 NTU	99.6	85.0	115	----
Physical Tests (QCLot: 294409)									
acidity (as CaCO3)	----	E283	2	mg/L	50 mg/L	98.0	85.0	115	----
Physical Tests (QCLot: 296870)									
solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	95.8	85.0	115	----
Physical Tests (QCLot: 296875)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	94.2	85.0	115	----
Physical Tests (QCLot: 299553)									
oxidation-reduction potential [ORP]	----	E125	----	mV	220 mV	100	95.4	104	----
Physical Tests (QCLot: 301626)									
pH	----	E108	----	pH units	7 pH units	100	98.6	101	----
Physical Tests (QCLot: 301627)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	99.7	90.0	110	----
Physical Tests (QCLot: 301628)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	99.2	85.0	115	----
Anions and Nutrients (QCLot: 293811)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	108	90.0	110	----
Anions and Nutrients (QCLot: 293812)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 293813)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	109	85.0	115	----
Anions and Nutrients (QCLot: 293814)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 293815)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 293816)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 293964)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.02 mg/L	103	80.0	120	----
Anions and Nutrients (QCLot: 298289)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 298650)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 298650) - continued									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	8.32 mg/L	100	80.0	120	----
Anions and Nutrients (QCLot: 302671)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	109	85.0	115	----
Organic / Inorganic Carbon (QCLot: 299651)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	10 mg/L	98.0	80.0	120	----
Organic / Inorganic Carbon (QCLot: 299659)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	10 mg/L	93.7	80.0	120	----
Total Metals (QCLot: 295656)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	102	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	102	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	101	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	97.6	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	99.7	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	95.4	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	99.2	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	102	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	99.1	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	97.2	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	93.3	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	102	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	102	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	106	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	97.6	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	98.0	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	97.0	80.0	120	----
sodium, total	17341-25-2	E420	0.05	mg/L	50 mg/L	103	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	98.1	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	91.5	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	100	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	98.9	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 295656) - continued									
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	100	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	105	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	104	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	106	80.0	120	----
Total Metals (QCLot: 295657)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
Total Metals (QCLot: 299637)									
mercury, total	7439-97-6	E508-L	0.5	ng/L	5 ng/L	92.2	80.0	120	----
Dissolved Metals (QCLot: 295658)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	98.5	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	98.1	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	99.3	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	97.4	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	96.9	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	99.2	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	95.6	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	94.7	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	98.2	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	98.1	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	96.0	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	97.0	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	95.7	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	93.2	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	97.4	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	98.7	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	96.9	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	97.7	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	95.0	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	95.6	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	93.0	80.0	120	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	50 mg/L	96.2	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	93.0	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	92.4	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	99.3	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	94.6	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 295658) - continued									
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	97.9	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	101	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	99.0	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	98.6	80.0	120	----
Dissolved Metals (QCLot: 295659)									
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	97.6	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	97.2	80.0	120	----

Matrix Spike (MS) Report

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

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 293811)										
CG2104113-005	Anonymous	fluoride	16984-48-8	E235.F	1.04 mg/L	1 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 293812)										
CG2104113-005	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	113 mg/L	100 mg/L	113	75.0	125	----
Anions and Nutrients (QCLot: 293813)										
CG2104113-005	Anonymous	bromide	24959-67-9	E235.Br-L	0.534 mg/L	0.5 mg/L	107	75.0	125	----
Anions and Nutrients (QCLot: 293814)										
CG2104113-005	Anonymous	chloride	16887-00-6	E235.Cl-L	102 mg/L	100 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 293815)										
CG2104113-005	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.56 mg/L	2.5 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 293816)										
CG2104113-005	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.510 mg/L	0.5 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 293964)										
CG2104111-001	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0567 mg/L	0.05 mg/L	113	70.0	130	----
Anions and Nutrients (QCLot: 298289)										
CG2104110-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.83 mg/L	2.5 mg/L	113	70.0	130	----
Anions and Nutrients (QCLot: 298650)										
CG2104110-002	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0540 mg/L	0.0676 mg/L	79.8	70.0	130	----
Anions and Nutrients (QCLot: 302671)										
CG2104088-005	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0971 mg/L	0.1 mg/L	97.1	75.0	125	----
Organic / Inorganic Carbon (QCLot: 299651)										
CG2104113-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	23.5 mg/L	23.9 mg/L	98.4	70.0	130	----
Organic / Inorganic Carbon (QCLot: 299659)										
CG2104108-001	Anonymous	carbon, total organic [TOC]	----	E355-L	24.7 mg/L	23.9 mg/L	103	70.0	130	----
Total Metals (QCLot: 295656)										
CG2104071-002	Anonymous	aluminum, total	7429-90-5	E420	0.191 mg/L	0.2 mg/L	95.6	70.0	130	----
		antimony, total	7440-36-0	E420	0.0195 mg/L	0.02 mg/L	97.7	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0199 mg/L	0.02 mg/L	99.4	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 295656) - continued										
CG2104071-002	Anonymous	beryllium, total	7440-41-7	E420	0.0370 mg/L	0.04 mg/L	92.6	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00912 mg/L	0.01 mg/L	91.2	70.0	130	----
		boron, total	7440-42-8	E420	0.097 mg/L	0.1 mg/L	96.8	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00383 mg/L	0.004 mg/L	95.7	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0188 mg/L	0.02 mg/L	94.1	70.0	130	----
		copper, total	7440-50-8	E420	0.0188 mg/L	0.02 mg/L	93.8	70.0	130	----
		iron, total	7439-89-6	E420	1.91 mg/L	2 mg/L	95.5	70.0	130	----
		lead, total	7439-92-1	E420	0.0180 mg/L	0.02 mg/L	90.0	70.0	130	----
		lithium, total	7439-93-2	E420	0.0968 mg/L	0.1 mg/L	96.8	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.0192 mg/L	0.02 mg/L	96.1	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0196 mg/L	0.02 mg/L	98.0	70.0	130	----
		nickel, total	7440-02-0	E420	0.0374 mg/L	0.04 mg/L	93.6	70.0	130	----
		potassium, total	7440-09-7	E420	3.93 mg/L	4 mg/L	98.3	70.0	130	----
		selenium, total	7782-49-2	E420	0.0412 mg/L	0.04 mg/L	103	70.0	130	----
		silicon, total	7440-21-3	E420	9.02 mg/L	10 mg/L	90.2	70.0	130	----
		silver, total	7440-22-4	E420	0.00375 mg/L	0.004 mg/L	93.7	70.0	130	----
		sodium, total	17341-25-2	E420	1.90 mg/L	2 mg/L	95.0	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		thallium, total	7440-28-0	E420	0.00364 mg/L	0.004 mg/L	91.1	70.0	130	----
		tin, total	7440-31-5	E420	0.0195 mg/L	0.02 mg/L	97.6	70.0	130	----
		titanium, total	7440-32-6	E420	0.0389 mg/L	0.04 mg/L	97.3	70.0	130	----
		uranium, total	7440-61-1	E420	0.00398 mg/L	0.004 mg/L	99.6	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0991 mg/L	0.1 mg/L	99.1	70.0	130	----
		zinc, total	7440-66-6	E420	0.389 mg/L	0.4 mg/L	97.2	70.0	130	----
Total Metals (QCLot: 295657)										
CG2104071-002	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.0387 mg/L	0.04 mg/L	96.8	70.0	130	----
Total Metals (QCLot: 299637)										
CG2104111-002	Anonymous	mercury, total	7439-97-6	E508-L	4.87 ng/L	5 ng/L	97.5	70.0	130	----
Dissolved Metals (QCLot: 295658)										
CG2104110-002	Anonymous	aluminum, dissolved	7429-90-5	E421	0.194 mg/L	0.2 mg/L	96.8	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0193 mg/L	0.02 mg/L	96.7	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0196 mg/L	0.02 mg/L	98.0	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 295658) - continued										
CG2104110-002	Anonymous	beryllium, dissolved	7440-41-7	E421	0.0383 mg/L	0.04 mg/L	95.8	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00882 mg/L	0.01 mg/L	88.2	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.096 mg/L	0.1 mg/L	96.0	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00376 mg/L	0.004 mg/L	93.9	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0186 mg/L	0.02 mg/L	92.9	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0184 mg/L	0.02 mg/L	92.3	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.85 mg/L	2 mg/L	92.5	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0181 mg/L	0.02 mg/L	90.7	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.0188 mg/L	0.02 mg/L	94.0	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0193 mg/L	0.02 mg/L	96.3	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0368 mg/L	0.04 mg/L	92.0	70.0	130	----
		potassium, dissolved	7440-09-7	E421	3.83 mg/L	4 mg/L	95.7	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0387 mg/L	0.04 mg/L	96.7	70.0	130	----
		silicon, dissolved	7440-21-3	E421	8.66 mg/L	10 mg/L	86.6	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00375 mg/L	0.004 mg/L	93.8	70.0	130	----
		sodium, dissolved	17341-25-2	E421	1.91 mg/L	2 mg/L	95.7	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	ND mg/L	20 mg/L	ND	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00368 mg/L	0.004 mg/L	91.9	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0192 mg/L	0.02 mg/L	96.0	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0381 mg/L	0.04 mg/L	95.3	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00392 mg/L	0.004 mg/L	98.0	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.0982 mg/L	0.1 mg/L	98.2	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.389 mg/L	0.4 mg/L	97.2	70.0	130	----
Dissolved Metals (QCLot: 295659)										
CG2104110-002	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.0384 mg/L	0.04 mg/L	95.9	70.0	130	----
Dissolved Metals (QCLot: 295812)										
CG2104086-002	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000978 mg/L	0.0001 mg/L	97.8	70.0	130	----

Teck

COC ID: September EVO LAEMP 2021 | TURNAROUND TIME:

PROJECT/CLIENT INFO

Facility Name / Job#	REP
Project Manager	Allie Ferguson
Email	[illegible]
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

SAMPLE DETAILS / **ANALYSIS REQUESTED**

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	TECKCOAL-ROUTINE-VA (N)	ALS_Package-DOC (F, H2SO4)	ALS_Package-TKN/TOC (N, H2SO4)	HG-T-U-CVAF-VA (N)	HG-D-CVAF-VA (F, HCL)	TECKCOAL-MET-T-VA (N, HNO3)	TECKCOAL-MET-D-VA (F, HNO3)
RG_MICOMP_WS_EVO_LAEMP_2021-09-13_NP	RG_MICOMP	WS	No	9/13/2021	1600	G	7	X	X	X	X	X	X	X
RG_RIVER_WS_2021-09-13_NP	RG_RIVER	WS	No	9/13/2021	1600	G	7	X	X	X	X	X	X	X
RG_FBLANK_WS_2021-09-13_NP	RG_FBLANK	WS	No	9/13/2021	1600	G	7	X	X	X	X	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	
ALS PO 750546	Jennifer Ings/Minnow	################	Dc	9/15 0850

NB OF BOTTLES RETURNED/DESCRIPTION

Regular (default)	x
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For ... Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Jennifer Ings	Mobile #	519-500-3444
Sampler's Signature	Jennifer Ings	Date/Time	September 14, 2021

Environmental Division
Calgary
Work Order Reference
CG2104114

Telephone : +1 403 407 1800

6c

WATER CHEMISTRY

ALS Laboratory Report CG2106842

(Finalized January 5, 2022)

CERTIFICATE OF ANALYSIS

Work Order	: **CG2106842**	Page	: 1 of 11
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Allie Ferguson	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Avenue Sparwood BC Canada	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 16-Dec-2021 09:00
PO	: VPO00748510	Date Analysis Commenced	: 16-Dec-2021
C-O-C number	: DECEMBER EVP LAEMP 2021	Issue Date	: 05-Jan-2022 11:32
Sampler	: AMC		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 7		
No. of samples analysed	: 7		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Elke Tabora		Inorganics, Calgary, Alberta
Erin Sanchez		Inorganics, Calgary, Alberta
Hannah Phung	Lab Assistant	Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Ilnaz Badbezanchi	Team Leader - Metals preparation	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Maria Tuguinay	Lab Assistant	Inorganics, Calgary, Alberta
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Parker Sgarbossa	Laboratory Analyst	Inorganics, Calgary, Alberta
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Russell Zhang		Metals, Burnaby, British Columbia
Sara Niroomand		Inorganics, Calgary, Alberta
Saron Kim	Analyst	Metals, Burnaby, British Columbia
Vladka Stamenova	Analyst	Inorganics, Calgary, Alberta

General Comments

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

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

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

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

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

Unit	*Description*
-	No Unit
%	percent
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
meq/L	milliequivalents per litre
mg/L	milligrams per litre
mV	millivolts
ng/L	nanograms per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
DLA	*Detection Limit adjusted for required dilution.*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
DTC	*Dissolved concentration exceeds total. Results were confirmed by re-analysis.*
RRV	*Reported result verified by repeat analysis.*
TKNI	*TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.*

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	RG_M13_WS_LAEMP_EVO_2021-12-14_NP	RG_RIVER_WS_LAEMP_EVO_2021-09_NP	RG_TRIP_WS_LAEMP_EVO_2021-12_NP	RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP
				Client sampling date / time	14-Dec-2021 15:30	14-Dec-2021 13:30	14-Dec-2021 13:30	14-Dec-2021 13:30	14-Dec-2021 09:45
					CG2106842-001	CG2106842-002	CG2106842-003	CG2106842-004	CG2106842-005
					Result	Result	Result	Result	Result
Physical Tests									
acidity (as CaCO3)	----	E283	2.0	mg/L	<2.0	10.5	<2.0	8.4	<2.0
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	121	478	<1.0	484	428
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L	147	583	<1.0	590	522
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	121	478	<1.0	484	428
conductivity	----	E100	2.0	µS/cm	318	1990	<2.0	1960	1850
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L	173	1420	<0.50	1390	1290
oxidation-reduction potential [ORP]	----	E125	0.10	mV	439	421	479	439	426
pH	----	E108	0.10	pH units	8.27	8.22	5.51	7.76	8.18
solids, total dissolved [TDS]	----	E162	10	mg/L	203	1720	<10	1670	1580
solids, total suspended [TSS]	----	E160-L	1.0	mg/L	4.0	7.6	<1.0	2.6	26.2
turbidity	----	E121	0.10	NTU	1.52	2.08	<0.10	<0.10	2.76
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0118	0.0091	<0.0050	0.0060	0.0074
bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.250 DLDS	<0.050	<0.250 DLDS	<0.250 DLDS
chloride	16887-00-6	E235.Cl-L	0.10	mg/L	0.97	6.24	<0.10	6.46	7.58
fluoride	16984-48-8	E235.F	0.020	mg/L	0.136	0.112	<0.020	0.130	0.184
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.091	0.377 TKNI	<0.050	<0.050 TKNI	0.451 TKNI
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.286	17.6	<0.0050	17.5	7.77
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0050 DLDS	<0.0010	<0.0050 DLDS	<0.0050 DLDS
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0100	0.0215	<0.0010	0.0222	0.0011
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0109	0.0215 DLM	<0.0020	0.0229 DLM	0.0323
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	56.8	807	<0.30	802	818
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	2.57 DTC, RRV	0.81	<0.50	0.68	0.86

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

				Client sample ID	RG_M13_WS_LAEMP_EVO_2021-12-14_NP	RG_RIVER_WS_LAEMP_EVO_2021-09_NP	RG_TRIP_WS_LAEMP_EVO_2021-12_NP	RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP
				Client sampling date / time	14-Dec-2021 15:30	14-Dec-2021 13:30	14-Dec-2021 13:30	14-Dec-2021 13:30	14-Dec-2021 09:45
Analyte	CAS Number	Method	LOR	Unit	CG2106842-001	CG2106842-002	CG2106842-003	CG2106842-004	CG2106842-005
					Result	Result	Result	Result	Result
Organic / Inorganic Carbon									
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	1.76 DTC, RRV	0.68	<0.50	0.67	0.90
Ion Balance									
anion sum	----	EC101	0.10	meq/L	3.66	27.8	<0.10	27.8	26.4
cation sum	----	EC101	0.10	meq/L	3.63	28.6	<0.10	28.1	26.2
ion balance (cations/anions ratio)	----	EC101	0.010	%	99.2	103	100	101	99.2
ion balance (cation-anion difference)	----	EC101	0.010	%	0.412	1.42	<0.010	0.537	0.380
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0346	<0.0060 DLA	<0.0030	<0.0030	0.117
antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00020 DLA	<0.00010	0.00020	0.00036
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00020	0.00027	<0.00010	0.00025	0.00046
barium, total	7440-39-3	E420	0.00010	mg/L	0.0830	0.0664	<0.00010	0.0652	0.0319
beryllium, total	7440-41-7	E420	0.020	µg/L	<0.020	<0.040 DLA	<0.020	<0.020	<0.020
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000100 DLA	<0.000050	<0.000050	<0.000050
boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.020 DLA	<0.010	0.014	0.028
cadmium, total	7440-43-9	E420	0.0050	µg/L	0.0299	0.104	<0.0050	0.0819	0.0516
calcium, total	7440-70-2	E420	0.050	mg/L	42.7	267	<0.050	263	248
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00012	<0.00020 DLA	<0.00010	0.00020	0.00026
cobalt, total	7440-48-4	E420	0.10	µg/L	<0.10	<0.20 DLA	<0.10	<0.10	4.61
copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00100 DLA	<0.00050	<0.00050	<0.00050
iron, total	7439-89-6	E420	0.010	mg/L	0.031	<0.020 DLA	<0.010	<0.010	0.200
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000100 DLA	<0.000050	<0.000050	0.000205
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0050	0.0288	<0.0010	0.0281	0.0482
magnesium, total	7439-95-4	E420	0.0050	mg/L	13.8	157	<0.0050	156	155
manganese, total	7439-96-5	E420	0.00010	mg/L	0.00206	<0.00020 DLA	<0.00010	<0.00010	0.107
mercury, total	7439-97-6	E508-L	0.50	ng/L	1.06	<0.50	<0.50	0.85	<0.50
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000644	0.00108	<0.000050	0.00104	0.0104
nickel, total	7440-02-0	E420	0.00050	mg/L	0.00152	<0.00100 DLA	<0.00050	0.00090	0.0286
potassium, total	7440-09-7	E420	0.050	mg/L	0.607	2.72	<0.050	2.73	3.92
selenium, total	7782-49-2	E420	0.050	µg/L	2.18	161	<0.050	169	77.8

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	RG_M13_WS_LAEMP_EVO_2021-12-14_NP	RG_RIVER_WS_LAEMP_EVO_2021-09_NP	RG_TRIP_WS_LAEMP_EVO_2021-12_NP	RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP
				Client sampling date / time	14-Dec-2021 15:30	14-Dec-2021 13:30	14-Dec-2021 13:30	14-Dec-2021 13:30	14-Dec-2021 09:45
					CG2106842-001	CG2106842-002	CG2106842-003	CG2106842-004	CG2106842-005
					Result	Result	Result	Result	Result
Total Metals									
silicon, total	7440-21-3	E420	0.10	mg/L	2.33	3.97	<0.10	3.98	3.79
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000020 DLA	<0.000010	<0.000010	<0.000010
sodium, total	7440-23-5	E420	0.050	mg/L	3.38	3.45	<0.050	3.48	5.61
strontium, total	7440-24-6	E420	0.00020	mg/L	0.135	0.240	<0.00020	0.245	0.321
sulfur, total	7704-34-9	E420	0.50	mg/L	20.5	303	<0.50	312	323
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000020 DLA	<0.000010	<0.000010	0.000043
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00020 DLA	<0.00010	<0.00010	<0.00010
titanium, total	7440-32-6	E420	0.00030	mg/L	0.00052	<0.00060 DLA	<0.00030	<0.00030	0.00196
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000569	0.00822	<0.000010	0.00895	0.0109
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00100 DLA	<0.00050	<0.00050	0.00058
zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0060 DLA	<0.0030	<0.0030	<0.0030
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0091	0.0073	<0.0010	<0.0010	0.0019
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	0.00017	<0.00010	0.00018	0.00034
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00018	0.00029	<0.00010	0.00025	0.00034
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0851	0.0682	<0.00010	0.0672	0.0294
beryllium, dissolved	7440-41-7	E421	0.020	µg/L	<0.020	<0.020	<0.020	<0.020	<0.020
cadmium, dissolved	7440-43-9	E421	0.0050	µg/L	0.0253	0.101	<0.0050	0.0884	0.0168
calcium, dissolved	7440-70-2	E421	0.050	mg/L	46.0	294	<0.050	291	262
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00018	0.00023	<0.00010	0.00020	<0.00010
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00031	<0.00020	<0.00020	<0.00020	<0.00020
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0047	0.0288	<0.0010	0.0292	0.0513
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	14.1	166	<0.0050	162	155
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00095	<0.00010	<0.00010	<0.00010	0.0747
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000840	0.00105	<0.000050	0.00110	0.0113
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00138	0.00094	<0.00050	0.00092	0.0264
potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.665	3.07	<0.050	2.93	4.09

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Client sample ID					RG_M13_WS_LAEMP_EVO_2021-12-14_NP	RG_RIVER_WS_LAEMP_EVO_2021-09_NP	RG_TRIP_WS_LAEMP_EVO_2021-12_NP	RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP
Client sampling date / time					14-Dec-2021 15:30	14-Dec-2021 13:30	14-Dec-2021 13:30	14-Dec-2021 13:30	14-Dec-2021 09:45
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	**CG2106842-001**	**CG2106842-002**	**CG2106842-003**	**CG2106842-004**	**CG2106842-005**
					Result	Result	Result	Result	Result
Dissolved Metals									
selenium, dissolved	7782-49-2	E421	0.050	µg/L	2.11	199	<0.050	204	89.6
silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.30	4.04	<0.050	4.04	3.54
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, dissolved	7440-23-5	E421	0.050	mg/L	3.55	3.72	<0.050	3.60	5.72
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.134	0.241	<0.00020	0.242	0.312
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	20.0	297	<0.50	306	304
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	0.000035
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	0.00034	<0.00030	<0.00030	<0.00030	<0.00030
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000594	0.00873	<0.000010	0.00874	0.0105
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0030	0.0037	<0.0010	0.0018	<0.0010
dissolved mercury filtration location	----	EP509	-	-	Field	Field	Field	Field	Field
dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	Field	Field

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

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	----	----	----
				Client sampling date / time	15-Dec-2021 12:00	15-Dec-2021 16:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	CG2106842-006	CG2106842-007	--------	--------	--------
					Result	Result	----	----	----
Physical Tests									
acidity (as CaCO3)	----	E283	2.0	mg/L	6.1	<2.0	----	----	----
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	484	<1.0	----	----	----
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L	590	<1.0	----	----	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	----	----	----
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L	<1.0	<1.0	----	----	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	----	----	----
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L	<1.0	<1.0	----	----	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	484	<1.0	----	----	----
conductivity	----	E100	2.0	µS/cm	1960	<2.0	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L	1380	<0.50	----	----	----
oxidation-reduction potential [ORP]	----	E125	0.10	mV	437	480	----	----	----
pH	----	E108	0.10	pH units	8.04	5.21	----	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L	1800	<10	----	----	----
solids, total suspended [TSS]	----	E160-L	1.0	mg/L	5.9	<1.0	----	----	----
turbidity	----	E121	0.10	NTU	2.25	<0.10	----	----	----
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	----	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.250 DLDS	<0.050	----	----	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L	6.57	<0.10	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L	0.119	<0.020	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.440 TKNI	<0.050	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	18.3	<0.0050	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0050 DLDS	<0.0010	----	----	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0195	<0.0010	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0224	<0.0020	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	788	<0.30	----	----	----
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	0.74	<0.50	----	----	----
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	0.73	<0.50	----	----	----

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	----	----	----
				Client sampling date / time	15-Dec-2021 12:00	15-Dec-2021 16:00	----	----	----
					CG2106842-006	CG2106842-007	--------	--------	--------
					Result	Result	----	----	----
Ion Balance									
anion sum	----	EC101	0.10	meq/L	27.6	<0.10	----	----	----
cation sum	----	EC101	0.10	meq/L	27.8	<0.10	----	----	----
ion balance (cations/anions ratio)	----	EC101	0.010	%	101	100	----	----	----
ion balance (cation-anion difference)	----	EC101	0.010	%	0.361	<0.010	----	----	----
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0117	<0.0030	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00021	<0.00010	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00051	<0.00010	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L	0.0649	<0.00010	----	----	----
beryllium, total	7440-41-7	E420	0.020	µg/L	<0.020	<0.020	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L	0.015	<0.010	----	----	----
cadmium, total	7440-43-9	E420	0.0050	µg/L	0.189	<0.0050	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L	273	<0.050	----	----	----
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00022	<0.00010	----	----	----
cobalt, total	7440-48-4	E420	0.10	µg/L	1.85	<0.10	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L	0.427	<0.010	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L	0.000096	<0.000050	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0294	<0.0010	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	156	<0.0050	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L	0.0467	<0.00010	----	----	----
mercury, total	7439-97-6	E508-L	0.50	ng/L	<0.50	<0.50	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00102	<0.000050	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L	0.00448	<0.00050	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L	2.74	<0.050	----	----	----
selenium, total	7782-49-2	E420	0.050	µg/L	168	<0.050	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L	4.01	<0.10	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	----	----	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	----	----	----
				Client sampling date / time	15-Dec-2021 12:00	15-Dec-2021 16:00	----	----	----
					CG2106842-006	CG2106842-007	--------	--------	--------
					Result	Result	----	----	----
Total Metals									
sodium, total	7440-23-5	E420	0.050	mg/L	3.56	<0.050	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L	0.248	<0.00020	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L	314	<0.50	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L	0.000015	<0.000010	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L	0.00875	<0.000010	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L	0.0079	<0.0030	----	----	----
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0010	<0.0010	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00018	<0.00010	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00028	<0.00010	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0673	<0.00010	----	----	----
beryllium, dissolved	7440-41-7	E421	0.020	µg/L	<0.020	<0.020	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0050	µg/L	0.0964	<0.0050	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	290	<0.050	----	----	----
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00020	<0.00010	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0289	<0.0010	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	159	<0.0050	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00460	<0.00010	----	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00120	<0.000050	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00306	<0.00050	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	2.88	<0.050	----	----	----
selenium, dissolved	7782-49-2	E421	0.050	µg/L	206	<0.050	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	4.08	<0.050	----	----	----

Analytical Results

Sub-Matrix: Water

(Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	----	----	----
				Client sampling date / time	15-Dec-2021 12:00	15-Dec-2021 16:00	----	----	----
					CG2106842-006	CG2106842-007	--------	--------	--------
					Result	Result	----	----	----
Dissolved Metals									
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L	3.54	<0.050	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.249	<0.00020	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	305	<0.50	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	0.000012	<0.000010	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00877	<0.000010	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0034	<0.0010	----	----	----
dissolved mercury filtration location	----	EP509	-	-	Field	Field	----	----	----
dissolved metals filtration location	----	EP421	-	-	Field	Field	----	----	----

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

ALS Environmental

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2106842**	Page	: 1 of 29
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Allie Ferguson	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Avenue Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 16-Dec-2021 09:00
PO	: VPO00748510	Issue Date	: 05-Jan-2022 11:33
C-O-C number	: DECEMBER EVP LAEMP 2021		
Sampler	: AMC		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 7		
No. of samples analysed	: 7		

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

Key

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	E298	15-Dec-2021	16-Dec-2021	----	----		16-Dec-2021	28 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	E298	15-Dec-2021	16-Dec-2021	----	----		16-Dec-2021	28 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP	E298	14-Dec-2021	16-Dec-2021	----	----		16-Dec-2021	28 days	2 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	E298	14-Dec-2021	16-Dec-2021	----	----		16-Dec-2021	28 days	2 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RG_M13_WS_LAEMP_EVO_2021-12-14_NP	E298	14-Dec-2021	16-Dec-2021	----	----		16-Dec-2021	28 days	2 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RG_RIVER_WS_LAEMP_EVO_2021-09_NP	E298	14-Dec-2021	16-Dec-2021	----	----		16-Dec-2021	28 days	2 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RG_TRIP_WS_LAEMP_EVO_2021-12_NP	E298	14-Dec-2021	16-Dec-2021	----	----		16-Dec-2021	28 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP	E235.Br-L	14-Dec-2021	----	----	----		16-Dec-2021	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	E235.Br-L	14-Dec-2021	----	----	----		16-Dec-2021	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_M13_WS_LAEMP_EVO_2021-12-14_NP	E235.Br-L	14-Dec-2021	----	----	----		16-Dec-2021	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_RIVER_WS_LAEMP_EVO_2021-09_NP	E235.Br-L	14-Dec-2021	----	----	----		16-Dec-2021	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_TRIP_WS_LAEMP_EVO_2021-12_NP	E235.Br-L	14-Dec-2021	----	----	----		16-Dec-2021	28 days	2 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	E235.Br-L	15-Dec-2021	----	----	----		18-Dec-2021	28 days	3 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	E235.Br-L	15-Dec-2021	----	----	----		18-Dec-2021	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP	E235.Cl-L	14-Dec-2021	----	----	----		16-Dec-2021	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	E235.Cl-L	14-Dec-2021	----	----	----		16-Dec-2021	28 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_M13_WS_LAEMP_EVO_2021-12-14_NP	E235.Cl-L	14-Dec-2021	----	----	----		16-Dec-2021	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_RIVER_WS_LAEMP_EVO_2021-09_NP	E235.Cl-L	14-Dec-2021	----	----	----		16-Dec-2021	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_TRIP_WS_LAEMP_EVO_2021-12_NP	E235.Cl-L	14-Dec-2021	----	----	----		16-Dec-2021	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	E235.Cl-L	15-Dec-2021	----	----	----		18-Dec-2021	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	E235.Cl-L	15-Dec-2021	----	----	----		18-Dec-2021	28 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	E378-U	15-Dec-2021	----	----	----		16-Dec-2021	3 days	1 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	E378-U	15-Dec-2021	----	----	----		16-Dec-2021	3 days	1 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP	E378-U	14-Dec-2021	----	----	----		16-Dec-2021	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	E378-U	14-Dec-2021	----	----	----		16-Dec-2021	3 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE RG_M13_WS_LAEMP_EVO_2021-12-14_NP	E378-U	14-Dec-2021	----	----	----		16-Dec-2021	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE RG_RIVER_WS_LAEMP_EVO_2021-09_NP	E378-U	14-Dec-2021	----	----	----		16-Dec-2021	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE RG_TRIP_WS_LAEMP_EVO_2021-12_NP	E378-U	14-Dec-2021	----	----	----		16-Dec-2021	3 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP	E235.F	14-Dec-2021	----	----	----		16-Dec-2021	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	E235.F	14-Dec-2021	----	----	----		16-Dec-2021	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_M13_WS_LAEMP_EVO_2021-12-14_NP	E235.F	14-Dec-2021	----	----	----		16-Dec-2021	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_RIVER_WS_LAEMP_EVO_2021-09_NP	E235.F	14-Dec-2021	----	----	----		16-Dec-2021	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_TRIP_WS_LAEMP_EVO_2021-12_NP	E235.F	14-Dec-2021	----	----	----		16-Dec-2021	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	E235.F	15-Dec-2021	----	----	----		18-Dec-2021	28 days	3 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	E235.F	15-Dec-2021	----	----	----		18-Dec-2021	28 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP	E235.NO3-L	14-Dec-2021	----	----	----		16-Dec-2021	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	E235.NO3-L	14-Dec-2021	----	----	----		16-Dec-2021	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
RG_M13_WS_LAEMP_EVO_2021-12-14_NP	E235.NO3-L	14-Dec-2021	----	----	----		16-Dec-2021	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
RG_RIVER_WS_LAEMP_EVO_2021-09_NP	E235.NO3-L	14-Dec-2021	----	----	----		16-Dec-2021	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
RG_TRIP_WS_LAEMP_EVO_2021-12_NP	E235.NO3-L	14-Dec-2021	----	----	----		16-Dec-2021	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	E235.NO3-L	15-Dec-2021	----	----	----		18-Dec-2021	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	E235.NO3-L	15-Dec-2021	----	----	----		18-Dec-2021	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP	E235.NO2-L	14-Dec-2021	----	----	----		16-Dec-2021	3 days	2 days	✓

Matrix: **Water**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	E235.NO2-L	14-Dec-2021	----	----	----		16-Dec-2021	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_M13_WS_LAEMP_EVO_2021-12-14_NP	E235.NO2-L	14-Dec-2021	----	----	----		16-Dec-2021	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_RIVER_WS_LAEMP_EVO_2021-09_NP	E235.NO2-L	14-Dec-2021	----	----	----		16-Dec-2021	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_TRIP_WS_LAEMP_EVO_2021-12_NP	E235.NO2-L	14-Dec-2021	----	----	----		16-Dec-2021	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	E235.NO2-L	15-Dec-2021	----	----	----		18-Dec-2021	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	E235.NO2-L	15-Dec-2021	----	----	----		18-Dec-2021	3 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP	E235.SO4	14-Dec-2021	----	----	----		16-Dec-2021	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	E235.SO4	14-Dec-2021	----	----	----		16-Dec-2021	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_M13_WS_LAEMP_EVO_2021-12-14_NP	E235.SO4	14-Dec-2021	----	----	----		16-Dec-2021	28 days	2 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_RIVER_WS_LAEMP_EVO_2021-09_NP	E235.SO4	14-Dec-2021	----	----	----		16-Dec-2021	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_TRIP_WS_LAEMP_EVO_2021-12_NP	E235.SO4	14-Dec-2021	----	----	----		16-Dec-2021	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	E235.SO4	15-Dec-2021	----	----	----		18-Dec-2021	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	E235.SO4	15-Dec-2021	----	----	----		18-Dec-2021	28 days	3 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	E318	15-Dec-2021	23-Dec-2021	----	----		23-Dec-2021	28 days	8 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	E318	15-Dec-2021	23-Dec-2021	----	----		23-Dec-2021	28 days	8 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP	E318	14-Dec-2021	23-Dec-2021	----	----		23-Dec-2021	28 days	9 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	E318	14-Dec-2021	23-Dec-2021	----	----		23-Dec-2021	28 days	9 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) RG_M13_WS_LAEMP_EVO_2021-12-14_NP	E318	14-Dec-2021	23-Dec-2021	----	----		23-Dec-2021	28 days	9 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) RG_RIVER_WS_LAEMP_EVO_2021-09_NP	E318	14-Dec-2021	23-Dec-2021	----	----		23-Dec-2021	28 days	9 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) RG_TRIP_WS_LAEMP_EVO_2021-12_NP	E318	14-Dec-2021	23-Dec-2021	----	----		23-Dec-2021	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	E372-U	15-Dec-2021	21-Dec-2021	----	----		21-Dec-2021	28 days	6 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	E372-U	15-Dec-2021	21-Dec-2021	----	----		21-Dec-2021	28 days	6 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP	E372-U	14-Dec-2021	21-Dec-2021	----	----		21-Dec-2021	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	E372-U	14-Dec-2021	21-Dec-2021	----	----		21-Dec-2021	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) RG_M13_WS_LAEMP_EVO_2021-12-14_NP	E372-U	14-Dec-2021	21-Dec-2021	----	----		21-Dec-2021	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) RG_RIVER_WS_LAEMP_EVO_2021-09_NP	E372-U	14-Dec-2021	21-Dec-2021	----	----		21-Dec-2021	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) RG_TRIP_WS_LAEMP_EVO_2021-12_NP	E372-U	14-Dec-2021	21-Dec-2021	----	----		21-Dec-2021	28 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid) RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	E421.Cr-L	15-Dec-2021	28-Dec-2021	----	----		28-Dec-2021	180 days	13 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid) RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	E421.Cr-L	15-Dec-2021	28-Dec-2021	----	----		28-Dec-2021	180 days	13 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid) RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP	E421.Cr-L	14-Dec-2021	28-Dec-2021	----	----		28-Dec-2021	180 days	14 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid) RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	E421.Cr-L	14-Dec-2021	28-Dec-2021	----	----		28-Dec-2021	180 days	14 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid) RG_M13_WS_LAEMP_EVO_2021-12-14_NP	E421.Cr-L	14-Dec-2021	28-Dec-2021	----	----		28-Dec-2021	180 days	14 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid) RG_RIVER_WS_LAEMP_EVO_2021-09_NP	E421.Cr-L	14-Dec-2021	28-Dec-2021	----	----		28-Dec-2021	180 days	14 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid) RG_TRIP_WS_LAEMP_EVO_2021-12_NP	E421.Cr-L	14-Dec-2021	28-Dec-2021	----	----		28-Dec-2021	180 days	14 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	E509	15-Dec-2021	04-Jan-2022	----	----		04-Jan-2022	28 days	20 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	E509	15-Dec-2021	04-Jan-2022	----	----		04-Jan-2022	28 days	20 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP	E509	14-Dec-2021	04-Jan-2022	----	----		04-Jan-2022	28 days	21 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	E509	14-Dec-2021	04-Jan-2022	----	----		04-Jan-2022	28 days	21 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_M13_WS_LAEMP_EVO_2021-12-14_NP	E509	14-Dec-2021	04-Jan-2022	----	----		04-Jan-2022	28 days	21 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_RIVER_WS_LAEMP_EVO_2021-09_NP	E509	14-Dec-2021	04-Jan-2022	----	----		04-Jan-2022	28 days	21 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) RG_TRIP_WS_LAEMP_EVO_2021-12_NP	E509	14-Dec-2021	04-Jan-2022	----	----		04-Jan-2022	28 days	21 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	E421	15-Dec-2021	28-Dec-2021	----	----		28-Dec-2021	180 days	13 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	E421	15-Dec-2021	28-Dec-2021	----	----		28-Dec-2021	180 days	13 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP	E421	14-Dec-2021	28-Dec-2021	----	----		28-Dec-2021	180 days	14 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	E421	14-Dec-2021	28-Dec-2021	----	----		28-Dec-2021	180 days	14 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_M13_WS_LAEMP_EVO_2021-12-14_NP	E421	14-Dec-2021	28-Dec-2021	----	----		28-Dec-2021	180 days	14 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_RIVER_WS_LAEMP_EVO_2021-09_NP	E421	14-Dec-2021	28-Dec-2021	----	----		28-Dec-2021	180 days	14 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) RG_TRIP_WS_LAEMP_EVO_2021-12_NP	E421	14-Dec-2021	28-Dec-2021	----	----		28-Dec-2021	180 days	14 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	E358-L	15-Dec-2021	16-Dec-2021	----	----		18-Dec-2021	28 days	3 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	E358-L	15-Dec-2021	16-Dec-2021	----	----		18-Dec-2021	28 days	3 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP	E358-L	14-Dec-2021	16-Dec-2021	----	----		18-Dec-2021	28 days	4 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	E358-L	14-Dec-2021	16-Dec-2021	----	----		18-Dec-2021	28 days	4 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_M13_WS_LAEMP_EVO_2021-12-14_NP	E358-L	14-Dec-2021	16-Dec-2021	----	----		18-Dec-2021	28 days	4 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_RIVER_WS_LAEMP_EVO_2021-09_NP	E358-L	14-Dec-2021	16-Dec-2021	----	----		18-Dec-2021	28 days	4 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) RG_TRIP_WS_LAEMP_EVO_2021-12_NP	E358-L	14-Dec-2021	16-Dec-2021	----	----		18-Dec-2021	28 days	4 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	E355-L	15-Dec-2021	16-Dec-2021	----	----		18-Dec-2021	28 days	3 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	E355-L	15-Dec-2021	16-Dec-2021	----	----		18-Dec-2021	28 days	3 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP	E355-L	14-Dec-2021	16-Dec-2021	----	----		18-Dec-2021	28 days	4 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	E355-L	14-Dec-2021	16-Dec-2021	----	----		18-Dec-2021	28 days	4 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_M13_WS_LAEMP_EVO_2021-12-14_NP	E355-L	14-Dec-2021	16-Dec-2021	----	----		18-Dec-2021	28 days	4 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_RIVER_WS_LAEMP_EVO_2021-09_NP	E355-L	14-Dec-2021	16-Dec-2021	----	----		18-Dec-2021	28 days	4 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RG_TRIP_WS_LAEMP_EVO_2021-12_NP	E355-L	14-Dec-2021	16-Dec-2021	----	----		18-Dec-2021	28 days	4 days	✓
Physical Tests : Acidity by Titration										
HDPE RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	E283	15-Dec-2021	----	----	----		16-Dec-2021	14 days	1 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Acidity by Titration										
HDPE RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	E283	15-Dec-2021	----	----	----		16-Dec-2021	14 days	1 days	✓
Physical Tests : Acidity by Titration										
HDPE RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP	E283	14-Dec-2021	----	----	----		16-Dec-2021	14 days	2 days	✓
Physical Tests : Acidity by Titration										
HDPE RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	E283	14-Dec-2021	----	----	----		16-Dec-2021	14 days	2 days	✓
Physical Tests : Acidity by Titration										
HDPE RG_M13_WS_LAEMP_EVO_2021-12-14_NP	E283	14-Dec-2021	----	----	----		16-Dec-2021	14 days	2 days	✓
Physical Tests : Acidity by Titration										
HDPE RG_RIVER_WS_LAEMP_EVO_2021-09_NP	E283	14-Dec-2021	----	----	----		16-Dec-2021	14 days	2 days	✓
Physical Tests : Acidity by Titration										
HDPE RG_TRIP_WS_LAEMP_EVO_2021-12_NP	E283	14-Dec-2021	----	----	----		16-Dec-2021	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	E290	15-Dec-2021	----	----	----		20-Dec-2021	14 days	5 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	E290	15-Dec-2021	----	----	----		20-Dec-2021	14 days	5 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP	E290	14-Dec-2021	----	----	----		20-Dec-2021	14 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Physical Tests : Alkalinity Species by Titration										
HDPE RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	E290	14-Dec-2021	----	----	----		20-Dec-2021	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_M13_WS_LAEMP_EVO_2021-12-14_NP	E290	14-Dec-2021	----	----	----		20-Dec-2021	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_RIVER_WS_LAEMP_EVO_2021-09_NP	E290	14-Dec-2021	----	----	----		20-Dec-2021	14 days	6 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RG_TRIP_WS_LAEMP_EVO_2021-12_NP	E290	14-Dec-2021	----	----	----		20-Dec-2021	14 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	E100	15-Dec-2021	----	----	----		20-Dec-2021	28 days	5 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	E100	15-Dec-2021	----	----	----		20-Dec-2021	28 days	5 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP	E100	14-Dec-2021	----	----	----		20-Dec-2021	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	E100	14-Dec-2021	----	----	----		20-Dec-2021	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_M13_WS_LAEMP_EVO_2021-12-14_NP	E100	14-Dec-2021	----	----	----		20-Dec-2021	28 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Water										
HDPE RG_RIVER_WS_LAEMP_EVO_2021-09_NP	E100	14-Dec-2021	----	----	----		20-Dec-2021	28 days	6 days	✓
Physical Tests : Conductivity in Water										
HDPE RG_TRIP_WS_LAEMP_EVO_2021-12_NP	E100	14-Dec-2021	----	----	----		20-Dec-2021	28 days	6 days	✓
Physical Tests : ORP by Electrode										
HDPE RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	E125	15-Dec-2021	----	----	----		22-Dec-2021	0.25 hrs	163 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	E125	15-Dec-2021	----	----	----		22-Dec-2021	0.25 hrs	167 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_M13_WS_LAEMP_EVO_2021-12-14_NP	E125	14-Dec-2021	----	----	----		22-Dec-2021	0.25 hrs	187 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	E125	14-Dec-2021	----	----	----		22-Dec-2021	0.25 hrs	189 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_RIVER_WS_LAEMP_EVO_2021-09_NP	E125	14-Dec-2021	----	----	----		22-Dec-2021	0.25 hrs	189 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_TRIP_WS_LAEMP_EVO_2021-12_NP	E125	14-Dec-2021	----	----	----		22-Dec-2021	0.25 hrs	189 hrs	× EHTR-FM
Physical Tests : ORP by Electrode										
HDPE RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP	E125	14-Dec-2021	----	----	----		22-Dec-2021	0.25 hrs	193 hrs	× EHTR-FM

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Physical Tests : pH by Meter										
HDPE										
RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	E108	15-Dec-2021	----	----	----		20-Dec-2021	0.25 hrs	114 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE										
RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	E108	15-Dec-2021	----	----	----		20-Dec-2021	0.25 hrs	118 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE										
RG_M13_WS_LAEMP_EVO_2021-12-14_NP	E108	14-Dec-2021	----	----	----		20-Dec-2021	0.25 hrs	138 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE										
RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	E108	14-Dec-2021	----	----	----		20-Dec-2021	0.25 hrs	140 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE										
RG_RIVER_WS_LAEMP_EVO_2021-09_NP	E108	14-Dec-2021	----	----	----		20-Dec-2021	0.25 hrs	140 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE										
RG_TRIP_WS_LAEMP_EVO_2021-12_NP	E108	14-Dec-2021	----	----	----		20-Dec-2021	0.25 hrs	140 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE										
RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP	E108	14-Dec-2021	----	----	----		20-Dec-2021	0.25 hrs	144 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE										
RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP	E162	14-Dec-2021	----	----	----		20-Dec-2021	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	E162	15-Dec-2021	----	----	----		21-Dec-2021	7 days	6 days	✓

Matrix: **Water**

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

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TDS by Gravimetry										
HDPE RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	E162	14-Dec-2021	----	----	----		20-Dec-2021	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	E162	15-Dec-2021	----	----	----		21-Dec-2021	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_M13_WS_LAEMP_EVO_2021-12-14_NP	E162	14-Dec-2021	----	----	----		20-Dec-2021	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_RIVER_WS_LAEMP_EVO_2021-09_NP	E162	14-Dec-2021	----	----	----		20-Dec-2021	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE RG_TRIP_WS_LAEMP_EVO_2021-12_NP	E162	14-Dec-2021	----	----	----		20-Dec-2021	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP	E160-L	14-Dec-2021	----	----	----		20-Dec-2021	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	E160-L	14-Dec-2021	----	----	----		20-Dec-2021	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	E160-L	15-Dec-2021	----	----	----		21-Dec-2021	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_M13_WS_LAEMP_EVO_2021-12-14_NP	E160-L	14-Dec-2021	----	----	----		20-Dec-2021	7 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_RIVER_WS_LAEMP_EVO_2021-09_NP	E160-L	14-Dec-2021	----	----	----		20-Dec-2021	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_TRIP_WS_LAEMP_EVO_2021-12_NP	E160-L	14-Dec-2021	----	----	----		20-Dec-2021	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	E160-L	15-Dec-2021	----	----	----		22-Dec-2021	7 days	7 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP	E121	14-Dec-2021	----	----	----		16-Dec-2021	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	E121	15-Dec-2021	----	----	----		18-Dec-2021	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	E121	14-Dec-2021	----	----	----		17-Dec-2021	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	E121	15-Dec-2021	----	----	----		18-Dec-2021	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_M13_WS_LAEMP_EVO_2021-12-14_NP	E121	14-Dec-2021	----	----	----		17-Dec-2021	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE RG_RIVER_WS_LAEMP_EVO_2021-09_NP	E121	14-Dec-2021	----	----	----		17-Dec-2021	3 days	3 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Physical Tests : Turbidity by Nephelometry										
HDPE RG_TRIP_WS_LAEMP_EVO_2021-12_NP	E121	14-Dec-2021	----	----	----		17-Dec-2021	3 days	3 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	E420.Cr-L	15-Dec-2021	----	----	----		23-Dec-2021	180 days	8 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	E420.Cr-L	15-Dec-2021	----	----	----		23-Dec-2021	180 days	8 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP	E420.Cr-L	14-Dec-2021	----	----	----		23-Dec-2021	180 days	9 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	E420.Cr-L	14-Dec-2021	----	----	----		23-Dec-2021	180 days	9 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_M13_WS_LAEMP_EVO_2021-12-14_NP	E420.Cr-L	14-Dec-2021	----	----	----		23-Dec-2021	180 days	9 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_RIVER_WS_LAEMP_EVO_2021-09_NP	E420.Cr-L	14-Dec-2021	----	----	----		23-Dec-2021	180 days	9 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) RG_TRIP_WS_LAEMP_EVO_2021-12_NP	E420.Cr-L	14-Dec-2021	----	----	----		23-Dec-2021	180 days	9 days	✓
Total Metals : Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)										
Pre-cleaned amber glass - total (lab preserved) RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	E508-L	15-Dec-2021	----	----	----		22-Dec-2021	28 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Total Metals : Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)										
Pre-cleaned amber glass - total (lab preserved) RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	E508-L	15-Dec-2021	----	----	----		22-Dec-2021	28 days	7 days	✓
Total Metals : Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)										
Pre-cleaned amber glass - total (lab preserved) RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP	E508-L	14-Dec-2021	----	----	----		22-Dec-2021	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)										
Pre-cleaned amber glass - total (lab preserved) RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	E508-L	14-Dec-2021	----	----	----		22-Dec-2021	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)										
Pre-cleaned amber glass - total (lab preserved) RG_M13_WS_LAEMP_EVO_2021-12-14_NP	E508-L	14-Dec-2021	----	----	----		22-Dec-2021	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)										
Pre-cleaned amber glass - total (lab preserved) RG_RIVER_WS_LAEMP_EVO_2021-09_NP	E508-L	14-Dec-2021	----	----	----		22-Dec-2021	28 days	8 days	✓
Total Metals : Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)										
Pre-cleaned amber glass - total (lab preserved) RG_TRIP_WS_LAEMP_EVO_2021-12_NP	E508-L	14-Dec-2021	----	----	----		22-Dec-2021	28 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	E420	15-Dec-2021	----	----	----		23-Dec-2021	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	E420	15-Dec-2021	----	----	----		23-Dec-2021	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP	E420	14-Dec-2021	----	----	----		23-Dec-2021	180 days	9 days	✓

Matrix: **Water**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	E420	14-Dec-2021	----	----	----		23-Dec-2021	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_M13_WS_LAEMP_EVO_2021-12-14_NP	E420	14-Dec-2021	----	----	----		23-Dec-2021	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_RIVER_WS_LAEMP_EVO_2021-09_NP	E420	14-Dec-2021	----	----	----		23-Dec-2021	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid) RG_TRIP_WS_LAEMP_EVO_2021-12_NP	E420	14-Dec-2021	----	----	----		23-Dec-2021	180 days	9 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

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

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Acidity by Titration	E283	369891	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	372517	2	29	6.9	5.0	✓
Ammonia by Fluorescence	E298	369894	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	369689	2	31	6.4	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	369688	2	31	6.4	5.0	✓
Conductivity in Water	E100	372518	2	30	6.6	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	377071	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	380334	1	16	6.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	377072	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	369738	1	7	14.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	369930	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	369691	2	31	6.4	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	369687	2	31	6.4	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	369686	2	31	6.4	5.0	✓
ORP by Electrode	E125	373563	1	20	5.0	5.0	✓
pH by Meter	E108	372516	2	40	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	369690	2	31	6.4	5.0	✓
TDS by Gravimetry	E162	371909	4	70	5.7	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	374584	1	19	5.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	375528	1	9	11.1	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	374977	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	374583	1	19	5.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	369739	1	7	14.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	369765	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	369726	4	65	6.1	5.0	✓
Laboratory Control Samples (LCS)							
Acidity by Titration	E283	369891	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	372517	2	29	6.9	5.0	✓
Ammonia by Fluorescence	E298	369894	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	369689	2	31	6.4	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	369688	2	31	6.4	5.0	✓
Conductivity in Water	E100	372518	2	30	6.6	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	377071	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	380334	1	16	6.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	377072	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	369738	1	7	14.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	369930	1	20	5.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Fluoride in Water by IC	E235.F	369691	2	31	6.4	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	369687	2	31	6.4	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	369686	2	31	6.4	5.0	✓
ORP by Electrode	E125	373563	1	20	5.0	5.0	✓
pH by Meter	E108	372516	2	40	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	369690	2	31	6.4	5.0	✓
TDS by Gravimetry	E162	371909	4	70	5.7	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	374584	1	19	5.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	375528	1	9	11.1	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	374977	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	374583	1	19	5.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	369739	1	7	14.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	369765	1	20	5.0	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	371907	4	76	5.2	5.0	✓
Turbidity by Nephelometry	E121	369726	4	65	6.1	5.0	✓
Method Blanks (MB)							
Acidity by Titration	E283	369891	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	372517	2	29	6.9	5.0	✓
Ammonia by Fluorescence	E298	369894	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	369689	2	31	6.4	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	369688	2	31	6.4	5.0	✓
Conductivity in Water	E100	372518	2	30	6.6	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	377071	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	380334	1	16	6.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	377072	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	369738	1	7	14.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	369930	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	369691	2	31	6.4	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	369687	2	31	6.4	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	369686	2	31	6.4	5.0	✓
Sulfate in Water by IC	E235.SO4	369690	2	31	6.4	5.0	✓
TDS by Gravimetry	E162	371909	4	70	5.7	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	374584	1	19	5.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	375528	1	9	11.1	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	374977	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	374583	1	19	5.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	369739	1	7	14.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	369765	1	20	5.0	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	371907	4	76	5.2	5.0	✓
Turbidity by Nephelometry	E121	369726	4	65	6.1	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	369894	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	369689	2	31	6.4	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	369688	2	31	6.4	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	377071	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	380334	1	16	6.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	377072	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	369738	1	7	14.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	369930	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	369691	2	31	6.4	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	369687	2	31	6.4	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	369686	2	31	6.4	5.0	✓
Sulfate in Water by IC	E235.SO4	369690	2	31	6.4	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	374584	1	19	5.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	375528	1	9	11.1	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	374977	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	374583	1	19	5.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	369739	1	7	14.2	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	369765	1	20	5.0	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Calgary - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Calgary - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Calgary - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
ORP by Electrode	E125 Calgary - Environmental	Water	ASTM D1498 (mod)	Oxidation redution potential is reported as the oxidation-reduction potential of the platinum metal-reference electrode employed, measured in mV. For high accuracy test results, it is recommended that this analysis be conducted in the field.
TSS by Gravimetry (Low Level)	E160-L Calgary - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Calgary - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Acidity by Titration	E283 Calgary - Environmental	Water	APHA 2310 B (mod)	Acidity is determined by potentiometric titration to pH 8.3

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Calgary - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Total Kjeldahl Nitrogen is determined using block digestion followed by flow-injection analysis with fluorescence detection.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Calgary - Environmental	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U Calgary - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a flow analyzer on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L Vancouver - Environmental	Water	APHA 3030 B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAFS.
Dissolved Mercury in Water by CVAAS	E509 Vancouver - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 Calgary - Environmental	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested using block digestion with Copper Sulfate Digestion Reagent.
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Preparation for Dissolved Organic Carbon for Combustion	EP358 Calgary - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

QUALITY CONTROL REPORT

Work Order	: **CG2106842**	Page	: 1 of 21
Client	: Teck Coal Limited	Laboratory	: Calgary - Environmental
Contact	: Allie Ferguson	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Avenue Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 16-Dec-2021 09:00
PO	: VPO00748510	Date Analysis Commenced	: 16-Dec-2021
C-O-C number	: DECEMBER EVP LAEMP 2021	Issue Date	: 05-Jan-2022 11:33
Sampler	: AMC		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 7		
No. of samples analysed	: 7		

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

This Quality Control Report contains the following information:

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

Signatories

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

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General Comments

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

Key :

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 369726)											
CG2106788-001	Anonymous	turbidity	----	E121	0.10	NTU	0.40	0.38	0.02	Diff <2x LOR	----
Physical Tests (QC Lot: 369891)											
CG2106834-027	Anonymous	acidity (as CaCO3)	----	E283	10.0	mg/L	16.5	14.1	2.4	Diff <2x LOR	----
Physical Tests (QC Lot: 370735)											
CG2106761-002	Anonymous	turbidity	----	E121	0.10	NTU	26.8	26.4	1.50%	15%	----
Physical Tests (QC Lot: 371437)											
CG2106831-001	Anonymous	turbidity	----	E121	0.10	NTU	<0.10	<0.10	0	Diff <2x LOR	----
Physical Tests (QC Lot: 371557)											
CG2106834-017	Anonymous	turbidity	----	E121	0.10	NTU	7.32	7.36	0.490%	15%	----
Physical Tests (QC Lot: 371909)											
CG2106794-011	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	332	329	0.756%	20%	----
Physical Tests (QC Lot: 372482)											
CG2106761-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	474	470	0.742%	20%	----
Physical Tests (QC Lot: 372502)											
CG2106834-030	Anonymous	solids, total dissolved [TDS]	----	E162	40	mg/L	2450	2470	0.814%	20%	----
Physical Tests (QC Lot: 372516)											
CG2106834-018	Anonymous	pH	----	E108	0.10	pH units	8.03	8.05	0.249%	4%	----
Physical Tests (QC Lot: 372517)											
CG2106834-027	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	483	484	0.103%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	483	484	0.103%	20%	----
Physical Tests (QC Lot: 372518)											
CG2106834-027	Anonymous	conductivity	----	E100	2.0	µS/cm	1880	1890	0.424%	10%	----
Physical Tests (QC Lot: 372522)											
CG2106834-016	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	1670	1700	1.60%	20%	----
Physical Tests (QC Lot: 372528)											
CG2106842-004	RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	conductivity	----	E100	2.0	µS/cm	1960	1970	0.204%	10%	----
Physical Tests (QC Lot: 372529)											
CG2106842-004	RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	pH	----	E108	0.10	pH units	7.76	7.77	0.129%	4%	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Physical Tests (QC Lot: 372530)											
CG2106842-004	RG_ERCKUT_WS_LAEMP _EVO_2021-12-14_NP	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	484	478	1.18%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	484	478	1.18%	20%	----
Physical Tests (QC Lot: 373563)											
CG2106834-027	Anonymous	oxidation-reduction potential [ORP]	----	E125	0.10	mV	416	416	0.0721%	15%	----
Anions and Nutrients (QC Lot: 369686)											
CG2106837-030	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0050	mg/L	0.0237	0.0238	0.0001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 369687)											
CG2106837-030	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	3.38	3.38	0.0414%	20%	----
Anions and Nutrients (QC Lot: 369688)											
CG2106837-030	Anonymous	chloride	16887-00-6	E235.Cl-L	0.50	mg/L	8.08	8.03	0.620%	20%	----
Anions and Nutrients (QC Lot: 369689)											
CG2106837-030	Anonymous	bromide	24959-67-9	E235.Br-L	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 369690)											
CG2106837-030	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	819	816	0.463%	20%	----
Anions and Nutrients (QC Lot: 369691)											
CG2106837-030	Anonymous	fluoride	16984-48-8	E235.F	0.100	mg/L	0.250	0.240	0.010	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 369765)											
CG2106834-022	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0079	0.0072	0.0006	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 369894)											
CG2106834-027	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0711	0.0722	1.54%	20%	----
Anions and Nutrients (QC Lot: 369930)											
CG2106840-002	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0012	0.0013	0.00008	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 371400)											
CG2106842-006	RG_ERCKDT_WS_LAEMP _EVO_2021-12-15_NP	bromide	24959-67-9	E235.Br-L	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 371401)											
CG2106842-006	RG_ERCKDT_WS_LAEMP _EVO_2021-12-15_NP	chloride	16887-00-6	E235.Cl-L	0.50	mg/L	6.57	6.56	0.0746%	20%	----
Anions and Nutrients (QC Lot: 371402)											
CG2106842-006	RG_ERCKDT_WS_LAEMP _EVO_2021-12-15_NP	nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	18.3	17.6	4.33%	20%	----
Anions and Nutrients (QC Lot: 371403)											
CG2106842-006	RG_ERCKDT_WS_LAEMP _EVO_2021-12-15_NP	fluoride	16984-48-8	E235.F	0.100	mg/L	0.119	0.120	0.001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 371404)											

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Anions and Nutrients (QC Lot: 371404) - continued											
CG2106842-006	RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	788	806	2.21%	20%	----
Anions and Nutrients (QC Lot: 371405)											
CG2106842-006	RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	nitrite (as N)	14797-65-0	E235.NO2-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 375528)											
CG2106842-001	RG_M13_WS_LAEMP_EVO_2021-12-14_NP	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.091	0.074	0.016	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 369738)											
CG2106842-001	RG_M13_WS_LAEMP_EVO_2021-12-14_NP	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	2.57	2.48	0.10	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 369739)											
CG2106842-001	RG_M13_WS_LAEMP_EVO_2021-12-14_NP	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	1.76	1.76	0.003	Diff <2x LOR	----
Total Metals (QC Lot: 374583)											
CG2106788-001	Anonymous	aluminum, total	7429-90-5	E420	0.0060	mg/L	<0.0060	<0.0060	0	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00020	mg/L	0.00245	0.00253	3.25%	20%	----
		arsenic, total	7440-38-2	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00020	mg/L	0.0204	0.0199	2.24%	20%	----
		beryllium, total	7440-41-7	E420	0.040	mg/L	<0.040 µg/L	<0.000040	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.020	mg/L	0.130	0.135	0.006	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0100	mg/L	0.942 µg/L	0.000947	0.510%	20%	----
		calcium, total	7440-70-2	E420	0.100	mg/L	585	624	6.37%	20%	----
		cobalt, total	7440-48-4	E420	0.20	mg/L	85.0 µg/L	0.0869	2.24%	20%	----
		copper, total	7440-50-8	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.020	mg/L	0.078	0.078	0.0002	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000100	mg/L	0.000135	0.000130	0.000006	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0020	mg/L	1.24	1.26	2.14%	20%	----
		magnesium, total	7439-95-4	E420	0.0100	mg/L	251	255	1.65%	20%	----
		manganese, total	7439-96-5	E420	0.00020	mg/L	0.570	0.578	1.37%	20%	----
		molybdenum, total	7439-98-7	E420	0.000100	mg/L	0.00480	0.00499	3.81%	20%	----
		nickel, total	7440-02-0	E420	0.00100	mg/L	0.489	0.501	2.44%	20%	----
		potassium, total	7440-09-7	E420	0.100	mg/L	22.1	22.0	0.450%	20%	----
		selenium, total	7782-49-2	E420	0.100	mg/L	29.3 µg/L	0.0308	5.12%	20%	----
		silicon, total	7440-21-3	E420	0.20	mg/L	3.20	3.20	0.0348%	20%	----
		silver, total	7440-22-4	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.100	mg/L	37.0	38.8	4.89%	20%	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 374583) - continued											
CG2106788-001	Anonymous	strontium, total	7440-24-6	E420	0.00040	mg/L	1.59	1.66	4.28%	20%	----
		sulfur, total	7704-34-9	E420	1.00	mg/L	470	484	2.99%	20%	----
		thallium, total	7440-28-0	E420	0.000020	mg/L	0.000218	0.000215	1.53%	20%	----
		tin, total	7440-31-5	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00060	mg/L	<0.00060	<0.00060	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000020	mg/L	0.0363	0.0358	1.50%	20%	----
		vanadium, total	7440-62-2	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0060	mg/L	0.139	0.140	0.458%	20%	----
Total Metals (QC Lot: 374584)											
CG2106788-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 374977)											
CG2106842-001	RG_M13_WS_LAEMP_EVO_2021-12-14_NP	mercury, total	7439-97-6	E508-L	0.50	ng/L	1.06	1.01	0.05	Diff <2x LOR	----
Dissolved Metals (QC Lot: 377071)											
CG2106834-020	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00017	0.00018	0.000006	Diff <2x LOR	----
Dissolved Metals (QC Lot: 377072)											
CG2106834-020	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00023	0.00023	0.000005	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00061	0.00060	0.00001	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0132	0.0129	1.89%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0050	mg/L	0.0058 µg/L	0.0000077	0.0000019	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	324	313	3.46%	20%	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	0.236	0.235	0.444%	20%	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0745	0.0718	3.65%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	173	166	3.88%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.257	0.250	2.73%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00541	0.00565	4.38%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.103	0.101	2.11%	20%	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	5.69	5.50	3.38%	20%	----
		selenium, dissolved	7782-49-2	E421	0.050	mg/L	1.37 µg/L	0.00136	1.06%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	3.16	3.18	0.680%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	5.96	5.76	3.37%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.400	0.398	0.577%	20%	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Dissolved Metals (QC Lot: 377072) - continued											
CG2106834-020	Anonymous	sulfur, dissolved	7704-34-9	E421	0.50	mg/L	332	334	0.432%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	0.000060	0.000057	0.000002	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.0142	0.0136	4.40%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0281	0.0272	3.26%	20%	----
Dissolved Metals (QC Lot: 380334)											
CG2106842-001	RG_M13_WS_LAEMP_EVO_2021-12-14_NP	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 369726)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 369891)						
acidity (as CaCO3)	----	E283	2	mg/L	2.0	----
Physical Tests (QCLot: 370735)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 371437)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 371557)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 371907)						
solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 371909)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 372480)						
solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 372482)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 372502)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 372517)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 372518)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 372520)						
solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 372522)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 372524)						
solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 372528)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 372528) - continued						
conductivity	----	E100	1	µS/cm	1.2	----
Physical Tests (QCLot: 372530)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 369686)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 369687)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 369688)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 369689)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 369690)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 369691)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 369765)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 369894)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 369930)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 371400)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 371401)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 371402)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 371403)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 371404)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 371405)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 375528)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Organic / Inorganic Carbon (QCLot: 369738)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 369739)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 374583)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 374583) - continued						
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Total Metals (QCLot: 374584)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Total Metals (QCLot: 374977)						
mercury, total	7439-97-6	E508-L	0.5	ng/L	<0.50	----
Dissolved Metals (QCLot: 377071)						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	----
Dissolved Metals (QCLot: 377072)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Dissolved Metals (QCLot: 380334)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 369726)									
turbidity	----	E121	0.1	NTU	200 NTU	103	85.0	115	----
Physical Tests (QCLot: 369891)									
acidity (as CaCO3)	----	E283	2	mg/L	50 mg/L	108	85.0	115	----
Physical Tests (QCLot: 370735)									
turbidity	----	E121	0.1	NTU	200 NTU	101	85.0	115	----
Physical Tests (QCLot: 371437)									
turbidity	----	E121	0.1	NTU	200 NTU	100	85.0	115	----
Physical Tests (QCLot: 371557)									
turbidity	----	E121	0.1	NTU	200 NTU	101	85.0	115	----
Physical Tests (QCLot: 371907)									
solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	106	85.0	115	----
Physical Tests (QCLot: 371909)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	94.0	85.0	115	----
Physical Tests (QCLot: 372480)									
solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	112	85.0	115	----
Physical Tests (QCLot: 372482)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	99.1	85.0	115	----
Physical Tests (QCLot: 372502)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	103	85.0	115	----
Physical Tests (QCLot: 372516)									
pH	----	E108	----	pH units	7 pH units	100	98.6	101	----
Physical Tests (QCLot: 372517)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	100	85.0	115	----
Physical Tests (QCLot: 372518)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	96.4	90.0	110	----
Physical Tests (QCLot: 372520)									
solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	104	85.0	115	----
Physical Tests (QCLot: 372522)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	90.9	85.0	115	----
Physical Tests (QCLot: 372524)									
solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	91.2	85.0	115	----
Physical Tests (QCLot: 372528)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	97.1	90.0	110	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Physical Tests (QCLot: 372529)									
pH	----	E108	----	pH units	7 pH units	100	98.6	101	----
Physical Tests (QCLot: 372530)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	104	85.0	115	----
Physical Tests (QCLot: 373563)									
oxidation-reduction potential [ORP]	----	E125	----	mV	220 mV	100	95.4	104	----
Anions and Nutrients (QCLot: 369686)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 369687)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 369688)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 369689)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	102	85.0	115	----
Anions and Nutrients (QCLot: 369690)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 369691)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 369765)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	8.02 mg/L	97.5	80.0	120	----
Anions and Nutrients (QCLot: 369894)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	106	85.0	115	----
Anions and Nutrients (QCLot: 369930)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.02 mg/L	95.7	80.0	120	----
Anions and Nutrients (QCLot: 371400)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	101	85.0	115	----
Anions and Nutrients (QCLot: 371401)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 371402)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 371403)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	96.6	90.0	110	----
Anions and Nutrients (QCLot: 371404)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 371405)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 375528)									

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Anions and Nutrients (QCLot: 375528) - continued									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	104	75.0	125	----
Organic / Inorganic Carbon (QCLot: 369738)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	10 mg/L	87.6	80.0	120	----
Organic / Inorganic Carbon (QCLot: 369739)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	10 mg/L	88.2	80.0	120	----
Total Metals (QCLot: 374583)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	103	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	105	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	101	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	98.8	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	97.8	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	96.6	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	99.5	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	98.2	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	98.5	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	101	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	97.2	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	102	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	97.7	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	102	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	97.9	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	99.0	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	100.0	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	92.2	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	104	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	108	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	95.3	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	103	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	97.9	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	100	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	95.8	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	101	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Total Metals (QCLot: 374583) - continued									
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	100	80.0	120	----
Total Metals (QCLot: 374584)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	99.6	80.0	120	----
Total Metals (QCLot: 374977)									
mercury, total	7439-97-6	E508-L	0.5	ng/L	5 ng/L	99.6	80.0	120	----
Dissolved Metals (QCLot: 377071)									
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	105	80.0	120	----
Dissolved Metals (QCLot: 377072)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	106	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	95.2	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	102	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	105	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	103	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	99.9	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	102	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	95.6	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	101	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	91.1	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	105	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	99.7	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	104	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	99.0	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	99.7	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	88.9	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	103	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	97.5	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	99.9	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	96.1	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	93.5	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	104	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	104	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	104	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	86.6	80.0	120	----

Matrix Spike (MS) Report

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

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 369686)										
CG2106842-002	RG_RIVER_WS_LAEMP_EVO_2021-09_NP	nitrite (as N)	14797-65-0	E235.NO2-L	0.456 mg/L	0.5 mg/L	91.3	75.0	125	----
Anions and Nutrients (QCLot: 369687)										
CG2106842-002	RG_RIVER_WS_LAEMP_EVO_2021-09_NP	nitrate (as N)	14797-55-8	E235.NO3-L	ND mg/L	2.5 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 369688)										
CG2106842-002	RG_RIVER_WS_LAEMP_EVO_2021-09_NP	chloride	16887-00-6	E235.Cl-L	90.3 mg/L	100 mg/L	90.3	75.0	125	----
Anions and Nutrients (QCLot: 369689)										
CG2106842-002	RG_RIVER_WS_LAEMP_EVO_2021-09_NP	bromide	24959-67-9	E235.Br-L	0.439 mg/L	0.5 mg/L	87.8	75.0	125	----
Anions and Nutrients (QCLot: 369690)										
CG2106842-002	RG_RIVER_WS_LAEMP_EVO_2021-09_NP	sulfate (as SO4)	14808-79-8	E235.SO4	ND mg/L	100 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 369691)										
CG2106842-002	RG_RIVER_WS_LAEMP_EVO_2021-09_NP	fluoride	16984-48-8	E235.F	0.796 mg/L	1 mg/L	79.6	75.0	125	----
Anions and Nutrients (QCLot: 369765)										
CG2106834-023	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0517 mg/L	0.0676 mg/L	76.4	70.0	130	----
Anions and Nutrients (QCLot: 369894)										
CG2106842-003	RG_TRIP_WS_LAEMP_EVO_2021-12_NP	ammonia, total (as N)	7664-41-7	E298	0.110 mg/L	0.1 mg/L	110	75.0	125	----
Anions and Nutrients (QCLot: 369930)										
CG2106840-003	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0512 mg/L	0.05 mg/L	102	70.0	130	----
Anions and Nutrients (QCLot: 371400)										
CG2106842-007	RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	bromide	24959-67-9	E235.Br-L	0.517 mg/L	0.5 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 371401)										
CG2106842-007	RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	chloride	16887-00-6	E235.Cl-L	99.7 mg/L	100 mg/L	99.7	75.0	125	----
Anions and Nutrients (QCLot: 371402)										
CG2106842-007	RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	nitrate (as N)	14797-55-8	E235.NO3-L	2.52 mg/L	2.5 mg/L	101	75.0	125	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 371403)										
CG2106842-007	RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	fluoride	16984-48-8	E235.F	1.00 mg/L	1 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 371404)										
CG2106842-007	RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	sulfate (as SO4)	14808-79-8	E235.SO4	99.6 mg/L	100 mg/L	99.6	75.0	125	----
Anions and Nutrients (QCLot: 371405)										
CG2106842-007	RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	nitrite (as N)	14797-65-0	E235.NO2-L	0.507 mg/L	0.5 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 375528)										
CG2106842-002	RG_RIVER_WS_LAEMP_EVO_2021-09_NP	Kjeldahl nitrogen, total [TKN]	----	E318	2.34 mg/L	2.5 mg/L	93.4	70.0	130	----
Organic / Inorganic Carbon (QCLot: 369738)										
CG2106842-001	RG_M13_WS_LAEMP_EVO_2021-12-14_NP	carbon, dissolved organic [DOC]	----	E358-L	22.0 mg/L	23.9 mg/L	91.8	70.0	130	----
Organic / Inorganic Carbon (QCLot: 369739)										
CG2106842-001	RG_M13_WS_LAEMP_EVO_2021-12-14_NP	carbon, total organic [TOC]	----	E355-L	22.4 mg/L	23.9 mg/L	93.8	70.0	130	----
Total Metals (QCLot: 374583)										
CG2106788-002	Anonymous	aluminum, total	7429-90-5	E420	0.400 mg/L	0.4 mg/L	100	70.0	130	----
		antimony, total	7440-36-0	E420	0.0410 mg/L	0.04 mg/L	102	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0419 mg/L	0.04 mg/L	105	70.0	130	----
		barium, total	7440-39-3	E420	0.0388 mg/L	0.04 mg/L	97.1	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0765 mg/L	0.08 mg/L	95.6	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0176 mg/L	0.02 mg/L	88.0	70.0	130	----
		boron, total	7440-42-8	E420	0.196 mg/L	0.2 mg/L	98.0	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00773 mg/L	0.008 mg/L	96.6	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	8 mg/L	ND	70.0	130	----
		cobalt, total	7440-48-4	E420	ND mg/L	0.04 mg/L	ND	70.0	130	----
		copper, total	7440-50-8	E420	0.0359 mg/L	0.04 mg/L	89.7	70.0	130	----
		iron, total	7439-89-6	E420	4.00 mg/L	4 mg/L	100.0	70.0	130	----
		lead, total	7439-92-1	E420	0.0358 mg/L	0.04 mg/L	89.6	70.0	130	----
		lithium, total	7439-93-2	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.04 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0428 mg/L	0.04 mg/L	107	70.0	130	----
		nickel, total	7440-02-0	E420	ND mg/L	0.08 mg/L	ND	70.0	130	----
		potassium, total	7440-09-7	E420	ND mg/L	8 mg/L	ND	70.0	130	----
		selenium, total	7782-49-2	E420	0.0885 mg/L	0.08 mg/L	111	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*Concentration*	*Target*	*MS*	*Low*	*High*	*Qualifier*
Total Metals (QCLot: 374583) - continued										
CG2106788-002	Anonymous	silicon, total	7440-21-3	E420	19.5 mg/L	20 mg/L	97.3	70.0	130	----
		silver, total	7440-22-4	E420	0.00774 mg/L	0.008 mg/L	96.8	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.04 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	40 mg/L	ND	70.0	130	----
		thallium, total	7440-28-0	E420	0.00723 mg/L	0.008 mg/L	90.4	70.0	130	----
		tin, total	7440-31-5	E420	0.0393 mg/L	0.04 mg/L	98.4	70.0	130	----
		titanium, total	7440-32-6	E420	0.0851 mg/L	0.08 mg/L	106	70.0	130	----
		uranium, total	7440-61-1	E420	ND mg/L	0.008 mg/L	ND	70.0	130	----
		vanadium, total	7440-62-2	E420	0.208 mg/L	0.2 mg/L	104	70.0	130	----
		zinc, total	7440-66-6	E420	0.732 mg/L	0.8 mg/L	91.5	70.0	130	----
Total Metals (QCLot: 374584)										
CG2106788-002	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.0790 mg/L	0.08 mg/L	98.7	70.0	130	----
Total Metals (QCLot: 374977)										
CG2106842-002	RG_RIVER_WS_LAEMP_EVO_2021-09_NP	mercury, total	7439-97-6	E508-L	4.11 ng/L	5 ng/L	82.2	70.0	130	----
Dissolved Metals (QCLot: 377071)										
CG2106834-021	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.0427 mg/L	0.04 mg/L	107	70.0	130	----
Dissolved Metals (QCLot: 377072)										
CG2106834-021	Anonymous	aluminum, dissolved	7429-90-5	E421	0.215 mg/L	0.2 mg/L	108	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0232 mg/L	0.02 mg/L	116	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.0206 mg/L	0.02 mg/L	103	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0414 mg/L	0.04 mg/L	104	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00397 mg/L	0.004 mg/L	99.3	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0184 mg/L	0.02 mg/L	92.2	70.0	130	----
		iron, dissolved	7439-89-6	E421	2.02 mg/L	2 mg/L	101	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.105 mg/L	0.1 mg/L	105	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0215 mg/L	0.02 mg/L	108	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0375 mg/L	0.04 mg/L	93.8	70.0	130	----
		potassium, dissolved	7440-09-7	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0444 mg/L	0.04 mg/L	111	70.0	130	----
		silicon, dissolved	7440-21-3	E421	10.3 mg/L	10 mg/L	103	70.0	130	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
					Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 377072) - continued										
CG2106834-021	Anonymous	silver, dissolved	7440-22-4	E421	0.00323 mg/L	0.004 mg/L	80.7	70.0	130	----
		sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	ND mg/L	20 mg/L	ND	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00356 mg/L	0.004 mg/L	89.1	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0433 mg/L	0.04 mg/L	108	70.0	130	----
		uranium, dissolved	7440-61-1	E421	ND mg/L	0.004 mg/L	ND	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.111 mg/L	0.1 mg/L	111	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.384 mg/L	0.4 mg/L	96.1	70.0	130	----
Dissolved Metals (QCLot: 380334)										
CG2106842-002	RG_RIVER_WS_LAEMP_EVO_2021-09_NP	mercury, dissolved	7439-97-6	E509	0.0000989 mg/L	0.0001 mg/L	98.9	70.0	130	----

Teck

COC ID:	December EVO LAEMP 2021	TURNAROUND TIME:	

PROJECT/CLIENT INFO

Facility Name / Job#	REP
Project Manager	Allie Ferguson
Email	[illegible]
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
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teckcoal@equisonline.com			x
[illegible]	x	x	x
[illegible]	x	x	x
[illegible]	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.	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
								Filtered	N	F	N	N	F	N	F
								Preserv.		H2SO4	H2SO4		HCL	HNO3	HNO3
1	RG_MI3_WS_LAEMP_EVO_2021-12-14_NP	RG_MI3	WS	No	12/14/2021	15:30	G	7	X	X	X	X	X	X	X
2	RG_RIVER_WS_LAEMP_EVO_2021-09_NP	RG_RIVER	WS	No	12/14/2021	13:30	G	7	X	X	X	X	X	X	X
3	RG_TRIP_WS_LAEMP_EVO_2021-12_NP	RG_TRIP	WS	No	12/14/2021	13:30	G	7	X	X	X	X	X	X	X
4	RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_NP	RG_ERCKUT	WS	No	12/14/2021	13:30	G	7	X	X	X	X	X	X	X
5	RG_ERCK_WS_LAEMP_EVO_2021-12-14_NP	RG_ERCK	WS	No	12/14/2021	9:45	G	7	X	X	X	X	X	X	X
6	RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_NP	RG_ERCKDT	WS	No	12/15/2021	12:00	G	7	X	X	X	X	X	X	X
7	RG_FBLANK_WS_LAEMP_EVO_2021-12-15_NP	RG_FBLANK	WS	No	12/15/2021	16:00	G	7	x	x	x	x	x	x	x

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

ALS PO 750546

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Alex McClymont/Minnow	December 15, 2021		12/16 9:00

3

NB OF BOTTLES RETURNED/DESCRIPTION

Regular (default) x
Priority (2-3 business days) - 50% surcharge
Emergency (1 Business Day) - 100% surcharge
Same Day, ASAP or Weekend - Contact ALS

Sampler's Name	Alex McClymont	Mobile #	780-293-6750
Sampler's Signature	AMC	Date/Time	December 15, 2021

Environmental Division
Calgary
Work Order Reference
CG2106842

Telephone: 1 403 407 1800

WATER CHEMISTRY

ALS Laboratory Report CG2106846

(Finalized January 5, 2022)

CERTIFICATE OF ANALYSIS

Work Order	:	**CG2106846**	Page	:	1 of 6
Client	:	**Teck Coal Limited**	Laboratory	:	Calgary - Environmental
Contact	:	Allie Ferguson	Account Manager	:	Lyudmyla Shvets
Address	:	421 Pine Avenue Sparwood BC Canada	Address	:	2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	:	----	Telephone	:	+1 403 407 1800
Project	:	REGIONAL EFFECTS PROGRAM	Date Samples Received	:	16-Dec-2021 09:00
PO	:	VPO00748510	Date Analysis Commenced	:	16-Dec-2021
C-O-C number	:	DECEMBER EVO LAEMP 2021	Issue Date	:	05-Jan-2022 11:41
Sampler	:	AMC			
Site	:	----			
Quote number	:	Teck Coal Master Quote			
No. of samples received	:	1			
No. of samples analysed	:	1			

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Elke Tabora		Inorganics, Calgary, Alberta
Hannah Phung	Lab Assistant	Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Ilnaz Badbezanchi	Team Leader - Metals preparation	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Maria Tuguinay	Lab Assistant	Inorganics, Calgary, Alberta
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Parker Sgarbossa	Laboratory Analyst	Inorganics, Calgary, Alberta
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta

General Comments

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

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

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

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

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	Description
-	No Unit
%	percent
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
meq/L	milliequivalents per litre
mg/L	milligrams per litre
mV	millivolts
ng/L	nanograms per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	Description
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
DTSE	*Dissolved Se concentration exceeds total. Positive bias on D-Se suspected due to signal enhancement from volatile selenium species. Contact ALS if an alternative test to address this interference is needed.*
TKNI	*TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.*

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	EV_EC_FLOW2_2021-12-15_NP	----	----	----	----
				Client sampling date / time	15-Dec-2021 14:00	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	CG2106846-001	--------	--------	--------	--------
					Result	----	----	----	----
Physical Tests									
acidity (as CaCO3)	----	E283	2.0	mg/L	<2.0	----	----	----	----
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	487	----	----	----	----
alkalinity, bicarbonate (as HCO3)	71-52-3	E290	1.0	mg/L	594	----	----	----	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	----	----	----	----
alkalinity, carbonate (as CO3)	3812-32-6	E290	1.0	mg/L	<1.0	----	----	----	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	----	----	----	----
alkalinity, hydroxide (as OH)	14280-30-9	E290	1.0	mg/L	<1.0	----	----	----	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	487	----	----	----	----
conductivity	----	E100	2.0	µS/cm	1930	----	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L	1350	----	----	----	----
oxidation-reduction potential [ORP]	----	E125	0.10	mV	401	----	----	----	----
pH	----	E108	0.10	pH units	8.12	----	----	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L	1790	----	----	----	----
solids, total suspended [TSS]	----	E160-L	1.0	mg/L	5.7	----	----	----	----
turbidity	----	E121	0.10	NTU	1.32	----	----	----	----
Anions and Nutrients									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	----	----	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.250 DLDS	----	----	----	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L	17.4	----	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L	<0.100 DLDS	----	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	<0.050 TKNI	----	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	15.3	----	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0076	----	----	----	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0128	----	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0148 DLM	----	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	805	----	----	----	----
Organic / Inorganic Carbon									
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	0.83	----	----	----	----
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	0.86	----	----	----	----

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	EV_EC_FLOW2_2021-12-15_NP	----	----	----	----
				Client sampling date / time	15-Dec-2021 14:00	----	----	----	----
					CG2106846-001	--------	--------	--------	--------
					Result	----	----	----	----
Ion Balance									
anion sum	----	EC101	0.10	meq/L	28.1	----	----	----	----
cation sum	----	EC101	0.10	meq/L	27.2	----	----	----	----
ion balance (cations/anions ratio)	----	EC101	0.010	%	96.8	----	----	----	----
ion balance (cation-anion difference)	----	EC101	0.010	%	1.63	----	----	----	----
Total Metals									
aluminum, total	7429-90-5	E420	0.0030	mg/L	<0.0030	----	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00023	----	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00032	----	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L	0.0560	----	----	----	----
beryllium, total	7440-41-7	E420	0.020	µg/L	<0.020	----	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	----	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L	0.016	----	----	----	----
cadmium, total	7440-43-9	E420	0.0050	µg/L	0.185	----	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L	263	----	----	----	----
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00019	----	----	----	----
cobalt, total	7440-48-4	E420	0.10	µg/L	1.31	----	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	----	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L	0.057	----	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	----	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0317	----	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	153	----	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L	0.0313	----	----	----	----
mercury, total	7439-97-6	E508-L	0.50	ng/L	<0.50	----	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00285	----	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L	0.0125	----	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L	2.85	----	----	----	----
selenium, total	7782-49-2	E420	0.050	µg/L	149	----	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L	3.86	----	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	----	----	----	----
sodium, total	7440-23-5	E420	0.050	mg/L	3.79	----	----	----	----

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

				Client sample ID	EV_EC_FLOW2_2021-12-15_NP	----	----	----	----
				Client sampling date / time	15-Dec-2021 14:00	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	CG2106846-001	--------	--------	--------	--------
					Result	----	----	----	----
Total Metals									
strontium, total	7440-24-6	E420	0.00020	mg/L	0.245	----	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L	308	----	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L	0.000038	----	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	----	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	----	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L	0.00883	----	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	----	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L	0.0097	----	----	----	----
Dissolved Metals									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0010	----	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00019	----	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00031	----	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0590	----	----	----	----
beryllium, dissolved	7440-41-7	E421	0.020	µg/L	<0.020	----	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0050	µg/L	0.176	----	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	283	----	----	----	----
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00021	----	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	----	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	----	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0283	----	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	156	----	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0249	----	----	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	----	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00152	----	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.0128	----	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	2.86	----	----	----	----
selenium, dissolved	7782-49-2	E421	0.050	µg/L	209 DTSE	----	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	4.19	----	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	----	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L	3.60	----	----	----	----

Analytical Results

Sub-Matrix: **Water**

(Matrix: **Water**)

					Client sample ID	EV_EC_FLOW2_2021-12-15_NP	----	----	----	----
					Client sampling date / time	15-Dec-2021 14:00	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit		CG2106846-001	--------	--------	--------	--------
						Result	----	----	----	----
Dissolved Metals										
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.240	----	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		316	----	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		0.000036	----	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00030	----	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.00848	----	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	----	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0092	----	----	----	----
dissolved mercury filtration location	----	EP509	-	-		Field	----	----	----	----
dissolved metals filtration location	----	EP421	-	-		Field	----	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2106846**	Page	: 1 of 13
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Allie Ferguson	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Avenue Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 16-Dec-2021 09:00
PO	: VPO00748510	Issue Date	: 05-Jan-2022 11:41
C-O-C number	: DECEMBER EVO LAEMP 2021		
Sampler	: AMC		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 1		
No. of samples analysed	: 1		

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

Key

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Anions and Nutrients	CG2106846-001	EV_EC_FLOW2_2021-12-15_NP	Kjeldahl nitrogen, total [TKN]	----	E318	0.125 % TKND	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).

Result Qualifiers

Qualifier	*Description*
TKND	*TKN duplication was poor due to interference from high nitrate, which causes negative bias on TKN.*

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Extraction / Preparation: Holding Times Rec	Extraction / Preparation: Holding Times Actual	Extraction / Preparation: Eval	Analysis: Analysis Date	Analysis: Holding Times Rec	Analysis: Holding Times Actual	Analysis: Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) EV_EC_FLOW2_2021-12-15_NP	E298	15-Dec-2021	16-Dec-2021	----	----		16-Dec-2021	28 days	1 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE EV_EC_FLOW2_2021-12-15_NP	E235.Br-L	15-Dec-2021	----	----	----		18-Dec-2021	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE EV_EC_FLOW2_2021-12-15_NP	E235.Cl-L	15-Dec-2021	----	----	----		18-Dec-2021	28 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE EV_EC_FLOW2_2021-12-15_NP	E378-U	15-Dec-2021	----	----	----		16-Dec-2021	3 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE EV_EC_FLOW2_2021-12-15_NP	E235.F	15-Dec-2021	----	----	----		18-Dec-2021	28 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE EV_EC_FLOW2_2021-12-15_NP	E235.NO3-L	15-Dec-2021	----	----	----		18-Dec-2021	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE EV_EC_FLOW2_2021-12-15_NP	E235.NO2-L	15-Dec-2021	----	----	----		18-Dec-2021	3 days	3 days	✓

Matrix: **Water**

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

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE EV_EC_FLOW2_2021-12-15_NP	E235.SO4	15-Dec-2021	----	----	----		18-Dec-2021	28 days	3 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) EV_EC_FLOW2_2021-12-15_NP	E318	15-Dec-2021	22-Dec-2021	----	----		23-Dec-2021	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) EV_EC_FLOW2_2021-12-15_NP	E372-U	15-Dec-2021	21-Dec-2021	----	----		21-Dec-2021	28 days	6 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE dissolved (nitric acid) EV_EC_FLOW2_2021-12-15_NP	E421.Cr-L	15-Dec-2021	28-Dec-2021	----	----		28-Dec-2021	180 days	13 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) EV_EC_FLOW2_2021-12-15_NP	E509	15-Dec-2021	04-Jan-2022	----	----		04-Jan-2022	28 days	20 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) EV_EC_FLOW2_2021-12-15_NP	E421	15-Dec-2021	28-Dec-2021	----	----		28-Dec-2021	180 days	13 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) EV_EC_FLOW2_2021-12-15_NP	E358-L	15-Dec-2021	16-Dec-2021	----	----		18-Dec-2021	28 days	3 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) EV_EC_FLOW2_2021-12-15_NP	E355-L	15-Dec-2021	16-Dec-2021	----	----		18-Dec-2021	28 days	3 days	✓
Physical Tests : Acidity by Titration										
HDPE EV_EC_FLOW2_2021-12-15_NP	E283	15-Dec-2021	----	----	----		16-Dec-2021	14 days	1 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE EV_EC_FLOW2_2021-12-15_NP	E290	15-Dec-2021	----	----	----		20-Dec-2021	14 days	5 days	✓
Physical Tests : Conductivity in Water										
HDPE EV_EC_FLOW2_2021-12-15_NP	E100	15-Dec-2021	----	----	----		20-Dec-2021	28 days	5 days	✓
Physical Tests : ORP by Electrode										
HDPE EV_EC_FLOW2_2021-12-15_NP	E125	15-Dec-2021	----	----	----		22-Dec-2021	0.25 hrs	165 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE EV_EC_FLOW2_2021-12-15_NP	E108	15-Dec-2021	----	----	----		20-Dec-2021	0.25 hrs	116 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE EV_EC_FLOW2_2021-12-15_NP	E162	15-Dec-2021	----	----	----		21-Dec-2021	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE EV_EC_FLOW2_2021-12-15_NP	E160-L	15-Dec-2021	----	----	----		21-Dec-2021	7 days	6 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE EV_EC_FLOW2_2021-12-15_NP	E121	15-Dec-2021	----	----	----		18-Dec-2021	3 days	3 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE total (nitric acid) EV_EC_FLOW2_2021-12-15_NP	E420.Cr-L	15-Dec-2021	----	----	----		23-Dec-2021	180 days	8 days	✓
Total Metals : Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)										
Pre-cleaned amber glass - total (lab preserved) EV_EC_FLOW2_2021-12-15_NP	E508-L	15-Dec-2021	----	----	----		23-Dec-2021	28 days	8 days	✓

Matrix: **Water**

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

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
EV_EC_FLOW2_2021-12-15_NP	E420	15-Dec-2021	----	----	----		23-Dec-2021	180 days	8 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

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

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Acidity by Titration	E283	369891	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	372530	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	369894	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	371383	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	371384	1	20	5.0	5.0	✓
Conductivity in Water	E100	372528	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	377071	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	380334	1	16	6.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	377072	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	369869	1	8	12.5	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	369930	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	371381	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	371379	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	371380	1	20	5.0	5.0	✓
ORP by Electrode	E125	373563	1	20	5.0	5.0	✓
pH by Meter	E108	372529	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	371382	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	372522	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	374584	1	19	5.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	375014	1	20	5.0	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	375468	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	374583	1	19	5.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	369872	1	9	11.1	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	369765	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	371557	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Acidity by Titration	E283	369891	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	372530	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	369894	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	371383	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	371384	1	20	5.0	5.0	✓
Conductivity in Water	E100	372528	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	377071	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	380334	1	16	6.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	377072	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	369869	1	8	12.5	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	369930	1	20	5.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Fluoride in Water by IC	E235.F	371381	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	371379	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	371380	1	20	5.0	5.0	✓
ORP by Electrode	E125	373563	1	20	5.0	5.0	✓
pH by Meter	E108	372529	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	371382	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	372522	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	374584	1	19	5.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	375014	1	20	5.0	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	375468	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	374583	1	19	5.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	369872	1	9	11.1	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	369765	1	20	5.0	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	372524	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	371557	1	20	5.0	5.0	✓
Method Blanks (MB)							
Acidity by Titration	E283	369891	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	372530	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	369894	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	371383	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	371384	1	20	5.0	5.0	✓
Conductivity in Water	E100	372528	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	377071	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	380334	1	16	6.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	377072	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	369869	1	8	12.5	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	369930	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	371381	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	371379	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	371380	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	371382	1	20	5.0	5.0	✓
TDS by Gravimetry	E162	372522	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	374584	1	19	5.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	375014	1	20	5.0	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	375468	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	374583	1	19	5.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	369872	1	9	11.1	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	369765	1	20	5.0	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	372524	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	371557	1	20	5.0	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	369894	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	371383	1	20	5.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	371384	1	20	5.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	377071	1	20	5.0	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	380334	1	16	6.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	377072	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	369869	1	8	12.5	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	369930	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	371381	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	371379	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	371380	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	371382	1	20	5.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	374584	1	19	5.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	375014	1	20	5.0	5.0	✓
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L	375468	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	374583	1	19	5.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	369872	1	9	11.1	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	369765	1	20	5.0	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Calgary - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Calgary - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Calgary - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
ORP by Electrode	E125 Calgary - Environmental	Water	ASTM D1498 (mod)	Oxidation redution potential is reported as the oxidation-reduction potential of the platinum metal-reference electrode employed, measured in mV. For high accuracy test results, it is recommended that this analysis be conducted in the field.
TSS by Gravimetry (Low Level)	E160-L Calgary - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Calgary - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Acidity by Titration	E283 Calgary - Environmental	Water	APHA 2310 B (mod)	Acidity is determined by potentiometric titration to pH 8.3

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Calgary - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Total Kjeldahl Nitrogen is determined using block digestion followed by flow-injection analysis with fluorescence detection.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Calgary - Environmental	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U Calgary - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a flow analyzer on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L Vancouver - Environmental	Water	APHA 3030 B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS
Total Mercury in Water by CVAFS (Low Level, LOR = 0.5 ppt)	E508-L Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAFS.
Dissolved Mercury in Water by CVAAS	E509 Vancouver - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as $CaCO_3$), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in $CaCO_3$ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 Calgary - Environmental	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested using block digestion with Copper Sulfate Digestion Reagent.
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Preparation for Dissolved Organic Carbon for Combustion	EP358 Calgary - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO_3.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Mercury Water Filtration	EP509 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

QUALITY CONTROL REPORT

Work Order	: **CG2106846**	Page	: 1 of 17
Client	: Teck Coal Limited	Laboratory	: Calgary - Environmental
Contact	: Allie Ferguson	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Avenue Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 16-Dec-2021 09:00
PO	: VPO00748510	Date Analysis Commenced	: 16-Dec-2021
C-O-C number	: DECEMBER EVO LAEMP 2021	Issue Date	: 05-Jan-2022 11:41
Sampler	: AMC		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 1		
No. of samples analysed	: 1		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Team Leader - Inorganics	Inorganics, Calgary, Alberta
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Dee Lee	Analyst	Metals, Burnaby, British Columbia
Elke Tabora		Inorganics, Calgary, Alberta
Hannah Phung	Lab Assistant	Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Ilnaz Badbezanchi	Team Leader - Metals preparation	Metals, Burnaby, British Columbia
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Parker Sgarbossa	Laboratory Analyst	Inorganics, Calgary, Alberta
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta

General Comments

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

Key :

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 369891)											
CG2106834-027	Anonymous	acidity (as CaCO3)	----	E283	10.0	mg/L	16.5	14.1	2.4	Diff <2x LOR	----
Physical Tests (QC Lot: 371557)											
CG2106834-017	Anonymous	turbidity	----	E121	0.10	NTU	7.32	7.36	0.490%	15%	----
Physical Tests (QC Lot: 372522)											
CG2106834-016	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	1670	1700	1.60%	20%	----
Physical Tests (QC Lot: 372528)											
CG2106842-004	Anonymous	conductivity	----	E100	2.0	µS/cm	1960	1970	0.204%	10%	----
Physical Tests (QC Lot: 372529)											
CG2106842-004	Anonymous	pH	----	E108	0.10	pH units	7.76	7.77	0.129%	4%	----
Physical Tests (QC Lot: 372530)											
CG2106842-004	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	484	478	1.18%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	484	478	1.18%	20%	----
Physical Tests (QC Lot: 373563)											
CG2106834-027	Anonymous	oxidation-reduction potential [ORP]	----	E125	0.10	mV	416	416	0.0721%	15%	----
Anions and Nutrients (QC Lot: 369765)											
CG2106834-022	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0079	0.0072	0.0006	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 369894)											
CG2106834-027	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0711	0.0722	1.54%	20%	----
Anions and Nutrients (QC Lot: 369930)											
CG2106840-002	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0012	0.0013	0.00008	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 371379)											
CG2106832-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	5.50	5.31	3.54%	20%	----
Anions and Nutrients (QC Lot: 371380)											
CG2106832-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0050	mg/L	0.0124	0.0075	0.0049	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 371381)											
CG2106832-001	Anonymous	fluoride	16984-48-8	E235.F	0.100	mg/L	0.133	0.112	0.020	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 371382)											
CG2106832-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	831	843	1.51%	20%	----
Anions and Nutrients (QC Lot: 371383)											

Sub-Matrix: **Water**

Laboratory Duplicate (DUP) Report

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Anions and Nutrients (QC Lot: 371383) - continued											
CG2106832-001	Anonymous	bromide	24959-67-9	E235.Br-L	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 371384)											
CG2106832-001	Anonymous	chloride	16887-00-6	E235.Cl-L	0.50	mg/L	1.04	1.04	0.002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 375014)											
CG2106846-001	EV_EC_FLOW2_2021-12-15_NP	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	<0.050	# 0.175	0.125	Diff <2x LOR	TKND
Organic / Inorganic Carbon (QC Lot: 369869)											
CG2106846-001	EV_EC_FLOW2_2021-12-15_NP	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	0.83	0.88	0.04	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 369872)											
CG2106846-001	EV_EC_FLOW2_2021-12-15_NP	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	0.86	0.74	0.12	Diff <2x LOR	----
Total Metals (QC Lot: 374583)											
CG2106788-001	Anonymous	aluminum, total	7429-90-5	E420	0.0060	mg/L	<0.0060	<0.0060	0	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00020	mg/L	0.00245	0.00253	3.25%	20%	----
		arsenic, total	7440-38-2	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00020	mg/L	0.0204	0.0199	2.24%	20%	----
		beryllium, total	7440-41-7	E420	0.040	mg/L	<0.040 µg/L	<0.000040	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.020	mg/L	0.130	0.135	0.006	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0100	mg/L	0.942 µg/L	0.000947	0.510%	20%	----
		calcium, total	7440-70-2	E420	0.100	mg/L	585	624	6.37%	20%	----
		cobalt, total	7440-48-4	E420	0.20	mg/L	85.0 µg/L	0.0869	2.24%	20%	----
		copper, total	7440-50-8	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.020	mg/L	0.078	0.078	0.0002	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000100	mg/L	0.000135	0.000130	0.000006	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0020	mg/L	1.24	1.26	2.14%	20%	----
		magnesium, total	7439-95-4	E420	0.0100	mg/L	251	255	1.65%	20%	----
		manganese, total	7439-96-5	E420	0.00020	mg/L	0.570	0.578	1.37%	20%	----
		molybdenum, total	7439-98-7	E420	0.000100	mg/L	0.00480	0.00499	3.81%	20%	----
		nickel, total	7440-02-0	E420	0.00100	mg/L	0.489	0.501	2.44%	20%	----
		potassium, total	7440-09-7	E420	0.100	mg/L	22.1	22.0	0.450%	20%	----
		selenium, total	7782-49-2	E420	0.100	mg/L	29.3 µg/L	0.0308	5.12%	20%	----
		silicon, total	7440-21-3	E420	0.20	mg/L	3.20	3.20	0.0348%	20%	----
		silver, total	7440-22-4	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.100	mg/L	37.0	38.8	4.89%	20%	----
		strontium, total	7440-24-6	E420	0.00040	mg/L	1.59	1.66	4.28%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 374583) - continued											
CG2106788-001	Anonymous	sulfur, total	7704-34-9	E420	1.00	mg/L	470	484	2.99%	20%	----
		thallium, total	7440-28-0	E420	0.000020	mg/L	0.000218	0.000215	1.53%	20%	----
		tin, total	7440-31-5	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00060	mg/L	<0.00060	<0.00060	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000020	mg/L	0.0363	0.0358	1.50%	20%	----
		vanadium, total	7440-62-2	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0060	mg/L	0.139	0.140	0.458%	20%	----
Total Metals (QC Lot: 374584)											
CG2106788-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 375468)											
CG2106846-001	EV_EC_FLOW2_2021-12-15_NP	mercury, total	7439-97-6	E508-L	0.50	ng/L	<0.50	<0.50	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 377071)											
CG2106834-020	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00017	0.00018	0.000006	Diff <2x LOR	----
Dissolved Metals (QC Lot: 377072)											
CG2106834-020	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00023	0.00023	0.000005	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00061	0.00060	0.00001	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0132	0.0129	1.89%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0050	mg/L	0.0058 µg/L	0.0000077	0.0000019	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	324	313	3.46%	20%	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	0.236	0.235	0.444%	20%	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0745	0.0718	3.65%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	173	166	3.88%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.257	0.250	2.73%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00541	0.00565	4.38%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.103	0.101	2.11%	20%	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	5.69	5.50	3.38%	20%	----
		selenium, dissolved	7782-49-2	E421	0.050	mg/L	1.37 µg/L	0.00136	1.06%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	3.16	3.18	0.680%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	5.96	5.76	3.37%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.400	0.398	0.577%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	332	334	0.432%	20%	----

Sub-Matrix: **Water**

Laboratory Duplicate (DUP) Report

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 377072) - continued											
CG2106834-020	Anonymous	thallium, dissolved	7440-28-0	E421	0.000010	mg/L	0.000060	0.000057	0.000002	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.0142	0.0136	4.40%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0281	0.0272	3.26%	20%	----
Dissolved Metals (QC Lot: 380334)											
CG2106842-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----

Qualifiers

Qualifier	*Description*
TKND	*TKN duplication was poor due to interference from high nitrate, which causes negative bias on TKN.*

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 369891)						
acidity (as CaCO3)	----	E283	2	mg/L	2.0	----
Physical Tests (QCLot: 371557)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 372522)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 372524)						
solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 372528)						
conductivity	----	E100	1	µS/cm	1.2	----
Physical Tests (QCLot: 372530)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 369765)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 369894)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 369930)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 371379)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 371380)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 371381)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 371382)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 371383)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 371384)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 375014)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 375014) - continued						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Organic / Inorganic Carbon (QCLot: 369869)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 369872)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 374583)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 374583) - continued						
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Total Metals (QCLot: 374584)						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
Total Metals (QCLot: 375468)						
mercury, total	7439-97-6	E508-L	0.5	ng/L	<0.50	----
Dissolved Metals (QCLot: 377071)						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	----
Dissolved Metals (QCLot: 377072)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Dissolved Metals (QCLot: 380334)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 369891)									
acidity (as CaCO3)	----	E283	2	mg/L	50 mg/L	108	85.0	115	----
Physical Tests (QCLot: 371557)									
turbidity	----	E121	0.1	NTU	200 NTU	101	85.0	115	----
Physical Tests (QCLot: 372522)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	90.9	85.0	115	----
Physical Tests (QCLot: 372524)									
solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	91.2	85.0	115	----
Physical Tests (QCLot: 372528)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	97.1	90.0	110	----
Physical Tests (QCLot: 372529)									
pH	----	E108	----	pH units	7 pH units	100	98.6	101	----
Physical Tests (QCLot: 372530)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	104	85.0	115	----
Physical Tests (QCLot: 373563)									
oxidation-reduction potential [ORP]	----	E125	----	mV	220 mV	100	95.4	104	----
Anions and Nutrients (QCLot: 369765)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	8.02 mg/L	97.5	80.0	120	----
Anions and Nutrients (QCLot: 369894)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	106	85.0	115	----
Anions and Nutrients (QCLot: 369930)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.02 mg/L	95.7	80.0	120	----
Anions and Nutrients (QCLot: 371379)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 371380)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 371381)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 371382)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 371383)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	102	85.0	115	----
Anions and Nutrients (QCLot: 371384)									

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Anions and Nutrients (QCLot: 371384) - continued									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 375014)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	98.4	75.0	125	----
Organic / Inorganic Carbon (QCLot: 369869)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	10 mg/L	86.3	80.0	120	----
Organic / Inorganic Carbon (QCLot: 369872)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	10 mg/L	89.1	80.0	120	----
Total Metals (QCLot: 374583)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	103	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	105	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	101	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	98.8	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	97.8	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	96.6	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	99.5	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	98.2	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	98.5	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	101	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	97.2	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	102	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	97.7	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	102	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	97.9	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	99.0	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	100.0	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	92.2	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	104	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	108	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	95.3	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	103	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	97.9	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 374583) - continued									
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	100	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	95.8	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	100	80.0	120	----
Total Metals (QCLot: 374584)									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	99.6	80.0	120	----
Total Metals (QCLot: 375468)									
mercury, total	7439-97-6	E508-L	0.5	ng/L	5 ng/L	106	80.0	120	----
Dissolved Metals (QCLot: 377071)									
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	105	80.0	120	----
Dissolved Metals (QCLot: 377072)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	106	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	95.2	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	102	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	105	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	103	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	99.9	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	102	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	95.6	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	101	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	91.1	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	105	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	99.7	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	104	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	99.0	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	99.7	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	88.9	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	103	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	97.5	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	99.9	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	96.1	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	93.5	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	104	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	104	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Dissolved Metals (QCLot: 377072) - continued									
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	104	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	86.6	80.0	120	----

Matrix Spike (MS) Report

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

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*Concentration*	*Target*	*MS*	*Low*	*High*	*Qualifier*
Anions and Nutrients (QCLot: 369765)										
CG2106834-023	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0517 mg/L	0.0676 mg/L	76.4	70.0	130	----
Anions and Nutrients (QCLot: 369894)										
CG2106842-003	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.110 mg/L	0.1 mg/L	110	75.0	125	----
Anions and Nutrients (QCLot: 369930)										
CG2106840-003	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0512 mg/L	0.05 mg/L	102	70.0	130	----
Anions and Nutrients (QCLot: 371379)										
CG2106832-002	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	ND mg/L	2.5 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 371380)										
CG2106832-002	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.498 mg/L	0.5 mg/L	99.5	75.0	125	----
Anions and Nutrients (QCLot: 371381)										
CG2106832-002	Anonymous	fluoride	16984-48-8	E235.F	1.01 mg/L	1 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 371382)										
CG2106832-002	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	ND mg/L	100 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 371383)										
CG2106832-002	Anonymous	bromide	24959-67-9	E235.Br-L	0.475 mg/L	0.5 mg/L	95.0	75.0	125	----
Anions and Nutrients (QCLot: 371384)										
CG2106832-002	Anonymous	chloride	16887-00-6	E235.Cl-L	90.4 mg/L	100 mg/L	90.4	75.0	125	----
Anions and Nutrients (QCLot: 375014)										
CG2106853-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.39 mg/L	2.5 mg/L	95.7	70.0	130	----
Organic / Inorganic Carbon (QCLot: 369869)										
CG2106846-001	EV_EC_FLOW2_2021-12-15_NP	carbon, dissolved organic [DOC]	----	E358-L	23.3 mg/L	23.9 mg/L	97.4	70.0	130	----
Organic / Inorganic Carbon (QCLot: 369872)										
CG2106846-001	EV_EC_FLOW2_2021-12-15_NP	carbon, total organic [TOC]	----	E355-L	23.4 mg/L	23.9 mg/L	98.0	70.0	130	----
Total Metals (QCLot: 374583)										
CG2106788-002	Anonymous	aluminum, total	7429-90-5	E420	0.400 mg/L	0.4 mg/L	100	70.0	130	----
		antimony, total	7440-36-0	E420	0.0410 mg/L	0.04 mg/L	102	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0419 mg/L	0.04 mg/L	105	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*Concentration*	*Target*	*MS*	*Low*	*High*	*Qualifier*
Total Metals (QCLot: 374583) - continued										
CG2106788-002	Anonymous	barium, total	7440-39-3	E420	0.0388 mg/L	0.04 mg/L	97.1	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0765 mg/L	0.08 mg/L	95.6	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0176 mg/L	0.02 mg/L	88.0	70.0	130	----
		boron, total	7440-42-8	E420	0.196 mg/L	0.2 mg/L	98.0	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00773 mg/L	0.008 mg/L	96.6	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	8 mg/L	ND	70.0	130	----
		cobalt, total	7440-48-4	E420	ND mg/L	0.04 mg/L	ND	70.0	130	----
		copper, total	7440-50-8	E420	0.0359 mg/L	0.04 mg/L	89.7	70.0	130	----
		iron, total	7439-89-6	E420	4.00 mg/L	4 mg/L	100.0	70.0	130	----
		lead, total	7439-92-1	E420	0.0358 mg/L	0.04 mg/L	89.6	70.0	130	----
		lithium, total	7439-93-2	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.04 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0428 mg/L	0.04 mg/L	107	70.0	130	----
		nickel, total	7440-02-0	E420	ND mg/L	0.08 mg/L	ND	70.0	130	----
		potassium, total	7440-09-7	E420	ND mg/L	8 mg/L	ND	70.0	130	----
		selenium, total	7782-49-2	E420	0.0885 mg/L	0.08 mg/L	111	70.0	130	----
		silicon, total	7440-21-3	E420	19.5 mg/L	20 mg/L	97.3	70.0	130	----
		silver, total	7440-22-4	E420	0.00774 mg/L	0.008 mg/L	96.8	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.04 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	40 mg/L	ND	70.0	130	----
		thallium, total	7440-28-0	E420	0.00723 mg/L	0.008 mg/L	90.4	70.0	130	----
		tin, total	7440-31-5	E420	0.0393 mg/L	0.04 mg/L	98.4	70.0	130	----
		titanium, total	7440-32-6	E420	0.0851 mg/L	0.08 mg/L	106	70.0	130	----
		uranium, total	7440-61-1	E420	ND mg/L	0.008 mg/L	ND	70.0	130	----
		vanadium, total	7440-62-2	E420	0.208 mg/L	0.2 mg/L	104	70.0	130	----
		zinc, total	7440-66-6	E420	0.732 mg/L	0.8 mg/L	91.5	70.0	130	----
Total Metals (QCLot: 374584)										
CG2106788-002	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.0790 mg/L	0.08 mg/L	98.7	70.0	130	----
Total Metals (QCLot: 375468)										
CG2106867-001	Anonymous	mercury, total	7439-97-6	E508-L	4.78 ng/L	5 ng/L	95.6	70.0	130	----
Dissolved Metals (QCLot: 377071)										
CG2106834-021	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.0427 mg/L	0.04 mg/L	107	70.0	130	----
Dissolved Metals (QCLot: 377072)										

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 377072) - continued										
CG2106834-021	Anonymous	aluminum, dissolved	7429-90-5	E421	0.215 mg/L	0.2 mg/L	108	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0232 mg/L	0.02 mg/L	116	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.0206 mg/L	0.02 mg/L	103	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0414 mg/L	0.04 mg/L	104	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00397 mg/L	0.004 mg/L	99.3	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0184 mg/L	0.02 mg/L	92.2	70.0	130	----
		iron, dissolved	7439-89-6	E421	2.02 mg/L	2 mg/L	101	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.105 mg/L	0.1 mg/L	105	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0215 mg/L	0.02 mg/L	108	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0375 mg/L	0.04 mg/L	93.8	70.0	130	----
		potassium, dissolved	7440-09-7	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0444 mg/L	0.04 mg/L	111	70.0	130	----
		silicon, dissolved	7440-21-3	E421	10.3 mg/L	10 mg/L	103	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00323 mg/L	0.004 mg/L	80.7	70.0	130	----
		sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	ND mg/L	20 mg/L	ND	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00356 mg/L	0.004 mg/L	89.1	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0433 mg/L	0.04 mg/L	108	70.0	130	----
		uranium, dissolved	7440-61-1	E421	ND mg/L	0.004 mg/L	ND	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.111 mg/L	0.1 mg/L	111	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.384 mg/L	0.4 mg/L	96.1	70.0	130	----
Dissolved Metals (QCLot: 380334)										
CG2106842-002	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000989 mg/L	0.0001 mg/L	98.9	70.0	130	----

Teck

Page 1 of 1

COC ID: December EVO LAEMP 2021

TURNAROUND TIME:

PROJECT/CLIENT INFO				LABORATORY			
Facility Name / Job#	REP			Lab Name	ALS Calgary		
Project Manager	Allie Ferguson			Lab Contact	Lyudmyla Shvets		
Email	[illegible]			Email	lyudmyla.shvets@alsglobal.com		
Address	421 Pine Avenue			Address	2559 29 Street NE		
City	Sparwood	Province	BC	City	Calgary	Province	AB
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada
Phone Number	250-425-8202			Phone Number	1 403 407 1794		

Excel | PDF | EDD

SAMPLE DETAILS / ANALYSIS REQUESTED

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	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
EV_EC_FLOW2_2021-12-15_NP	EV_EC_FLOW2	WS	No	12/15/2021	14:00	G	7	X	X	X	X	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

ALS PO 750546

Environmental Division
Calgary
Work Order Reference
CG2106846

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	
Alex McClymont/Minnow	December 15, 2021	Rafael	12/16 9:00

SERVICE REQUEST	
Regular (default)	x
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
<1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Alex McClymont	Mobile #	780-293-6750
Sampler's Signature	AMC	Date/Time	December 15, 2021

3°C

SELENIUM SPECIATION

BAL Final Report 2109233
(Finalized October 13, 2021)

BROOKS APPLIED LABS
18804 North Creek Parkway, Ste 100, Bothell, WA 98011 • USA • T: 206 632 6206 F: 206 632 6017 • info@brooksapplied.com

October 13, 2021

Teck Resources Limited - Vancouver
Allie Ferguson
421 Pine Avenue
Sparwood, B.C. CANADA V0B2G0
allie.ferguson@teck.com

Re: REP

Dear Allie Ferguson,

On September 16, 2021, Brooks Applied Labs (BAL) received eighteen (18) 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.

Sample ID values listed on the chain-of-custody (COC) forms did not exactly match the corresponding **Sample ID** values listed on container labels several samples in this work order. The discrepancies are described in the table below.

Laboratory ID	**Sample ID** ***(From COC form)***	**Sample ID** ***(Listed on container label)***
2109233-01	RG_ALUSM_WS_LAEMP_EVO_2021-09-12_N	RG_ALUSM_WS_2021-09-12_N
2109233-02	RG_ALUSM_WS_LAEMP_EVO_2021-09-12_N_NAL	RG_ALUSM_WS_2021-09-12_N_NAL
2109233-03	RG_ALUSM_WS_LAEMP_EVO_2021-09-12_N_NAL	RG_ALUSM_WS_2021-09-12_N_NAL
2109233-04	RG_ERCK_WS_LAEMP_EVO_2021-09-10_N	RG_ERCK_WS_2021-09-10-1130_N
2109233-05	RG_ERCK_WS_LAEMP_EVO_2021-09-10_N_NAL	RG_ERCK_WS_2021-09-10-1130_N_NAL
2109233-06	RG_ERCK_WS_LAEMP_EVO_2021-09-10_N_NAL	RG_ERCK_WS_2021-09-10-1130_N_NAL
2109233-07	RG_M13_WS_LAEMP_EVO_2021-09-10_N	RG_M13_WS_2021-09-10-1600
2109233-08	RG_M13_WS_LAEMP_EVO_2021-09-10_N_NAL	RG_M13_WS_2021-09-10-1600
2109233-09	RG_M13_WS_LAEMP_EVO_2021-09-10_N_NAL	RG_M13_WS_2021-09-10-1600
2109233-10	RG_MIDER_WS_LAEMP_EVO_2021-09-09_N	RG_MIDER_WS_2021-09-09-1435_N

Laboratory ID	Sample ID *(From COC form)*	Sample ID *(Listed on container label)*
2109233-11	RG_MIDER_WS_LAEMP_EVO_2021-09-09_N_NAL	RG_MIDER_WS_2021-09-09-1435_N_NAL
2109233-12	RG_MIDER_WS_LAEMP_EVO_2021-09-09_N_NAL	RG_MIDER_WS_2021-09-09-1435_N_NAL
2109233-13	RG_MIDGA_WS_LAEMP_EVO_2021-09-11_N	RG_MIDGA_WS_2021-09-11-1530
2109233-14	RG_MIDGA_WS_LAEMP_EVO_2021-09-11_N_NAL	RG_MIDGA_WS_2021-09-11-1530
2109233-15	RG_MIDGA_WS_LAEMP_EVO_2021-09-11_N_NAL	RG_MIDGA_WS_2021-09-11-1530
2109233-16	RG_RIVER_WS_2021-09-11_N	RG_RIVER_WS_2021-09-11-1530
2109233-17	RG_RIVER_WS_2021-09-11_N_NAL	RG_RIVER_WS_2021-09-11-1530
2109233-18	RG_RIVER_WS_2021-09-11_N_NAL	RG_RIVER_WS_2021-09-11-1530
2109233-19	RG_MIDBO_WS_LAEMP_EVO_2021-09-11_N	RG_MIDBO_WS_2021-09-11-1130
2109233-20	RG_MIDBO_WS_LAEMP_EVO_2021-09-11_N_NAL	RG_MIDBO_WS_2021-09-11-1130
2109233-21	RG_MIDBO_WS_LAEMP_EVO_2021-09-11_N_NAL	RG_MIDBO_WS_2021-09-11-1130
2109233-22	RG_MICOMP_WS_LAEMP_EVO_2021-09-13_N	RG_MICOMP_WS_LAEMP_EVO_2021-09-13-1600_N
2109233-23	RG_MICOMP_WS_LAEMP_EVO_2021-09-13_N_NAL	RG_MICOMP_WS_LAEMP_EVO_2021-09-13-1600_N_NAL
2109233-24	RG_MICOMP_WS_LAEMP_EVO_2021-09-13_N_NAL	RG_MICOMP_WS_LAEMP_EVO_2021-09-13-1600_N_NAL

Per client request, the samples described the table above were logged and reported in using the **Sample IDs** listed on the COC forms.

The sample fractions logged in for Se speciation and dissolved Se had been field-filtered prior to receipt at BAL. All samples were stored according to BAL SOPs.

Total Recoverable and Dissolved Se

Each aqueous sample fraction for total recoverable or dissolved Se was digested in a closed vessel (bomb) with nitric and hydrochloric acids. The resulting digests were analyzed for Se content via inductively coupled plasma triple quadrupole mass spectrometry (ICP-QQQ-MS). The ICP-QQQ-MS instrumentation uses advanced interference removal techniques to ensure accuracy of the sample results. For more information, please visit the *Interference Reduction Technology* section on our website, brooksapplied.com.

Se Speciation

Each aqueous sample was analyzed for Se speciation using ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS). Selenium species are chromatographically separated on an ion exchange column and then quantified using inductively coupled plasma collision reaction cell mass spectrometry (ICP-CRC-MS); for more information on this determinative technique, please visit the *Interference Reduction Technology* section on our website. The chromatographic method applied for the analyses provides greater retention of methylseleninic acid and selenomethionine, allowing for more definitive quantitation of these species.

In accordance with the quotation issued for this project, selenium speciation was defined as dissolved selenite [Se(IV)], selenate [Se(VI)], selenocyanate [SeCN], methylseleninic acid [MeSe(IV)], methaneselenonic acid [MeSe(VI)], selenomethionine [SeMet], selenosulfate [SeSO3], and dimethylselenoxide [DMSeO]. Unknown Se species was defined as the total concentration of all unknown Se species observed during the analysis. This item is identified on the report as [Unk Se Sp].

DMSeO elutes early in the chromatographic run due to the nature of the molecule and the applied chromatographic separation method. Since this species elutes near the dead volume, additional Se species may coelute. Alternate methods can be applied, upon client request, to increase the separation of DMSeO from potentially co-eluting Se species.

The results were not method blank corrected, as described in the calculations section of the relevant BAL SOPs and were evaluated using reporting limits adjusted to account for sample aliquot size. Please refer to the *Sample Results* page for sample-specific MDLs, MRLs, and other details.

In instances when a matrix spike/matrix spike duplicate (MS/MSD) set was spiked at a level less than the native sample concentration, the recoveries and the relative percent difference (RPD) are not considered valid indicators of data quality. In such instances, the recoveries of the laboratory fortified blanks (BS) and/or standard reference materials (SRM) demonstrate the accuracy of the applied methods. When the spiking level was less than 25% of the native sample concentration, the spike recovery was not reported (NR) and the RPD of the MS/MSD set was not calculated (N/C).

Except for concentration qualifiers, all data were reported without qualification. All associated quality control sample results met the acceptance criteria.

BAL, an accredited laboratory, certifies that the reported results of all analyses for which BAL is NELAP accredited met all NELAP requirements. For more information, please see the *Report Information* page.

Please feel free to contact us if you have any questions regarding this report.

Sincerely,

Jeremy Maute
Senior Project Manager
Brooks Applied Labs
Jeremy@brooksapplied.com

Report Information

Laboratory Accreditation

BAL is accredited by the *National Environmental Laboratory Accreditation Program* (NELAP) through the State of Florida Department of Health, Bureau of Laboratories (E87982) and is certified to perform many environmental analyses. BAL is also certified by many other states to perform environmental analyses. For a current list of our accreditations/certifications, please visit our website at <http://www.brooksapplied.com/resources/certificates-permits/> or review Tables 1 and 2 in our Accreditation Information. Results reported relate only to the samples listed in the report.

Field Quality Control Samples

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

Common Abbreviations

AR	as received	**MS**	matrix spike
BAL	Brooks Applied Labs	**MSD**	matrix spike duplicate
BLK	method blank	**ND**	non-detect
BS	blank spike	**NR**	non-reportable
CAL	calibration standard	**N/C**	not calculated
CCB	continuing calibration blank	**PS**	post preparation spike
CCV	continuing calibration verification	**REC**	percent recovery
COC	chain of custody record	**RPD**	relative percent difference
D	dissolved fraction	**SCV**	secondary calibration verification
DUP	duplicate	**SOP**	standard operating procedure
IBL	instrument blank	**SRM**	reference material
ICV	initial calibration verification	**T**	total fraction
MDL	method detection limit	**TR**	total recoverable fraction
MRL	method reporting limit		

Definition of Data Qualifiers

(Effective 3/23/2020)

E	An estimated value due to the presence of interferences. A full explanation is presented in the narrative.
H	Holding time and/or preservation requirements not met. Please see narrative for explanation.
J	Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate.
J-1	Estimated value. A full explanation is presented in the narrative.
M	Duplicate precision (RPD) was not within acceptance criteria. Please see narrative for explanation.
N	Spike recovery was not within acceptance criteria. Please see narrative for explanation.
R	Rejected, unusable value. A full explanation is presented in the narrative.
U	Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL.
X	Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch. Result is estimated.
Z	Holding time and/or preservation requirements not established for this method; however, BAL recommendations for holding time were not followed. Please see narrative for explanation.

These qualifiers are based on those previously utilized by Brooks Applied Labs, those found in the EPA SOW ILM03.0, Exhibit B, Section III, pg. B-18, and the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review; USEPA; January 2010. These supersede all previous qualifiers ever employed by BAL.

Accreditation Information

Table 1. Accredited method/matrix/analytes for TNI

Issued by: State of Florida Dept. of Health (The NELAC Institute 2016 Standard)
Issued on: July 1, 2021; Valid to: June 30, 2022
Certificate Number: E87982-37

Method	Matrix	TNI Accredited Analyte(s)
EPA 1638	Non-Potable Waters	Ag, Cd, Cu, Ni, Pb, Sb, Se, Tl, Zn
EPA 200.8	Non-Potable Waters	Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
EPA 6020	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
	Solids/Chemicals & Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, V, Zn
BAL-5000	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn, Hardness
	Solids/Chemicals	Ag, As, B, Be, Cd, Co, Cr, Cu, Pb, Mo, Ni, Sb, Se, Sn, Sr, Tl, V, Zn
	Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn
EPA 1640	Non-Potable Waters	Cd, Cu, Pb, Ni, Zn
EPA 1631E	Non-Potable Waters, Solids/Chemicals & Biological	Total Mercury
EPA 1630	Non-Potable Waters	Methyl Mercury
BAL-3200	Solids/Chemicals & Biological	Methyl Mercury
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs
BAL-4201	Non-Potable Waters	Se(IV), Se(VI)
BAL-4300	Non-Potable Waters Solid/Chemicals	Cr(VI)
SM2340B	Non-Potable Waters	Hardness

Accreditation Information

Table 2. Accredited method/matrix/analytes for ISO (1), Non-Governmental TNI (2), and DoD/DOE (3)

Issued by: ANAB

Issued on: September 21, 2021; Valid to: March 30, 2024

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 Hg (Biological Only)	Not Accredited
EPA 1640 Mod	Non-Potable Waters	Cd, Cu, Pb, Ni, Zn Ag, As, Cr, Co, Se, Tl, V (ISO Only)	Not Accredited
EPA 1631E Mod BAL-3100	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 (ISO Only)	Not Accredited
	Biological/Food Solids/Chemicals	Inorganic Arsenic (ISO Only)	Not Accredited
AOAC 2015.01 Mod BAL-5000	Food	As, Cd, Hg, Pb	Not Accredited
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs	Not Accredited
	Biological by BAL-4117	Inorganic Arsenic, DMAs, MMAs (ISO Only)	Not Accredited
BAL-4101	Food by BAL-4117	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 BAL-0501	Solids/Chemicals & Biological	% Dry Weight	% Dry Weight

(1) ISO/IEC 17025:2017 – Certificate Number ADE-1447.02

(2) Non-Governmental NELAC Institute 2016 Standard – Certificate Number ADE-1447.01

(3) Department of Defense/Energy Consolidated Quality Systems Manual v. 5.3 – Certificate Numbers ADE-1447 for DoD, ADE-1447.03 for DOE.

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_ALUSM_WS_LAEMP_EVO_2021-09-12_N	2109233-01	WS	Sample	09/12/2021	09/16/2021
RG_ALUSM_WS_LAEMP_EVO_2021-09-12_N_NAL	2109233-02	WS	Sample	09/12/2021	09/16/2021
RG_ALUSM_WS_LAEMP_EVO_2021-09-12_N_NAL	2109233-03	WS	Sample	09/12/2021	09/16/2021
RG_ERCK_WS_LAEMP_EVO_2021-09-10_N	2109233-04	WS	Sample	09/10/2021	09/16/2021
RG_ERCK_WS_LAEMP_EVO_2021-09-10_N_NAL	2109233-05	WS	Sample	09/10/2021	09/16/2021
RG_ERCK_WS_LAEMP_EVO_2021-09-10_N_NAL	2109233-06	WS	Sample	09/10/2021	09/16/2021
RG_MI3_WS_LAEMP_EVO_2021-09-10_N	2109233-07	WS	Sample	09/10/2021	09/16/2021
RG_MI3_WS_LAEMP_EVO_2021-09-10_N_NAL	2109233-08	WS	Sample	09/10/2021	09/16/2021
RG_MI3_WS_LAEMP_EVO_2021-09-10_N_NAL	2109233-09	WS	Sample	09/10/2021	09/16/2021
RG_MIDER_WS_LAEMP_EVO_2021-09-09_N	2109233-10	WS	Sample	09/09/2021	09/16/2021
RG_MIDER_WS_LAEMP_EVO_2021-09-09_N_NAL	2109233-11	WS	Sample	09/09/2021	09/16/2021
RG_MIDER_WS_LAEMP_EVO_2021-09-09_N_NAL	2109233-12	WS	Sample	09/09/2021	09/16/2021
RG_MIDGA_WS_LAEMP_EVO_2021-09-11_N	2109233-13	WS	Sample	09/11/2021	09/16/2021
RG_MIDGA_WS_LAEMP_EVO_2021-09-11_N_NAL	2109233-14	WS	Sample	09/11/2021	09/16/2021
RG_MIDGA_WS_LAEMP_EVO_2021-09-11_N_NAL	2109233-15	WS	Sample	09/11/2021	09/16/2021
RG_RIVER_WS_2021-09-11_N	2109233-16	WS	Sample	09/11/2021	09/16/2021
RG_RIVER_WS_2021-09-11_N_NAL	2109233-17	WS	Sample	09/11/2021	09/16/2021
RG_RIVER_WS_2021-09-11_N_NAL	2109233-18	WS	Sample	09/11/2021	09/16/2021
RG_MIDBO_WS_LAEMP_EVO_2021-09-11_N	2109233-19	WS	Sample	09/11/2021	09/16/2021
RG_MIDBO_WS_LAEMP_EVO_2021-09-11_N_NAL	2109233-20	WS	Sample	09/11/2021	09/16/2021
RG_MIDBO_WS_LAEMP_EVO_2021-09-11_N_NAL	2109233-21	WS	Sample	09/11/2021	09/16/2021
RG_MICOMP_WS_LAEMP_EVO_2021-09-13_N	2109233-22	WS	Sample	09/13/2021	09/16/2021
RG_MICOMP_WS_LAEMP_EVO_2021-09-13_N_NAL	2109233-23	WS	Sample	09/13/2021	09/16/2021

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_MICOMP_WS_LAEMP_EVO_2021-09-13_N_NAL	2109233-24	WS	Sample	09/13/2021	09/16/2021
RG_RIVER_WS_2021-09-13_N	2109233-25	WS	Sample	09/13/2021	09/16/2021
RG_RIVER_WS_2021-09-13_N_NAL	2109233-26	WS	Sample	09/13/2021	09/16/2021
RG_RIVER_WS_2021-09-13_N_NAL	2109233-27	WS	Sample	09/13/2021	09/16/2021

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
DMSeO	Water	SOP BAL-4201	09/21/2021	09/22/2021	B212646	S211101
MeSe(IV)	Water	SOP BAL-4201	09/21/2021	09/22/2021	B212646	S211101
MeSe(VI)	Water	SOP BAL-4201	09/21/2021	09/22/2021	B212646	S211101
Se	Water	EPA 1638 Mod	09/17/2021	09/21/2021	B212611	S211088
Se(IV)	Water	SOP BAL-4201	09/21/2021	09/22/2021	B212646	S211101
Se(VI)	Water	SOP BAL-4201	09/21/2021	09/22/2021	B212646	S211101
SeCN	Water	SOP BAL-4201	09/21/2021	09/22/2021	B212646	S211101
SeMet	Water	SOP BAL-4201	09/21/2021	09/22/2021	B212646	S211101
SeSO3	Water	SOP BAL-4201	09/21/2021	09/22/2021	B212646	S211101
Unk Se Sp	Water	SOP BAL-4201	09/21/2021	09/22/2021	B212646	S211101

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_ALUSM_WS_LAEMP_EVO_2021-09-12_N										
2109233-01	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-01	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-01	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-01	Se(IV)	WS	D	0.015	J	0.010	0.075	µg/L	B212646	S211101
2109233-01	Se(VI)	WS	D	0.562		0.010	0.055	µg/L	B212646	S211101
2109233-01	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B212646	S211101
2109233-01	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-01	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B212646	S211101
2109233-01	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B212646	S211101
RG_ALUSM_WS_LAEMP_EVO_2021-09-12_N_NAL										
2109233-02	Se	WS	TR	0.615		0.165	0.528	µg/L	B212611	S211088
RG_ALUSM_WS_LAEMP_EVO_2021-09-12_N_NAL										
2109233-03	Se	WS	D	0.560		0.165	0.528	µg/L	B212611	S211088
RG_ERCK_WS_LAEMP_EVO_2021-09-10_N										
2109233-04	DMSeO	WS	D	0.017	J	0.010	0.025	µg/L	B212646	S211101
2109233-04	MeSe(IV)	WS	D	0.018	J	0.010	0.025	µg/L	B212646	S211101
2109233-04	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-04	Se(IV)	WS	D	0.866		0.010	0.075	µg/L	B212646	S211101
2109233-04	Se(VI)	WS	D	145		0.010	0.055	µg/L	B212646	S211101
2109233-04	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B212646	S211101
2109233-04	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-04	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B212646	S211101
2109233-04	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B212646	S211101
RG_ERCK_WS_LAEMP_EVO_2021-09-10_N_NAL										
2109233-05	Se	WS	TR	120		0.165	0.528	µg/L	B212611	S211088
RG_ERCK_WS_LAEMP_EVO_2021-09-10_N_NAL										
2109233-06	Se	WS	D	123		0.165	0.528	µg/L	B212611	S211088

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_MI3_WS_LAEMP_EVO_2021-09-10_N										
2109233-07	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-07	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-07	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-07	Se(IV)	WS	D	0.045	J	0.010	0.075	µg/L	B212646	S211101
2109233-07	Se(VI)	WS	D	1.03		0.010	0.055	µg/L	B212646	S211101
2109233-07	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B212646	S211101
2109233-07	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-07	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B212646	S211101
2109233-07	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B212646	S211101
RG_MI3_WS_LAEMP_EVO_2021-09-10_N_NAL										
2109233-08	Se	WS	TR	0.942		0.165	0.528	µg/L	B212611	S211088
RG_MI3_WS_LAEMP_EVO_2021-09-10_N_NAL										
2109233-09	Se	WS	D	0.993		0.165	0.528	µg/L	B212611	S211088
RG_MIDER_WS_LAEMP_EVO_2021-09-09_N										
2109233-10	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-10	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-10	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-10	Se(IV)	WS	D	0.076		0.010	0.075	µg/L	B212646	S211101
2109233-10	Se(VI)	WS	D	1.85		0.010	0.055	µg/L	B212646	S211101
2109233-10	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B212646	S211101
2109233-10	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-10	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B212646	S211101
2109233-10	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B212646	S211101
RG_MIDER_WS_LAEMP_EVO_2021-09-09_N_NAL										
2109233-11	Se	WS	TR	1.87		0.165	0.528	µg/L	B212611	S211088
RG_MIDER_WS_LAEMP_EVO_2021-09-09_N_NAL										
2109233-12	Se	WS	D	1.81		0.165	0.528	µg/L	B212611	S211088

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_MIDGA_WS_LAEMP_EVO_2021-09-11_N										
2109233-13	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-13	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-13	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-13	Se(IV)	WS	D	0.163		0.010	0.075	µg/L	B212646	S211101
2109233-13	Se(VI)	WS	D	3.01		0.010	0.055	µg/L	B212646	S211101
2109233-13	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B212646	S211101
2109233-13	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-13	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B212646	S211101
2109233-13	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B212646	S211101
RG_MIDGA_WS_LAEMP_EVO_2021-09-11_N_NAL										
2109233-14	Se	WS	TR	3.12		0.165	0.528	µg/L	B212611	S211088
RG_MIDGA_WS_LAEMP_EVO_2021-09-11_N_NAL										
2109233-15	Se	WS	D	2.96		0.165	0.528	µg/L	B212611	S211088
RG_RIVER_WS_2021-09-11_N										
2109233-16	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-16	MeSe(IV)	WS	D	0.011	J	0.010	0.025	µg/L	B212646	S211101
2109233-16	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-16	Se(IV)	WS	D	0.149		0.010	0.075	µg/L	B212646	S211101
2109233-16	Se(VI)	WS	D	3.00		0.010	0.055	µg/L	B212646	S211101
2109233-16	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B212646	S211101
2109233-16	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-16	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B212646	S211101
2109233-16	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B212646	S211101
RG_RIVER_WS_2021-09-11_N_NAL										
2109233-17	Se	WS	TR	2.98		0.165	0.528	µg/L	B212611	S211088
RG_RIVER_WS_2021-09-11_N_NAL										
2109233-18	Se	WS	D	2.81		0.165	0.528	µg/L	B212611	S211088

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_MIDBO_WS_LAEMP_EVO_2021-09-11_N										
2109233-19	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-19	MeSe(IV)	WS	D	0.012	J	0.010	0.025	µg/L	B212646	S211101
2109233-19	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-19	Se(IV)	WS	D	0.170		0.010	0.075	µg/L	B212646	S211101
2109233-19	Se(VI)	WS	D	8.16		0.010	0.055	µg/L	B212646	S211101
2109233-19	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B212646	S211101
2109233-19	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-19	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B212646	S211101
2109233-19	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B212646	S211101
RG_MIDBO_WS_LAEMP_EVO_2021-09-11_N_NAL										
2109233-20	Se	WS	TR	8.00		0.165	0.528	µg/L	B212611	S211088
RG_MIDBO_WS_LAEMP_EVO_2021-09-11_N_NAL										
2109233-21	Se	WS	D	8.25		0.165	0.528	µg/L	B212611	S211088
RG_MICOMP_WS_LAEMP_EVO_2021-09-13_N										
2109233-22	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-22	MeSe(IV)	WS	D	0.014	J	0.010	0.025	µg/L	B212646	S211101
2109233-22	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-22	Se(IV)	WS	D	0.174		0.010	0.075	µg/L	B212646	S211101
2109233-22	Se(VI)	WS	D	6.97		0.010	0.055	µg/L	B212646	S211101
2109233-22	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B212646	S211101
2109233-22	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-22	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B212646	S211101
2109233-22	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B212646	S211101
RG_MICOMP_WS_LAEMP_EVO_2021-09-13_N_NAL										
2109233-23	Se	WS	TR	6.33		0.165	0.528	µg/L	B212611	S211088
RG_MICOMP_WS_LAEMP_EVO_2021-09-13_N_NAL										
2109233-24	Se	WS	D	6.47		0.165	0.528	µg/L	B212611	S211088

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_RIVER_WS_2021-09-13_N										
2109233-25	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-25	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-25	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-25	Se(IV)	WS	D	0.194		0.010	0.075	µg/L	B212646	S211101
2109233-25	Se(VI)	WS	D	6.94		0.010	0.055	µg/L	B212646	S211101
2109233-25	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B212646	S211101
2109233-25	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212646	S211101
2109233-25	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B212646	S211101
2109233-25	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B212646	S211101
RG_RIVER_WS_2021-09-13_N_NAL										
2109233-26	Se	WS	TR	6.61		0.165	0.528	µg/L	B212611	S211088
RG_RIVER_WS_2021-09-13_N_NAL										
2109233-27	Se	WS	D	6.83		0.165	0.528	µg/L	B212611	S211088

Accuracy & Precision Summary

Batch: B212611
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits		RPD & Limits	
B212611-BS1	**Blank Spike, (2104075)**								
	Se		200.0	187.9	µg/L	94%	75-125		
B212611-BS2	**Blank Spike, (2104075)**								
	Se		200.0	187.6	µg/L	94%	75-125		
B212611-BS3	**Blank Spike, (2104075)**								
	Se		200.0	188.4	µg/L	94%	75-125		
B212611-BS4	**Blank Spike, (2104075)**								
	Se		200.0	195.3	µg/L	98%	75-125		
B212611-BS5	**Blank Spike, (2104075)**								
	Se		200.0	189.7	µg/L	95%	75-125		
B212611-SRM1	**Reference Material (2110006, TMDA 51.5 Reference Standard - Bottle 6 - SRM)**								
	Se		14.30	12.97	µg/L	91%	75-125		
B212611-SRM2	**Reference Material (2110006, TMDA 51.5 Reference Standard - Bottle 6 - SRM)**								
	Se		14.30	13.22	µg/L	92%	75-125		
B212611-SRM3	**Reference Material (2110006, TMDA 51.5 Reference Standard - Bottle 6 - SRM)**								
	Se		14.30	13.06	µg/L	91%	75-125		
B212611-SRM4	**Reference Material (2110006, TMDA 51.5 Reference Standard - Bottle 6 - SRM)**								
	Se		14.30	13.28	µg/L	93%	75-125		
B212611-SRM5	**Reference Material (2110006, TMDA 51.5 Reference Standard - Bottle 6 - SRM)**								
	Se		14.30	13.55	µg/L	95%	75-125		
B212611-DUP9	**Duplicate, (2109230-02)**								
	Se	138.5		128.2	µg/L			8%	20

Accuracy & Precision Summary

Batch: B212611
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits		RPD & Limits	
B212611-MS9	**Matrix Spike, (2109230-02)**								
	Se	138.5	220.0	336.4	µg/L	90%	75-125		
B212611-MSD9	**Matrix Spike Duplicate, (2109230-02)**								
	Se	138.5	220.0	340.0	µg/L	92%	75-125	1%	20
B212611-DUPA	**Duplicate, (2109233-11)**								
	Se	1.867		1.832	µg/L			2%	20
B212611-MSA	**Matrix Spike, (2109233-11)**								
	Se	1.867	220.0	205.8	µg/L	93%	75-125		
B212611-MSDA	**Matrix Spike Duplicate, (2109233-11)**								
	Se	1.867	220.0	202.6	µg/L	91%	75-125	2%	20

Accuracy & Precision Summary

Batch: B212646
Lab Matrix: Water
Method: SOP BAL-4201

Sample	Analyte	Native	Spike	Result	Units	REC & Limits		RPD & Limits	
B212646-BS1	**Blank Spike, (2124033)**								
	MeSe(IV)		5.095	5.618	µg/L	110%	75-125		
	Se(IV)		5.000	5.126	µg/L	103%	75-125		
	Se(VI)		5.000	4.881	µg/L	98%	75-125		
	SeCN		5.015	5.110	µg/L	102%	75-125		
	SeMet		4.932	5.110	µg/L	104%	75-125		
B212646-DUP2	**Duplicate, (2109233-16)**								
	DMSeO	ND		ND	µg/L			N/C	25
	MeSe(IV)	0.011		0.011	µg/L			7%	25
	MeSe(VI)	ND		ND	µg/L			N/C	25
	Se(IV)	0.149		0.149	µg/L			0.06%	25
	Se(VI)	2.999		3.030	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
B212646-MS2	**Matrix Spike, (2109233-16)**								
	Se(IV)	0.149	4.900	5.676	µg/L	113%	75-125		
	Se(VI)	2.999	5.100	8.673	µg/L	111%	75-125		
	SeCN	ND	1.962	2.012	µg/L	103%	75-125		
	SeMet	ND	1.977	2.036	µg/L	103%	75-125		
B212646-MSD2	**Matrix Spike Duplicate, (2109233-16)**								
	Se(IV)	0.149	4.900	5.651	µg/L	112%	75-125	0.5%	25
	Se(VI)	2.999	5.100	8.573	µg/L	109%	75-125	1%	25
	SeCN	ND	1.962	2.041	µg/L	104%	75-125	1%	25
	SeMet	ND	1.977	2.109	µg/L	107%	75-125	4%	25

Method Blanks & Reporting Limits

Batch: B212611
Matrix: Water
Method: EPA 1638 Mod
Analyte: Se

Sample	Result	Units
B212611-BLK1	0.152	µg/L
B212611-BLK2	0.115	µg/L
B212611-BLK3	0.120	µg/L
B212611-BLK4	0.124	µg/L
B212611-BLK5	0.189	µg/L

Average: 0.140
Limit: 0.480

MDL: 0.150
MRL: 0.480

Method Blanks & Reporting Limits

Batch: B212646
Matrix: Water
Method: SOP BAL-4201
Analyte: DMSeO

Sample	Result	Units
B212646-BLK1	0.00	µg/L
B212646-BLK2	0.00	µg/L
B212646-BLK3	0.00	µg/L
B212646-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.005 **MRL:** 0.005

Analyte: MeSe(IV)

Sample	Result	Units
B212646-BLK1	0.00	µg/L
B212646-BLK2	0.00	µg/L
B212646-BLK3	0.00	µg/L
B212646-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.005 **MRL:** 0.005

Analyte: MeSe(VI)

Sample	Result	Units
B212646-BLK1	0.00	µg/L
B212646-BLK2	0.00	µg/L
B212646-BLK3	0.00	µg/L
B212646-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.005 **MRL:** 0.005

Method Blanks & Reporting Limits

Analyte: Se(IV)

Sample	Result	Units
B212646-BLK1	0.008	µg/L
B212646-BLK2	0.003	µg/L
B212646-BLK3	0.002	µg/L
B212646-BLK4	0.003	µg/L

Average: 0.004 **MDL:** 0.002
Limit: 0.015 **MRL:** 0.015

Analyte: Se(VI)

Sample	Result	Units
B212646-BLK1	0.002	µg/L
B212646-BLK2	0.001	µg/L
B212646-BLK3	0.0006	µg/L
B212646-BLK4	0.00	µg/L

Average: 0.001 **MDL:** 0.002
Limit: 0.011 **MRL:** 0.011

Analyte: SeCN

Sample	Result	Units
B212646-BLK1	0.00	µg/L
B212646-BLK2	0.00	µg/L
B212646-BLK3	0.00	µg/L
B212646-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.010 **MRL:** 0.010

Analyte: SeMet

Sample	Result	Units
B212646-BLK1	0.00	µg/L
B212646-BLK2	0.00	µg/L
B212646-BLK3	0.00	µg/L
B212646-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.005 **MRL:** 0.005

Method Blanks & Reporting Limits

Analyte: SeSO3

Sample	Result	Units
B212646-BLK1	0.00	µg/L
B212646-BLK2	0.00	µg/L
B212646-BLK3	0.00	µg/L
B212646-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.011 **MRL:** 0.011

Analyte: Unk Se Sp

Sample	Result	Units
B212646-BLK1	0.00	µg/L
B212646-BLK2	0.00	µg/L
B212646-BLK3	0.00	µg/L
B212646-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.015 **MRL:** 0.015

Sample Containers

Lab ID: 2109233-01
Sample: RG_ALUSM_WS_LAEMP_EVO_2021-09-12_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/12/2021
Received: 09/16/2021

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 - 2109233
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2109233
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #1 - 2109233

Lab ID: 2109233-02
Sample: RG_ALUSM_WS_LAEMP_EVO_2021-09-12_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/12/2021
Received: 09/16/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109233

Lab ID: 2109233-03
Sample: RG_ALUSM_WS_LAEMP_EVO_2021-09-12_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/12/2021
Received: 09/16/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109233

Sample Containers

Lab ID: 2109233-04
Sample: RG_ERCK_WS_LAEMP_EVO_2021-09-10_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/10/2021
Received: 09/16/2021

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 - 2109233
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2109233
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #1 - 2109233

Lab ID: 2109233-05
Sample: RG_ERCK_WS_LAEMP_EVO_2021-09-10_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/10/2021
Received: 09/16/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109233

Lab ID: 2109233-06
Sample: RG_ERCK_WS_LAEMP_EVO_2021-09-10_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/10/2021
Received: 09/16/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109233

Lab ID: 2109233-07
Sample: RG_MI3_WS_LAEMP_EVO_2021-09-10_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/10/2021
Received: 09/16/2021

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 - 2109233
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2109233
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #1 - 2109233

Sample Containers

Lab ID: 2109233-08
Sample: RG_MI3_WS_LAEMP_EVO_2021-09-10_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/10/2021
Received: 09/16/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109233

Lab ID: 2109233-09
Sample: RG_MI3_WS_LAEMP_EVO_2021-09-10_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/10/2021
Received: 09/16/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109233

Lab ID: 2109233-10
Sample: RG_MIDER_WS_LAEMP_EVO_2021-09-09_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/09/2021
Received: 09/16/2021

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 - 2109233
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2109233
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #1 - 2109233

Lab ID: 2109233-11
Sample: RG_MIDER_WS_LAEMP_EVO_2021-09-09_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/09/2021
Received: 09/16/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109233

Sample Containers

Lab ID: 2109233-12
Sample: RG_MIDER_WS_LAEMP_EVO_2021-09-09_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/09/2021
Received: 09/16/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109233

Lab ID: 2109233-13
Sample: RG_MIDGA_WS_LAEMP_EVO_2021-09-11_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/11/2021
Received: 09/16/2021

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 - 2109233
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2109233
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #1 - 2109233

Lab ID: 2109233-14
Sample: RG_MIDGA_WS_LAEMP_EVO_2021-09-11_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/11/2021
Received: 09/16/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109233

Lab ID: 2109233-15
Sample: RG_MIDGA_WS_LAEMP_EVO_2021-09-11_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/11/2021
Received: 09/16/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109233

Sample Containers

Lab ID: 2109233-16
Sample: RG_RIVER_WS_2021-09-11_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/11/2021
Received: 09/16/2021

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 - 2109233
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2109233
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #1 - 2109233

Lab ID: 2109233-17
Sample: RG_RIVER_WS_2021-09-11_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/11/2021
Received: 09/16/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109233

Lab ID: 2109233-18
Sample: RG_RIVER_WS_2021-09-11_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/11/2021
Received: 09/16/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109233

Lab ID: 2109233-19
Sample: RG_MIDBO_WS_LAEMP_EVO_2021-09-11_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/11/2021
Received: 09/16/2021

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 - 2109233
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2109233
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #1 - 2109233

Sample Containers

Lab ID: 2109233-20
Sample: RG_MIDBO_WS_LAEMP_EVO_2021-09-11_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/11/2021
Received: 09/16/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109233

Lab ID: 2109233-21
Sample: RG_MIDBO_WS_LAEMP_EVO_2021-09-11_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/11/2021
Received: 09/16/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109233

Lab ID: 2109233-22
Sample: RG_MICOMP_WS_LAEMP_EVO_2021-09-13_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/13/2021
Received: 09/16/2021

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 - 2109233
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2109233
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #1 - 2109233

Lab ID: 2109233-23
Sample: RG_MICOMP_WS_LAEMP_EVO_2021-09-13_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/13/2021
Received: 09/16/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109233

Sample Containers

Lab ID: 2109233-24
Sample: RG_MICOMP_WS_LAEMP_EVO_2021-09-13_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/13/2021
Received: 09/16/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109233

Lab ID: 2109233-25
Sample: RG_RIVER_WS_2021-09-13_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/13/2021
Received: 09/16/2021

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 - 2109233
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2109233
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #1 - 2109233

Lab ID: 2109233-26
Sample: RG_RIVER_WS_2021-09-13_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/13/2021
Received: 09/16/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109233

Lab ID: 2109233-27
Sample: RG_RIVER_WS_2021-09-13_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/13/2021
Received: 09/16/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109233

Shipping Containers

Styrofoam Cooler #1 - 2109233

Received: September 16, 2021 6:41
Tracking No: PAPS#RWHV87364 via Courier
Coolant Type: Ice
Temperature: 0.8 °C

Description: Styrofoam Cooler
Damaged in transit? No
Returned to client? No
Comments: IR#30

Custody seals present? No
Custody seals intact? No
COC present? No

Teck

COC ID:	September EVO LAEMP	TURNAROUND TIME:	Regular

PROJECT/CLIENT INFO

Facility Name / Job#	REP
Project Manager	Allie Ferguson
Email	allie.ferguson@teck.com
Address	421 Pine Avenue
City	Sparwood
Province	BC
Postal Code	V0B 2G0
Country	Canada
Phone Number	250-910-8755

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:	allie.ferguson@teck.com	x	x	x
Email 2:	teckcoal@equisonline.com			x
Email 3:	jessica.ritz@teck.com	x	x	x
Email 4:	lbowron@minnow.ca	x	x	x
Email 5:	tyler.mehler@minnow.ca	x	x	x
Email 5:				
PO number	VPO00748540			

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.	Total Selenium	Dissolved Selenium (F)	Selenium Speciation (F)
RG_ALUSM_WS_LAEMP_EVO_2021-09-12_N	RG_ALUSM	WS	No	12-Sep-21	1300	G	1			1
RG_ALUSM_WS_LAEMP_EVO_2021-09-12_N_NAL	RG_ALUSM	WS	No	12-Sep-21	1300	G	2	1	1	
RG_ERCK_WS_LAEMP_EVO_2021-09-10_N	RG_ERCK	WS	No	10-Sep-21	1130	G	1			1
RG_ERCK_WS_LAEMP_EVO_2021-09-10_N_NAL	RG_ERCK	WS	No	10-Sep-21	1130	G	2	1	1	
RG_MI3_WS_LAEMP_EVO_2021-09-10_N	RG_MI3	WS	No	10-Sep-21	1600	G	1			1
RG_MI3_WS_LAEMP_EVO_2021-09-10_N_NAL	RG_MI3	WS	No	10-Sep-21	1600	G	2	1	1	
RG_MIDER_WS_LAEMP_EVO_2021-09-09_N	RG_MIDER	WS	No	9-Sep-21	1435	G	1			1
RG_MIDER_WS_LAEMP_EVO_2021-09-09_N_NAL	RG_MIDER	WS	No	9-Sep-21	1435	G	2	1	1	

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

Total and dissolved selenium samples have NOT been preserved. Dissolved selenium have been filtered. Speciation samples have been filtered and frozen.

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Jennifer Ings/Minnow	14-Sep-2021	Shiela Prosnike	9/16/21 6:41

SERVICE REQUEST (rush - subject to availability)

Regular (default)	X
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Jennifer Ings	Mobile #	519-500-3444
Sampler's Signature	[signature]	Date/Time	September 14, 2021

94 ‹6

Teck Confidential

COC ID: **September EVO LAEMP** TURNAROUND TIME: Regular

PROJECT/CLIENT INFO

Facility Name / Job#	REP
Project Manager	Allie Ferguson
Email	allie.ferguson@teck.com
Address	421 Pine Avenue
City	Sparwood
Province	BC
Postal Code	V0B 2G0
Country	Canada
Phone Number	250-910-8755

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:	allie.ferguson@teck.com	X	X	X
Email 2:	teckcoal@equisonline.com			X
Email 3:	jessica.ritz@teck.com	X	X	X
Email 4:	tbowron@minnow.ca	X	X	X
Email 5:	tyler.mehler@minnow.ca	X	X	X
Email 5:				
PO number	VPO00748540			

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.	Total Selenium	Dissolved Selenium (F)	Selenium Speciation (F)
RG_MIDGA_WS_LAEMP_EVO_2021-09-11_N	RG_MIDGA	WS	No	11-Sep-21	1530	G	1			1
RG_MIDGA_WS_LAEMP_EVO_2021-09-11_N_NAL	RG_MIDGA	WS	No	11-Sep-21	1530	G	2	1	1	
RG_RIVER_WS_2021-09-11_N	RG_RIVER	WS	No	11-Sep-21	1530	G	1			1
RG_RIVER_WS_2021-09-11_N_NAL	RG_RIVER	WS	No	11-Sep-21	1530	G	2	1	1	
RG_MIDBO_WS_LAEMP_EVO_2021-09-11_N	RG_MIDBO	WS	No	11-Sep-21	1130	G	1			1
RG_MIDBO_WS_LAEMP_EVO_2021-09-11_N_NAL	RG_MIDBO	WS	No	11-Sep-21	1130	G	2	1	1	
RG_MICOMP_WS_LAEMP_EVO_2021-09-13_N	RG_MICOMP	WS	No	13-Sep-21	1600	G	1			1
RG_MICOMP_WS_LAEMP_EVO_2021-09-13_N_NAL	RG_MICOMP	WS	No	13-Sep-21	1600	G	2	1	1	
RG_RIVER_WS_2021-09-13_N	RG_RIVER	WS	No	13-Sep-21	1600	G	1			1
RG_RIVER_WS_2021-09-13_N_NAL	RG_RIVER	WS	No	13-Sep-21	1600	G	2	1	1	

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

Total and dissolved selenium samples have NOT been preserved. Dissolved selenium have been filtered. Speciation samples have been filtered and frozen.

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Jennifer Ings/Minnow	14-Sep-2021	Sheila Pierotti	9/16/21 6:41

SERVICE REQUEST (rush - subject to availability)

Regular (default)	X
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Jennifer Ings	Mobile #	519-500-3444
Sampler's Signature	Jennifer Ings	Date/Time	September 14, 2021

1049 51

RW HOT SHOT SERVICE INC.
250-425-7447
24 Hour Hot Shot Service

STRAIGHT BILL OF LADING
NOT NEGOTIABLE

No. 87364

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 Sept 15-21

INVOICE TO

PURCHASE ORDER NUMBER

BILL OF LADING #

CONSIGNEE (TO) Brooks Applied Labs
STREET 18804 N. Creek Parkway
CITY/PROVINCE Bothell, WA
POSTAL CODE 98011

SHIPPER (FROM) Teck Coal Ltd
STREET West Line Creek Treatment
CITY/PROVINCE Sparwood, BC
POSTAL CODE

SPECIAL INSTRUCTIONS

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)
5	Coolers - Water Samples	100 LBS

PAPS# RWHV87364

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
NUMBER OF PIECES RECEIVED 7 41

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 Jason Zurek

SHIPPER SIGN

CONSIGNEE PRINT Sean Zisch (BAL) 9/16/21

CONSIGNEE SIGN

GST # 864540398RT0001

WHITE: Office YELLOW: Carrier PINK: Consignee GOLDENROAD: Shipper

Cooler ID: Styrofoam Cooler #1 COC (Y/N) Temperature: 0.8 IR: 30

Coolant Type: Ice Blue Ice Ambient

Notes:

2109233

Sampling Locations:	BG		EV		GH	
Sample Types:	T/D	SP	T/D	SP	T/D	SP
Container Types:	40mL	60mL		60mL	40mL	60mL

Opened By: CVL Date: 9/16/21

COPY

Effective 7/29/20 Revision 004

RW HOT SHOT SERVICE INC.
250-425-7447
24 Hour Hot Shot Service

STRAIGHT BILL OF LADING
NOT NEGOTIABLE

No. 87364

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 Sept 15-21

INVOICE TO

PURCHASE ORDER NUMBER

BILL OF LADING #

CONSIGNEE (TO) Brooks Applied Labs

SHIPPER (FROM) Teck Coal Ltd

STREET 18804 N. Creek Parkway

STREET West Line Creek Treatment

POSTAL CODE 98011

CITY/PROVINCE Bothell WA

POSTAL CODE

CITY/PROVINCE Sparwood, BC

SPECIAL INSTRUCTIONS

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)
5	Coolers - Water Samples	100 LBS
	PAPS#RWHV87364	

FREIGHT CHARGES
SHIPPER TO CHECK
☐PREPAID ☐COLLECT
If not indicated, shipping will automatically move to collect

FEE
WAITING
XPU
CHARGES
FSC
US
SUB TOTAL
GST
TOTAL $

IF AT OWNER'S RISK, WRITE OR D HERE

DATE

TIME

NUMBER OF PIECES RECEIVED 5

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 consignee at the said destination, subject to the rates and classification in effect on the date of shipment. It is mutually agreed, as to each carrier of all or any of the goods over all or any portion of the route to destination, and as to each party of any time interested in all or any of the goods, that every service to be performed hereunder shall be subject to all the conditions standard Bill of Lading, in power at the date of issuing, which are hereto agreed by the consignor and accepted for himself and his assigns. Printed or written, including conditions set aside by the standard Bill of Lading, in power at the date of issuing, which are hereby agreed by the consignor and accepted for himself and his assigns. The Contract for the carriage of the goods listed in this 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 Jason Tharth

CONSIGNEE PRINT Fean Zach (BAL) 9/16/21

SHIPPER SIGN

CONSIGNEE SIGN

GST # 864540398RT0001

WHITE: Office YELLOW: Carrier PINK: Consignee GOLDENROAD: Shipper

AMIGOS PRINTING

Cooler ID: Styrofoam Cooler #2 **COC** (Y/N) **Temperature:** T/D: 5.6°C Sp: 1.1°C **IR:** 30

Coolant Type: Ice Blue Ice Ambient

Notes:

Sampling Locations:	LC		RG							
Sample Types:	T/D	SP	T/D	SP	T/D	SP	T/D	SP	T/D	SP
Container Types:	40mL		40mL	60mL						

Opened By: SP **Date:** 9/16/21

COPY

RW HOT SHOT SERVICE INC.
250-425-7447
24 Hour Hot Shot Service

No. 87364

STRAIGHT BILL OF LADING
NOT NEGOTIABLE

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 Sept 15-21

INVOICE TO

PURCHASE ORDER NUMBER

BILL OF LADING #

CONSIGNEE (TO) Brooks Applied Labs

SHIPPER (FROM) Teck Coal Ltd

STREET 18804 N. Creek Parkway

POSTAL CODE 98011

STREET West Line Creek Treatment

POSTAL CODE

CITY/PROVINCE Bothell WA

CITY/PROVINCE Sparwood, BC

SPECIAL INSTRUCTIONS

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)
5	Coolers - Water Samples	100 LBS
	PAPS#RWHV87364	

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 $

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 consignee at the said destination, subject to the rates and classification in effect on the date of shipment. It is mutually agreed, as to each carrier of all or any of the goods over all or any portion of the route to destination, and as to each party of any time interested in all or any of the goods, that every service to be performed hereunder shall be subject to all the conditions standard Bill of Lading, in power at the date of issuing, which are hereby agreed by the consignor and accepted for himself and his assigns. Printed or written, including conditions set aside by the standard Bill of Lading, in power at the date of issuing, which are hereby agreed by the consignor and accepted for himself and his assigns. The Contract for the carriage of the goods listed in the Bill of Lading is governed by regulation in force at the jurisdiction at the time and place of shipment and is subject to the conditions set out in such conditions.

IF AT OWNER'S RISK, WRITE O.R. HERE

DATE 9/16/21

TIME

NUMBER OF PIECES RECEIVED 5

SHIPPER PRINT Jason Zhorth

CONSIGNEE PRINT Sean Bizeh (BAL)

CONSIGNEE SIGN

SHIPPER SIGN

GST # 864540398RT0001

WHITE: Office YELLOW: Carrier PINK: Consignee GOLDENROD: Shipper

AMSCOS PRINTING

Cooler ID: Styrofoam Cooler #3 **COC** (Y/N) **Temperature:** T/D: 6.0°C Sp: 0.4°C **IR:** 30

Coolant Type: Ice Blue Ice Ambient

Notes:

Sampling Locations:	RG		EV		LC					
Sample Types:	T/D	SP	T/D	SP	T/D	SP	T/D	SP	T/D	SP
Container Types:	40mL	60mL	40mL			60mL				

Opened By: SP **Date:** 9/16/21

COPY

From: Tyler Mehler
To: Chelsea Van Landeghen; allie.ferguson@teck.com; jessica.ritz@teck.com; Lisa Bowron
Cc: Jeremy Maute
Subject: RE: Received - WO (2109233, 2109235, 2109237), REP - Privileged and Confidential
Date: Wednesday, September 22, 2021 1:25:20 PM

Hi Chelsea -- Please use the sample ID from the COC in this situation. Thanks.

From: Chelsea Van Landeghen <chelsea@brooksapplied.com>
Sent: Wednesday, September 22, 2021 10:47 AM
To: allie.ferguson@teck.com; jessica.ritz@teck.com; Lisa Bowron <LBowron@minnow.ca>; Tyler Mehler <tyler.mehler@minnow.ca>
Cc: Jeremy Maute <Jeremy@brooksapplied.com>
Subject: Received - WO (2109233, 2109235, 2109237), REP - Privileged and Confidential

Good morning!

This is confirmation that samples from the REP project were received at Brooks Applied Labs on September 16, 2021. The samples were logged in for the following turnaround times (TATs):

WO 2109233 – (5-9 business day) TAT
WO 2109235 – (5-9 business day) TAT
WO 2109237 – (5-9 business day) TAT

The **Sample ID** value listed on the chain-of-custody (COC) form did not exactly match the corresponding **Sample ID** terms listed on container labels for samples in WO *2109233*, *2109235*, and *2109237*. The discrepancies are described in the table below.

Laboratory ID	Sample ID (From COC form)	Sample ID (listed on container label)	Analytical Parameter
2109233-01	RG_ALUSM_WS_LAEMP_EVO_2021-09-12_N	RG_ALUSM_WS_2021-09-12_N	Se Speciation
2109233-02	RG_ALUSM_WS_LAEMP_EVO_2021-09-12_N_NAL	RG_ALUSM_WS_2021-09-12_N_NAL	Total Recoverable Se
2109233-03	RG_ALUSM_WS_LAEMP_EVO_2021-09-12_N_NAL	RG_ALUSM_WS_2021-09-12_N_NAL	Dissolved Se
2109233-04	RG_ERCK_WS_LAEMP_EVO_2021-09-10_N	RG_ERCK_WS_2021-09-10-1130_N	Se Speciation
2109233-05	RG_ERCK_WS_LAEMP_EVO_2021-09-10_N_NAL	RG_ERCK_WS_2021-09-10-1130_N_NAL	Total Recoverable Se
2109233-06	RG_ERCK_WS_LAEMP_EVO_2021-09-10_N_NAL	RG_ERCK_WS_2021-09-10-1130_N_NAL	Dissolved Se
2109233-07	RG_M13_WS_LAEMP_EVO_2021-09-10_N	RG_M13_WS_2021-09-10-1600	Se Speciation
2109233-08	RG_M13_WS_LAEMP_EVO_2021-09-10_N_NAL	RG_M13_WS_2021-09-10-1600	Total Recoverable Se
2109233-09	RG_M13_WS_LAEMP_EVO_2021-09-10_N_NAL	RG_M13_WS_2021-09-10-1600	Dissolved Se

2109233-10	RG_MIDER_WS_LAEMP_EVO_2021-09-09_N	RG_MIDER_WS_2021-09-09-1435_N	Se Speciation
2109233-11	RG_MIDER_WS_LAEMP_EVO_2021-09-09_N_NAL	RG_MIDER_WS_2021-09-09-1435_N_NAL	Total Recoverable Se
2109233-12	RG_MIDER_WS_LAEMP_EVO_2021-09-09_N_NAL	RG_MIDER_WS_2021-09-09-1435_N_NAL	Dissolved Se
2109233-13	RG_MIDGA_WS_LAEMP_EVO_2021-09-11_N	RG_MIDGA_WS_2021-09-11-1530	Se Speciation
2109233-14	RG_MIDGA_WS_LAEMP_EVO_2021-09-11_N_NAL	RG_MIDGA_WS_2021-09-11-1530	Total Recoverable Se
2109233-15	RG_MIDGA_WS_LAEMP_EVO_2021-09-11_N_NAL	RG_MIDGA_WS_2021-09-11-1530	Dissolved Se
2109233-16	RG_RIVER_WS_2021-09-11_N	RG_RIVER_WS_2021-09-11-1530	Se Speciation
2109233-17	RG_RIVER_WS_2021-09-11_N_NAL	RG_RIVER_WS_2021-09-11-1530	Total Recoverable Se
2109233-18	RG_RIVER_WS_2021-09-11_N_NAL	RG_RIVER_WS_2021-09-11-1530	Dissolved Se
2109233-19	RG_MIDBO_WS_LAEMP_EVO_2021-09-11_N	RG_MIDBO_WS_2021-09-11-1130	Se Speciation
2109233-20	RG_MIDBO_WS_LAEMP_EVO_2021-09-11_N_NAL	RG_MIDBO_WS_2021-09-11-1130	Total Recoverable Se
2109233-21	RG_MIDBO_WS_LAEMP_EVO_2021-09-11_N_NAL	RG_MIDBO_WS_2021-09-11-1130	Dissolved Se
2109233-22	RG_MICOMP_WS_LAEMP_EVO_2021-09-13_N	RG_MICOMP_WS_LAEMP_EVO_2021-09-13-1600_N	Se Speciation
2109233-23	RG_MICOMP_WS_LAEMP_EVO_2021-09-13_N_NAL	RG_MICOMP_WS_LAEMP_EVO_2021-09-13-1600_N_NAL	Total Recoverable Se
2109233-24	RG_MICOMP_WS_LAEMP_EVO_2021-09-13_N_NAL	RG_MICOMP_WS_LAEMP_EVO_2021-09-13-1600_N_NAL	Dissolved Se
2109235-04	RG_RIVER_WS_2021-09-09_N	RG_RIVER_WS_RAEM_2021-09-09_N	Se Speciation
2109235-06	RG_RIVER_WS_2021-09-09_N_NAL	RG_RIVER_WS_RAEM_2021-09-09_N_NAL	Dissolved Se
2109235-20	RG_GHCKD_WS_RAEMP_2021-09-11_N_NAL	RG_GHCKD_WS_RAEMP_2021-09-NP_N_NAL	Total Recoverable Se
2109235-21	RG_GHCKD_WS_RAEMP_2021-09-11_N_NAL	RG_GHCKD_WS_RAEMP_2021-09-NP_N_NAL	Dissolved Se
2109235-26	RG_BACK_WS_RAEMP_2021-09-13_NAL	RG_BACK_WS_RAEMP_2021-09-NP_NAL	Total Recoverable Se
2109235-27	RG_BACK_WS_RAEMP_2021-09-13_NAL	RG_BACK_WS_RAEMP_2021-09-NP_NAL	Dissolved Se
2109237-05	RG_GHNF_WS_GGCAMP_2021-09-10_N_NAL	RG_GHNF_WS_GGCAMP_2021-09-NP_N_NAL	Total Recoverable Se
2109237-06	RG_GHNF_WS_GGCAMP_2021-09-10_N_NAL	RG_GHNF_WS_GGCAMP_2021-09-NP_N_NAL	Dissolved Se
2109237-08	RG_GHUT_WS_GGCAMP_2021-09-13_N_NAL	RG_GHUT_WS_GGCAMP_2021-09-NP_N_NAL	Total Recoverable Se
2109237-09	RG_GHUT_WS_GGCAMP_2021-09-13_N_NAL	RG_GHUT_WS_GGCAMP_2021-09-NP_N_NAL	Dissolved Se
2109237-11	RG_RIVER_WS_2021-09-13_N_NAL	RG_RIVER_WS_2021-09-NP_N_NAL	Total Recoverable Se
2109237-12	RG_RIVER_WS_2021-09-13_N_NAL	RG_RIVER_WS_2021-09-NP_N_NAL	Dissolved Se
	RG_GHBP_WS_GGCAMP_2021-	RG_GHBP_WS_GGCAMP_2021-	Total

2109237-14	09-13_N_NAL	09-NP_N_NAL	Recoverable Se
2109237-15	RG_GHBP_WS_GGCAMP_2021-09-13_N_NAL	RG_GHBP_WS_GGCAMP_2021-09-NP_N_NAL	Dissolved Se

The samples described the table above were logged in using the **Sample ID** terms listed on the COC form. Please let us know if you would have us report any of these samples in a different manner.

Unfortunately, a recent storm has damaged our server and the lab has not had access to the server this week. Do not worry; no data was lost. We just do not have access to the server currently. This has delayed many processes, including analysis and reporting. The board we needed was obtained today and access to the server should be restored by this evening. We are making every effort to get the work orders reported within the requested time frame. I apologize for any inconvenience this may cause.

I've attached copies of the COC forms. If you have any questions, please contact the project manager, Jeremy Maute.

Best,
Chelsea

Chelsea Van Landeghen
Group Lead - Sample Control

email: chelsea@brooksapplied.com

BROOKS APPLIED LABS
Meaningful Metals Data and Advanced Speciation Solutions
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SELENIUM SPECIATION

BAL Final Report 2109308

(Finalized October 22, 2021)

BROOKS APPLIED LABS
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October 22, 2021

Teck Resources Limited - Vancouver
Allie Ferguson
421 Pine Avenue
Sparwood, B.C. CANADA V0B2G0
allie.ferguson@teck.com

Re: REP

Dear Allie Ferguson,

On September 23, 2021, Brooks Applied Labs (BAL) received twelve (12) aqueous samples. The samples were logged-in for total recoverable selenium [*Se*], dissolved Se, and Se speciation analyses, according to the chain-of-custody (COC) form.

The **Sample ID** value listed on the chain-of-custody (COC) form did not exactly match the corresponding **Sample ID** values on container labels for samples 2109308-08 and 2109308-09. The discrepancies are described in the table below.

Laboratory ID	**Sample ID** ***(From COC form)***	**Sample ID** ***(From container label)***
2109308-08	RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_N_NAL	RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_N_NAL
2109308-09	RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_N_NAL	RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_N_NAL

The samples described the table above were logged in and reported according to the **Sample ID** value listed on the COC form.

The sample fractions logged in for Se speciation and dissolved Se had been field-filtered prior to receipt at BAL. All samples were stored according to BAL SOPs.

Total Recoverable and Dissolved Se

Each aqueous sample fraction for total recoverable or dissolved Se was digested in a closed vessel (bomb) with nitric and hydrochloric acids. The resulting digests were analyzed for Se content via inductively coupled plasma triple quadrupole mass spectrometry (ICP-QQQ-MS). The ICP-QQQ-MS instrumentation uses advanced interference removal techniques to ensure accuracy of the sample results. For more information, please visit the *Interference Reduction Technology* section on our website, brooksapplied.com.

B212656-SRM1 was mis-prepped in the digest. Consequently, results are not reported for B212656-SRM1. The remaining blank spike samples and reference material samples in batch B212656 are used to demonstrate acceptable digest performance.

Se Speciation

Each aqueous sample was analyzed for Se speciation using ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS). Selenium species are chromatographically separated on an ion exchange column and then quantified using inductively coupled plasma collision reaction cell mass spectrometry (ICP-CRC-MS); for more information on this determinative technique, please visit the *Interference Reduction Technology* section on our website. The chromatographic method applied for the analyses provides greater retention of methylseleninic acid and selenomethionine, allowing for more definitive quantitation of these species.

In accordance with the quotation issued for this project, selenium speciation was defined as dissolved selenite [Se(IV)], selenate [Se(VI)], selenocyanate [SeCN], methylseleninic acid [MeSe(IV)], methaneselenonic acid [MeSe(VI)], selenomethionine [SeMet], selenosulfate [SeSO3], and dimethylselenoxide [DMSeO]. Unknown Se species was defined as the total concentration of all unknown Se species observed during the analysis. This item is identified on the report as [Unk Se Sp].

DMSeO elutes early in the chromatographic run due to the nature of the molecule and the applied chromatographic separation method. Since this species elutes near the dead volume, additional Se species may coelute. Alternate methods can be applied, upon client request, to increase the separation of DMSeO from potentially co-eluting Se species.

Chromatographic interference, as indicated by an elevated baseline, or co-eluting peak, was observed for selenosulfate in 2109308-13. Due to potential bias, the affected result has been qualified as estimated (**J-1**). Upon client request, Brooks Applied Labs can apply a higher dilution to this sample to potentially mitigate the chromatographic interferences, but a higher dilution would elevate the detection limit for SeMet above the client's requested limit of 0.010µg/L.

The results were not method blank corrected, as described in the calculations section of the relevant BAL SOPs and were evaluated using reporting limits adjusted to account for sample aliquot size. Please refer to the *Sample Results* page for sample-specific MDLs, MRLs, and other details.

In instances when a matrix spike/matrix spike duplicate (MS/MSD) set was spiked at a level less than the native sample concentration, the recoveries and the relative percent difference (RPD) are not considered valid indicators of data quality. In such instances, the recoveries of the laboratory fortified blanks (BS) and/or standard reference materials (SRM) demonstrate the accuracy of the applied methods. When the spiking level was less than 25% of the native sample concentration, the spike recovery was not reported (NR) and the RPD of the MS/MSD set was not calculated (N/C).

Except for concentration qualifiers and the item noted above, all data were reported without qualification. All associated quality control sample results met the acceptance criteria.

BAL, an accredited laboratory, certifies that the reported results of all analyses for which BAL is NELAP accredited met all NELAP requirements. For more information, please see the *Report Information* page.

Please feel free to contact us if you have any questions regarding this report.

Sincerely,

Jeremy Maute
Senior Project Manager
Brooks Applied Labs
Jeremy@brooksapplied.com

Report Information

Laboratory Accreditation

BAL is accredited by the *National Environmental Laboratory Accreditation Program* (NELAP) through the State of Florida Department of Health, Bureau of Laboratories (E87982) and is certified to perform many environmental analyses. BAL is also certified by many other states to perform environmental analyses. For a current list of our accreditations/certifications, please visit our website at <http://www.brooksapplied.com/resources/certificates-permits/> or review Tables 1 and 2 in our Accreditation Information. Results reported relate only to the samples listed in the report.

Field Quality Control Samples

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

Common Abbreviations

AR	as received
BAL	Brooks Applied Labs
BLK	method blank
BS	blank spike
CAL	calibration standard
CCB	continuing calibration blank
CCV	continuing calibration verification
COC	chain of custody record
D	dissolved fraction
DUP	duplicate
IBL	instrument blank
ICV	initial calibration verification
MDL	method detection limit
MRL	method reporting limit
MS	matrix spike
MSD	matrix spike duplicate
ND	non-detect
NR	non-reportable
N/C	not calculated
PS	post preparation spike
REC	percent recovery
RPD	relative percent difference
SCV	secondary calibration verification
SOP	standard operating procedure
SRM	reference material
T	total fraction
TR	total recoverable fraction

Definition of Data Qualifiers

(Effective 3/23/2020)

E An estimated value due to the presence of interferences. A full explanation is presented in the narrative.
H Holding time and/or preservation requirements not met. Please see narrative for explanation.
J Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate.
J-1 Estimated value. A full explanation is presented in the narrative.
M Duplicate precision (RPD) was not within acceptance criteria. Please see narrative for explanation.
N Spike recovery was not within acceptance criteria. Please see narrative for explanation.
R Rejected, unusable value. A full explanation is presented in the narrative.
U Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL.
X Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch. Result is estimated.
Z Holding time and/or preservation requirements not established for this method; however, BAL recommendations for holding time were not followed. Please see narrative for explanation.

These qualifiers are based on those previously utilized by Brooks Applied Labs, those found in the EPA SOW ILM03.0, Exhibit B, Section III, pg. B-18, and the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review; USEPA; January 2010. These supersede all previous qualifiers ever employed by BAL.

Accreditation Information

Table 1. Accredited method/matrix/analytes for TNI

Issued by: State of Florida Dept. of Health (The NELAC Institute 2016 Standard)
Issued on: July 1, 2021; Valid to: June 30, 2022
Certificate Number: E87982-37

Method	Matrix	TNI Accredited Analyte(s)
EPA 1638	Non-Potable Waters	Ag, Cd, Cu, Ni, Pb, Sb, Se, Tl, Zn
EPA 200.8	Non-Potable Waters	Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
EPA 6020	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
	Solids/Chemicals & Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, V, Zn
BAL-5000	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn, Hardness
	Solids/Chemicals	Ag, As, B, Be, Cd, Co, Cr, Cu, Pb, Mo, Ni, Sb, Se, Sn, Sr, Tl, V, Zn
	Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn
EPA 1640	Non-Potable Waters	Cd, Cu, Pb, Ni, Zn
EPA 1631E	Non-Potable Waters, Solids/Chemicals & Biological	Total Mercury
EPA 1630	Non-Potable Waters	Methyl Mercury
BAL-3200	Solids/Chemicals & Biological	Methyl Mercury
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs
BAL-4201	Non-Potable Waters	Se(IV), Se(VI)
BAL-4300	Non-Potable Waters Solid/Chemicals	Cr(VI)
SM2340B	Non-Potable Waters	Hardness

BROOKS APPLIED LABS

Accreditation Information

Table 2. Accredited method/matrix/analytes for ISO (1), Non-Governmental TNI (2), and DoD/DOE (3)

Issued by: ANAB

Issued on: September 21, 2021; Valid to: March 30, 2024

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 Hg (Biological Only)	Not Accredited
EPA 1640 Mod	Non-Potable Waters	Cd, Cu, Pb, Ni, Zn Ag, As, Cr, Co, Se, Tl, V (ISO Only)	Not Accredited
EPA 1631E Mod BAL-3100	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 (ISO Only)	Not Accredited
	Biological/Food Solids/Chemicals	Inorganic Arsenic (ISO Only)	Not Accredited
AOAC 2015.01 Mod BAL-5000	Food	As, Cd, Hg, Pb	Not Accredited
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs	Not Accredited
	Biological by BAL-4117	Inorganic Arsenic, DMAs, MMAs (ISO Only)	Not Accredited
BAL-4101	Food by BAL-4117	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 BAL-0501	Solids/Chemicals & Biological	% Dry Weight	% Dry Weight

(1) ISO/IEC 17025:2017 – Certificate Number ADE-1447.02

(2) Non-Governmental NELAC Institute 2016 Standard – Certificate Number ADE-1447.01

(3) Department of Defense/Energy Consolidated Quality Systems Manual v. 5.3 – Certificate Numbers ADE-1447 for DoD, ADE-1447.03 for DOE.

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_BOCK_WS_LAEMP_EVO_2021-09-16_N	2109308-01	WS	Sample	09/16/2021	09/23/2021
RG_BOCK_WS_LAEMP_EVO_2021-09-16_N_NAL	2109308-02	WS	Sample	09/16/2021	09/23/2021
RG_BOCK_WS_LAEMP_EVO_2021-09-16_N_NAL	2109308-03	WS	Sample	09/16/2021	09/23/2021
RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_N	2109308-04	WS	Sample	09/15/2021	09/23/2021
RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_N_NAL	2109308-05	WS	Sample	09/15/2021	09/23/2021
RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_N_NAL	2109308-06	WS	Sample	09/15/2021	09/23/2021
RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_N	2109308-07	WS	Sample	09/15/2021	09/23/2021
RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_N_NAL	2109308-08	WS	Sample	09/15/2021	09/23/2021
RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_N_NAL	2109308-09	WS	Sample	09/15/2021	09/23/2021
RG_GATEDP_WS_LAEMP_EVO_2021-09-16_N	2109308-10	WS	Sample	09/16/2021	09/23/2021
RG_GATEDP_WS_LAEMP_EVO_2021-09-16_N_NAL	2109308-11	WS	Sample	09/16/2021	09/23/2021
RG_GATEDP_WS_LAEMP_EVO_2021-09-16_N_NAL	2109308-12	WS	Sample	09/16/2021	09/23/2021
RG_GATE_WS_LAEMP_EVO_2021-09-16_N	2109308-13	WS	Sample	09/16/2021	09/23/2021
RG_GATE_WS_LAEMP_EVO_2021-09-16_N_NAL	2109308-14	WS	Sample	09/16/2021	09/23/2021
RG_GATE_WS_LAEMP_EVO_2021-09-16_N_NAL	2109308-15	WS	Sample	09/16/2021	09/23/2021
RG_MI25_WS_LAEMP_EVO_2021-09-13_N	2109308-16	WS	Sample	09/13/2021	09/23/2021
RG_MI25_WS_LAEMP_EVO_2021-09-13_N_NAL	2109308-17	WS	Sample	09/13/2021	09/23/2021
RG_MI25_WS_LAEMP_EVO_2021-09-13_N_NAL	2109308-18	WS	Sample	09/13/2021	09/23/2021

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
DMSeO	Water	SOP BAL-4201	09/23/2021	09/24/2021	B212628	S211093
DMSeO	Water	SOP BAL-4201	09/23/2021	10/01/2021	B212628	S211109
MeSe(IV)	Water	SOP BAL-4201	09/23/2021	09/24/2021	B212628	S211093
MeSe(IV)	Water	SOP BAL-4201	09/23/2021	10/01/2021	B212628	S211109
MeSe(VI)	Water	SOP BAL-4201	09/23/2021	09/24/2021	B212628	S211093
MeSe(VI)	Water	SOP BAL-4201	09/23/2021	10/01/2021	B212628	S211109
Se	Water	EPA 1638 Mod	09/28/2021	09/30/2021	B212656	S211116
Se(IV)	Water	SOP BAL-4201	09/23/2021	09/24/2021	B212628	S211093
Se(IV)	Water	SOP BAL-4201	09/23/2021	10/01/2021	B212628	S211109
Se(VI)	Water	SOP BAL-4201	09/23/2021	09/24/2021	B212628	S211093
Se(VI)	Water	SOP BAL-4201	09/23/2021	10/01/2021	B212628	S211109
SeCN	Water	SOP BAL-4201	09/23/2021	09/24/2021	B212628	S211093
SeCN	Water	SOP BAL-4201	09/23/2021	10/01/2021	B212628	S211109
SeMet	Water	SOP BAL-4201	09/23/2021	09/24/2021	B212628	S211093
SeMet	Water	SOP BAL-4201	09/23/2021	10/01/2021	B212628	S211109
SeSO3	Water	SOP BAL-4201	09/23/2021	09/24/2021	B212628	S211093
SeSO3	Water	SOP BAL-4201	09/23/2021	10/01/2021	B212628	S211109
Unk Se Sp	Water	SOP BAL-4201	09/23/2021	09/24/2021	B212628	S211093
Unk Se Sp	Water	SOP BAL-4201	09/23/2021	10/01/2021	B212628	S211109

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_BOCK_WS_LAEMP_EVO_2021-09-16_N										
2109308-01	DMSeO	WS	D	0.118		0.010	0.025	µg/L	B212628	S211093
2109308-01	MeSe(IV)	WS	D	0.089		0.010	0.025	µg/L	B212628	S211093
2109308-01	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212628	S211093
2109308-01	Se(IV)	WS	D	2.23		0.010	0.075	µg/L	B212628	S211093
2109308-01	Se(VI)	WS	D	201		0.010	0.055	µg/L	B212628	S211093
2109308-01	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B212628	S211093
2109308-01	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212628	S211093
2109308-01	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B212628	S211093
2109308-01	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B212628	S211093
RG_BOCK_WS_LAEMP_EVO_2021-09-16_N_NAL										
2109308-02	Se	WS	TR	209		0.165	0.528	µg/L	B212656	S211116
RG_BOCK_WS_LAEMP_EVO_2021-09-16_N_NAL										
2109308-03	Se	WS	D	204		0.165	0.528	µg/L	B212656	S211116
RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_N										
2109308-04	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212628	S211093
2109308-04	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212628	S211093
2109308-04	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212628	S211093
2109308-04	Se(IV)	WS	D	0.064	J	0.010	0.075	µg/L	B212628	S211093
2109308-04	Se(VI)	WS	D	137		0.010	0.055	µg/L	B212628	S211093
2109308-04	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B212628	S211093
2109308-04	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212628	S211093
2109308-04	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B212628	S211093
2109308-04	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B212628	S211093
RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_N_NAL										
2109308-05	Se	WS	TR	142		0.165	0.528	µg/L	B212656	S211116
RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_N_NAL										
2109308-06	Se	WS	D	139		0.165	0.528	µg/L	B212656	S211116

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_N										
2109308-07	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212628	S211093
2109308-07	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212628	S211093
2109308-07	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212628	S211093
2109308-07	Se(IV)	WS	D	0.019	J	0.010	0.075	µg/L	B212628	S211093
2109308-07	Se(VI)	WS	D	110		0.010	0.055	µg/L	B212628	S211093
2109308-07	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B212628	S211093
2109308-07	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212628	S211093
2109308-07	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B212628	S211093
2109308-07	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B212628	S211093
RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_N_NAL										
2109308-08	Se	WS	TR	141		0.165	0.528	µg/L	B212656	S211116
RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_N_NAL										
2109308-09	Se	WS	D	143		0.165	0.528	µg/L	B212656	S211116
RG_GATEDP_WS_LAEMP_EVO_2021-09-16_N										
2109308-10	DMSeO	WS	D	0.034		0.010	0.025	µg/L	B212628	S211093
2109308-10	MeSe(IV)	WS	D	0.051		0.010	0.025	µg/L	B212628	S211093
2109308-10	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212628	S211093
2109308-10	Se(IV)	WS	D	0.910		0.010	0.075	µg/L	B212628	S211093
2109308-10	Se(VI)	WS	D	201		0.010	0.055	µg/L	B212628	S211093
2109308-10	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B212628	S211093
2109308-10	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212628	S211093
2109308-10	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B212628	S211093
2109308-10	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B212628	S211093
RG_GATEDP_WS_LAEMP_EVO_2021-09-16_N_NAL										
2109308-11	Se	WS	TR	199		0.165	0.528	µg/L	B212656	S211116
RG_GATEDP_WS_LAEMP_EVO_2021-09-16_N_NAL										
2109308-12	Se	WS	D	199		0.165	0.528	µg/L	B212656	S211116

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_GATE_WS_LAEMP_EVO_2021-09-16_N										
2109308-13	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212628	S211093
2109308-13	MeSe(IV)	WS	D	0.042		0.010	0.025	µg/L	B212628	S211093
2109308-13	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212628	S211093
2109308-13	Se(IV)	WS	D	0.912		0.010	0.075	µg/L	B212628	S211093
2109308-13	Se(VI)	WS	D	224		0.010	0.055	µg/L	B212628	S211093
2109308-13	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B212628	S211093
2109308-13	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212628	S211093
2109308-13	SeSO3	WS	D	≤ 0.010	J-1 U	0.010	0.055	µg/L	B212628	S211093
2109308-13	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B212628	S211093
RG_GATE_WS_LAEMP_EVO_2021-09-16_N_NAL										
2109308-14	Se	WS	TR	219		0.165	0.528	µg/L	B212656	S211116
RG_GATE_WS_LAEMP_EVO_2021-09-16_N_NAL										
2109308-15	Se	WS	D	222		0.165	0.528	µg/L	B212656	S211116
RG_MI25_WS_LAEMP_EVO_2021-09-13_N										
2109308-16	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212628	S211109
2109308-16	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212628	S211109
2109308-16	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212628	S211109
2109308-16	Se(IV)	WS	D	0.020	J	0.010	0.075	µg/L	B212628	S211109
2109308-16	Se(VI)	WS	D	0.148		0.010	0.055	µg/L	B212628	S211109
2109308-16	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B212628	S211109
2109308-16	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B212628	S211109
2109308-16	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B212628	S211109
2109308-16	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B212628	S211109
RG_MI25_WS_LAEMP_EVO_2021-09-13_N_NAL										
2109308-17	Se	WS	TR	0.252	J	0.165	0.528	µg/L	B212656	S211116
RG_MI25_WS_LAEMP_EVO_2021-09-13_N_NAL										
2109308-18	Se	WS	D	0.180	J	0.165	0.528	µg/L	B212656	S211116

Accuracy & Precision Summary

Batch: B212628
Lab Matrix: Water
Method: SOP BAL-4201

Sample	Analyte	Native	Spike	Result	Units	REC	Limits	RPD	Limits
B212628-BS1	**Blank Spike, (2124033)**								
	MeSe(IV)		5.095	5.739	µg/L	113%	75-125		
	Se(IV)		5.000	5.115	µg/L	102%	75-125		
	Se(VI)		5.000	4.895	µg/L	98%	75-125		
	SeCN		5.015	5.044	µg/L	101%	75-125		
	SeMet		4.932	5.209	µg/L	106%	75-125		
B212628-DUP1	**Duplicate, (2109295-01)**								
	DMSeO	ND		ND	µg/L			N/C	25
	MeSe(IV)	ND		ND	µg/L			N/C	25
	MeSe(VI)	ND		ND	µg/L			N/C	25
	Se(IV)	0.159		0.158	µg/L			0.4%	25
	Se(VI)	ND		0.016	µg/L			N/C	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
B212628-MS1	**Matrix Spike, (2109295-01)**								
	Se(IV)	0.159	4.900	4.733	µg/L	93%	75-125		
	Se(VI)	ND	5.100	5.182	µg/L	102%	75-125		
	SeCN	ND	1.962	1.839	µg/L	94%	75-125		
	SeMet	ND	1.977	1.944	µg/L	98%	75-125		
B212628-MSD1	**Matrix Spike Duplicate, (2109295-01)**								
	Se(IV)	0.159	4.900	4.918	µg/L	97%	75-125	4%	25
	Se(VI)	ND	5.100	5.172	µg/L	101%	75-125	0.2%	25
	SeCN	ND	1.962	1.881	µg/L	96%	75-125	2%	25
	SeMet	ND	1.977	1.989	µg/L	101%	75-125	2%	25

Accuracy & Precision Summary

Batch: B212628
Lab Matrix: Water
Method: SOP BAL-4201

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits	
B212628-DUP8	**Duplicate, (2109308-16)**							
	DMSeO	ND		ND	µg/L		N/C	25
	MeSe(IV)	ND		ND	µg/L		N/C	25
	MeSe(VI)	ND		ND	µg/L		N/C	25
	Se(IV)	0.020		0.020	µg/L		0.5%	25
	Se(VI)	0.148		0.140	µg/L		6%	25
	SeCN	ND		ND	µg/L		N/C	25
	SeMet	ND		ND	µg/L		N/C	25
	SeSO3	ND		ND	µg/L		N/C	25
	Unk Se Sp	ND		ND	µg/L		N/C	25

Accuracy & Precision Summary

Batch: B212656
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC	Limits	RPD	Limits
B212656-BS1	**Blank Spike, (2104075)**								
	Se		200.0	200.6	µg/L	100%	75-125		
B212656-BS2	**Blank Spike, (2104075)**								
	Se		200.0	196.2	µg/L	98%	75-125		
B212656-BS3	**Blank Spike, (2104075)**								
	Se		200.0	201.0	µg/L	100%	75-125		
B212656-BS4	**Blank Spike, (2104075)**								
	Se		200.0	197.1	µg/L	99%	75-125		
B212656-SRM2	**Reference Material (2110008, TMDA 51.5 Reference Standard - Bottle 8 - SRM)**								
	Se		14.30	13.20	µg/L	92%	75-125		
B212656-SRM3	**Reference Material (2110008, TMDA 51.5 Reference Standard - Bottle 8 - SRM)**								
	Se		14.30	13.91	µg/L	97%	75-125		
B212656-SRM4	**Reference Material (2110008, TMDA 51.5 Reference Standard - Bottle 8 - SRM)**								
	Se		14.30	13.70	µg/L	96%	75-125		
B212656-DUP4	**Duplicate, (2109307-02)**								
	Se	5.947		6.345	µg/L			6%	20
B212656-MS4	**Matrix Spike, (2109307-02)**								
	Se	5.947	220.0	229.8	µg/L	102%	75-125		
B212656-MSD4	**Matrix Spike Duplicate, (2109307-02)**								
	Se	5.947	220.0	226.8	µg/L	100%	75-125	1%	20
B212656-DUP5	**Duplicate, (2109311-08)**								
	Se	163.5		163.3	µg/L			0.09%	20

Accuracy & Precision Summary

Batch: B212656
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits		RPD & Limits	
B212656-MS5	**Matrix Spike, (2109311-08)**								
	Se	163.5	220.0	393.8	µg/L	105%	75-125		
B212656-MSD5	**Matrix Spike Duplicate, (2109311-08)**								
	Se	163.5	220.0	400.8	µg/L	108%	75-125	2%	20

Method Blanks & Reporting Limits

Batch: B212628
Matrix: Water
Method: SOP BAL-4201
Analyte: DMSeO

Sample	Result	Units
B212628-BLK1	0.00	µg/L
B212628-BLK2	0.00	µg/L
B212628-BLK3	0.00	µg/L
B212628-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.005 **MRL:** 0.005

Analyte: MeSe(IV)

Sample	Result	Units
B212628-BLK1	0.00	µg/L
B212628-BLK2	0.00	µg/L
B212628-BLK3	0.00	µg/L
B212628-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.005 **MRL:** 0.005

Analyte: MeSe(VI)

Sample	Result	Units
B212628-BLK1	0.00	µg/L
B212628-BLK2	0.00	µg/L
B212628-BLK3	0.00	µg/L
B212628-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.005 **MRL:** 0.005

Method Blanks & Reporting Limits

Analyte: Se(IV)

Sample	Result	Units
B212628-BLK1	0.00	µg/L
B212628-BLK2	0.00	µg/L
B212628-BLK3	0.00	µg/L
B212628-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.015 **MRL:** 0.015

Analyte: Se(VI)

Sample	Result	Units
B212628-BLK1	0.00	µg/L
B212628-BLK2	0.00	µg/L
B212628-BLK3	0.00	µg/L
B212628-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.011 **MRL:** 0.011

Analyte: SeCN

Sample	Result	Units
B212628-BLK1	0.00	µg/L
B212628-BLK2	0.00	µg/L
B212628-BLK3	0.00	µg/L
B212628-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.010 **MRL:** 0.010

Analyte: SeMet

Sample	Result	Units
B212628-BLK1	0.00	µg/L
B212628-BLK2	0.00	µg/L
B212628-BLK3	0.00	µg/L
B212628-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.005 **MRL:** 0.005

Method Blanks & Reporting Limits

Analyte: SeSO3

Sample	Result	Units
B212628-BLK1	0.00	µg/L
B212628-BLK2	0.00	µg/L
B212628-BLK3	0.00	µg/L
B212628-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.011 **MRL:** 0.011

Analyte: Unk Se Sp

Sample	Result	Units
B212628-BLK1	0.00	µg/L
B212628-BLK2	0.00	µg/L
B212628-BLK3	0.00	µg/L
B212628-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.015 **MRL:** 0.015

Method Blanks & Reporting Limits

Batch: B212656
Matrix: Water
Method: EPA 1638 Mod
Analyte: Se

Sample	Result	Units
B212656-BLK1	0.077	µg/L
B212656-BLK2	0.095	µg/L
B212656-BLK3	0.154	µg/L
B212656-BLK4	0.153	µg/L

Average: 0.120
Limit: 0.480

MDL: 0.150
MRL: 0.480

Sample Containers

Lab ID: 2109308-01
Sample: RG_BOCK_WS_LAEMP_EVO_2021-09-16_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/16/2021
Received: 09/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #4 - 2109308
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #4 - 2109308
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #4 - 2109308

Lab ID: 2109308-02
Sample: RG_BOCK_WS_LAEMP_EVO_2021-09-16_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/16/2021
Received: 09/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109308

Lab ID: 2109308-03
Sample: RG_BOCK_WS_LAEMP_EVO_2021-09-16_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/16/2021
Received: 09/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109308

Lab ID: 2109308-04
Sample: RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/15/2021
Received: 09/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #4 - 2109308
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #4 - 2109308
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #4 - 2109308

Sample Containers

Lab ID: 2109308-05
Sample: RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/15/2021
Received: 09/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109308

Lab ID: 2109308-06
Sample: RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/15/2021
Received: 09/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109308

Lab ID: 2109308-07
Sample: RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/15/2021
Received: 09/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #4 - 2109308
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #4 - 2109308
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #4 - 2109308

Lab ID: 2109308-08
Sample: RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/15/2021
Received: 09/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109308

Sample Containers

Lab ID: 2109308-09
Sample: RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/15/2021
Received: 09/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109308

Lab ID: 2109308-10
Sample: RG_GATEDP_WS_LAEMP_EVO_2021-09-16_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/16/2021
Received: 09/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #4 - 2109308
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #4 - 2109308
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #4 - 2109308

Lab ID: 2109308-11
Sample: RG_GATEDP_WS_LAEMP_EVO_2021-09-16_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/16/2021
Received: 09/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109308

Lab ID: 2109308-12
Sample: RG_GATEDP_WS_LAEMP_EVO_2021-09-16_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/16/2021
Received: 09/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109308

Sample Containers

Lab ID: 2109308-13
Sample: RG_GATE_WS_LAEMP_EVO_2021-09-16_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/16/2021
Received: 09/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #4 - 2109308
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #4 - 2109308
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #4 - 2109308

Lab ID: 2109308-14
Sample: RG_GATE_WS_LAEMP_EVO_2021-09-16_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/16/2021
Received: 09/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109308

Lab ID: 2109308-15
Sample: RG_GATE_WS_LAEMP_EVO_2021-09-16_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/16/2021
Received: 09/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109308

Lab ID: 2109308-16
Sample: RG_MI25_WS_LAEMP_EVO_2021-09-13_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/13/2021
Received: 09/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #4 - 2109308
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #4 - 2109308
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #4 - 2109308

Sample Containers

Lab ID: 2109308-17
Sample: RG_MI25_WS_LAEMP_EVO_2021-09-13_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/13/2021
Received: 09/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109308

Lab ID: 2109308-18
Sample: RG_MI25_WS_LAEMP_EVO_2021-09-13_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/13/2021
Received: 09/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2127026	<2	Styrofoam Cooler #1 - 2109308

Shipping Containers

Styrofoam Cooler #1 - 2109308

Received: September 23, 2021 7:15
Tracking No: PAPS#RWHV87409 via Courier
Coolant Type: Blue Ice
Temperature: 2.0 °C
Description: Styrofoam Cooler
Damaged in transit? No
Returned to client? No
Comments: IR#30
Custody seals present? No
Custody seals intact? No
COC present? Yes

Styrofoam Cooler #4 - 2109308

Received: September 23, 2021 7:15
Tracking No: PAPS#RWHV87409 via Courier
Coolant Type: Blue Ice
Temperature: 0.5 °C
Description: Styrofoam Cooler
Damaged in transit? No
Returned to client? No
Comments: IR#31
Custody seals present? No
Custody seals intact? No
COC present? Yes

Teck

COC ID:	September EVO LAEMP	TURNAROUND TIME:	Regular

PROJECT/CLIENT INFO

Facility Name / Job#	REP
Project Manager	Allie Ferguson
Email	allie.ferguson@teck.com
Address	421 Pine Avenue
City	Sparwood
Province	BC
Postal Code	V0B 2G0
Country	Canada
Phone Number	250-910-8755

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:	allie.ferguson@teck.com	X	X	X
Email 2:	teckcoal@equisonline.com			X
Email 3:	jessica.ritz@teck.com	X	X	X
Email 4:	tbowron@minnow.ca	X	X	X
Email 5:	tyler.mehler@minnow.ca	X	X	X
Email 5:				
PO number	VPO00748540			

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.	Total Selenium	Dissolved Selenium (F)	Selenium Speciation (F)
RG_BOCK_WS_LAEMP_EVO_2021-09-16_N	RG_BOCK	WS	No	September 16, 2021	0920	G	1			1
RG_BOCK_WS_LAEMP_EVO_2021-09-16_N_NAL	RG_BOCK	WS	No	September 16, 2021	0920	G	2	1	1	
RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_N	RG_ERCKDT	WS	No	September 15, 2021	0909	G	1			1
RG_ERCKDT_WS_LAEMP_EVO_2021-09-15_N_NAL	RG_ERCKDT	WS	No	September 15, 2021	0909	G	2	1	1	
RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_N	RG_ERCKUT	WS	No	September 15, 2021	1530	G	1			1
RG_ERCKUT_WS_LAEMP_EVO_2021-09-15_N_NAL	RG_ERCKUT	WS	No	September 15, 2021	1530	G	2	1	1	
RG_GATEDP_WS_LAEMP_EVO_2021-09-16_N	RG_GATEDP	WS	No	September 16, 2021	1100	G	1			1
RG_GATEDP_WS_LAEMP_EVO_2021-09-16_N_NAL	RG_GATEDP	WS	No	September 16, 2021	1100	G	2	1	1	
RG_GATE_WS_LAEMP_EVO_2021-09-16_N	RG_GATE	WS	No	September 16, 2021	1330	G	1			1
RG_GATE_WS_LAEMP_EVO_2021-09-16_N_NAL	RG_GATE	WS	No	September 16, 2021	1330	G	2	1	1	
RG_MI25_WS_LAEMP_EVO_2021-09-13_N	RG_MI25	WS	No	September 13, 2021	1300	G	1			1
RG_MI25_WS_LAEMP_EVO_2021-09-13_N_NAL	RG_MI25	WS	No	September 13, 2021	1300	G	2	1	1	

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

Total and dissolved selenium samples have NOT been preserved. Dissolved selenium have been filtered. Speciation samples have been filtered and frozen.

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Jennifer Ings/Minnow	21-Sep-2021	[signature]	9/23/21 @ 0715

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	Jennifer Ings	Mobile #	519-500-3444
Sampler's Signature	[signature]	Date/Time	September 21, 2021

STRAIGHT BILL OF LADING
NOT NEGOTIABLE

RW HOT SHOT SERVICE INC.

250-425-7447

24 Hour Hot Shot Service

No. 87409

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 Sept 22-21

INVOICE TO

BILL OF LADING #

PURCHASE ORDER NUMBER (BAL)

SHIPPER (FROM) Teck Coal Ltd.

STREET West Line Creek Treatment

CITY/PROVINCE Sparwood, BC

POSTAL CODE

CONSIGNEE (TO) Brooks Applied Labs

STREET 18804 N. Creek Parkway

CITY/PROVINCE Bothell, WA

POSTAL CODE 98011

SPECIAL INSTRUCTIONS

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)
4	Coolers - Water Samples	97 LBS
	PAPS# RWHV87409	

FREIGHT CHARGES
SHIPPER TO CHECK
☐ PREPAID ☐ COLLECT
If not indicated, shipping will automatically move collect.

FEE
WAITING
XPU
CHARGES
FSC
US
SUB TOTAL
GST
TOTAL $
IF AT OWNER'S RISK, WRITE ORD HERE

UNIT #

DECLARED VALUATION: Maximum liability of carrier is $2.00 per lb. ($4.41 per kilogram) unless declared valuation states otherwise. $

DRIVER'S SIGNATURE - PICK UP BY

PICK UP TIME

DRIVER'S SIGNATURE - DELIVERY BY

FINISH TIME

NOTICE OF CLAIM: (a) No carrier is liable for loss, damage or delay of any goods under the Bill of Lading unless notice thereof setting out particulars of the origin, destination and date of shipment of the goods and the estimated amount claimed in respect of such loss, damage or delay is given in writing to the originating carrier or the delivering carrier within sixty (60) days after the delivery of the goods, or in the case of failure to make delivery within nine (9) months from the date of shipment. (b) The final statement of the claim must be filed within nine (9) months from the date of shipment together with a copy of the paid freight bill. RECEIVED at the point of origin on the date specified from the consignor mentioned herein the property herein described, in apparent good order, except as noted (contents and condition of contents of package unknown) marked, consigned and destined as indicated below, which the carrier agrees to carry and to deliver to the consignee at the said destination, subject to the rates and classification in effect on the date of shipment. It is mutually agreed, as to each carrier of all or any of the goods over all or any portion of the route to destination, and as to each party of any time interested in all or any of the goods, that every service to be performed hereunder shall be subject to all the conditions of 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 Rob Benedek

SHIPPER SIGN Rob Kent

CONSIGNEE PRINT SEAN ZIGAM

CONSIGNEE SIGN

DATE 09/23/21

TIME 715

NUMBER OF PIECES RECEIVED 4

GST # 864540398RT0001

WHITE: Office YELLOW: Carrier PINK: Consignee GOLDENROAD: Shipper

Cooler ID: Styrofoam Cooler # 1 **COC** [✓ Y]/N **Temperature:** ~~3~~ 2.0 EE TQ 9/23/21 **IR:** 30

Coolant Type: Ice [✓ Blue Ice] Ambient

Notes:

Sampling Locations:	RG		EN							
Sample Types:	[✓ T/D]	SP	[✓ T/D]	SP	T/D	SP	T/D	SP	T/D	SP
Container Types:	40 ml		40 ml							

Opened By: TQ **Date:** 9/23/21

COPY

Effective 7/29/20

2109308

on 004

RW HOT SHOT SERVICE INC.
250-425-7447
24 Hour Hot Shot Service

STRAIGHT BILL OF LADING
NOT NEGOTIABLE

No. 87409

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: Sept 22-21

PURCHASE ORDER NUMBER

SHIPPER (FROM): Teck Coal Ltd.
STREET: West Line Creek Treatment
CITY/PROVINCE: Sparwood, BC
POSTAL CODE

SPECIAL INSTRUCTIONS

CONSIGNEE (TO): Brooks Applied Labs
STREET: 18804 N. Creek Parkway
CITY/PROVINCE: Bothell WA
POSTAL CODE: 98011

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)
4	Coolers - Water Samples	97 LBS
	PAPS# RWHV87409	

FREIGHT CHARGES
SHIPPER TO CHECK
PREPAID / COLLECT

FEE
WAITING
XPU
CHARGES
FSC
US
SUB TOTAL
GST
TOTAL $

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

Rob Bennett

CONSIGNEE PRINT: SEAN ZIGAM
CONSIGNEE SIGN

DATE: 09/23/21
TIME: 7:15
NUMBER OF PIECES RECEIVED: 4

WHITE: Office YELLOW: Carrier PINK: Consignee GOLDENROD: Shipper

GST # 864540390RT0001

Cooler ID: Styrofoam Cooler # 4 **COC (Y/N):** **Temperature:** 0.5 **IR:** 31

Coolant Type: Ice Blue Ice Ambient

Notes:

Sampling Locations:

	BG		GH		EV					
Sample Types:	T/D	SP	T/D	SP	T/D	SP	T/D	SP	T/D	SP
Container Types:		60mL		60mL		60mL				

Opened By: CVL **Date:** 9/23/21

COPY

...ve 7/29/20 **Revision 004**

SELENIUM SPECIATION

BAL Final Report 2112284

(Finalized January 13, 2022)

BROOKS APPLIED LABS
18804 North Creek Parkway, Ste 100, Bothell, WA 98011 • USA • T: 206 632 6206 F: 206 632 6017 • info@brooksapplied.com

January 13, 2022

Teck Resources Limited - Vancouver
Allie Ferguson
421 Pine Avenue
Sparwood, B.C. CANADA V0B2G0
allie.ferguson@teck.com

Re: Elkview Operations

Dear Allie Ferguson,

On December 23, 2021, Brooks Applied Labs (BAL) received twelve (12) aqueous samples. The samples were logged-in for total recoverable selenium [*Se*], dissolved Se, and Se speciation analyses, according to the chain-of-custody (COC) form.

The sample fractions logged in for Se speciation and dissolved Se had been field-filtered prior to receipt at BAL. All samples were stored according to BAL SOPs.

Total Recoverable and Dissolved Se

Each aqueous sample fraction for total recoverable or dissolved Se was digested in a closed vessel (bomb) with nitric and hydrochloric acids. The resulting digests were analyzed for Se content via inductively coupled plasma triple quadrupole mass spectrometry (ICP-QQQ-MS). The ICP-QQQ-MS instrumentation uses advanced interference removal techniques to ensure accuracy of the sample results. For more information, please visit the *Interference Reduction Technology* section on our website, brooksapplied.com.

Se Speciation

Each aqueous sample was analyzed for Se speciation using ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS). Selenium species are chromatographically separated on an ion exchange column and then quantified using inductively coupled plasma collision reaction cell mass spectrometry (ICP-CRC-MS); for more information on this determinative technique, please visit the *Interference Reduction Technology* section on our website. The chromatographic method applied for the analyses provides greater retention of methylseleninic acid and selenomethionine, allowing for more definitive quantitation of these species.

In accordance with the quotation issued for this project, selenium speciation was defined as dissolved selenite [Se(IV)], selenate [Se(VI)], selenocyanate [SeCN], methylseleninic acid [MeSe(IV)], methaneselenonic acid [MeSe(VI)], selenomethionine [SeMet], selenosulfate [SeSO3], and dimethylselenoxide [DMSeO]. Unknown Se species was defined as the total concentration of all unknown Se species observed during the analysis. This item is identified on the report as [Unk Se Sp].

DMSeO elutes early in the chromatographic run due to the nature of the molecule and the applied chromatographic separation method. Since this species elutes near the dead volume, additional

Se species may coelute. Alternate methods can be applied, upon client request, to increase the separation of DMSeO from potentially co-eluting Se species.

The results were not method blank corrected, as described in the calculations section of the relevant BAL SOPs and were evaluated using reporting limits adjusted to account for sample aliquot size. Please refer to the *Sample Results* page for sample-specific MDLs, MRLs, and other details.

In instances when a matrix spike/matrix spike duplicate (MS/MSD) set was spiked at a level less than the native sample concentration, the recoveries and the relative percent difference (RPD) are not considered valid indicators of data quality. In such instances, the recoveries of the laboratory fortified blanks (BS) and/or standard reference materials (SRM) demonstrate the accuracy of the applied methods. When the spiking level was less than 25% of the native sample concentration, the spike recovery was not reported (NR) and the RPD of the MS/MSD set was not calculated (N/C).

Except for concentration qualifiers, all data were reported without qualification. All associated quality control sample results met the acceptance criteria.

BAL, an accredited laboratory, certifies that the reported results of all analyses for which BAL is NELAP accredited met all NELAP requirements. For more information, please see the *Report Information* page.

Please feel free to contact us if you have any questions regarding this report.

Sincerely,

Jeremy Maute
Senior Project Manager
Brooks Applied Labs
Jeremy@brooksapplied.com

Report Information

Laboratory Accreditation

BAL is accredited by the *National Environmental Laboratory Accreditation Program* (NELAP) through the State of Florida Department of Health, Bureau of Laboratories (E87982) and is certified to perform many environmental analyses. BAL is also certified by many other states to perform environmental analyses. For a current list of our accreditations/certifications, please visit our website at <http://www.brooksapplied.com/resources/certificates-permits/> or review Tables 1 and 2 in our Accreditation Information. Results reported relate only to the samples listed in the report.

Field Quality Control Samples

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

Common Abbreviations

AR	as received	**MS**	matrix spike
BAL	Brooks Applied Labs	**MSD**	matrix spike duplicate
BLK	method blank	**ND**	non-detect
BS	blank spike	**NR**	non-reportable
CAL	calibration standard	**N/C**	not calculated
CCB	continuing calibration blank	**PS**	post preparation spike
CCV	continuing calibration verification	**REC**	percent recovery
COC	chain of custody record	**RPD**	relative percent difference
D	dissolved fraction	**SCV**	secondary calibration verification
DUP	duplicate	**SOP**	standard operating procedure
IBL	instrument blank	**SRM**	reference material
ICV	initial calibration verification	**T**	total fraction
MDL	method detection limit	**TR**	total recoverable fraction
MRL	method reporting limit		

Definition of Data Qualifiers

(Effective 3/23/2020)

E	An estimated value due to the presence of interferences. A full explanation is presented in the narrative.
H	Holding time and/or preservation requirements not met. Please see narrative for explanation.
J	Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate.
J-1	Estimated value. A full explanation is presented in the narrative.
M	Duplicate precision (RPD) was not within acceptance criteria. Please see narrative for explanation.
N	Spike recovery was not within acceptance criteria. Please see narrative for explanation.
R	Rejected, unusable value. A full explanation is presented in the narrative.
U	Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL.
X	Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch. Result is estimated.
Z	Holding time and/or preservation requirements not established for this method; however, BAL recommendations for holding time were not followed. Please see narrative for explanation.

These qualifiers are based on those previously utilized by Brooks Applied Labs, those found in the EPA SOW ILM03.0, Exhibit B, Section III, pg. B-18, and the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review; USEPA; January 2010. These supersede all previous qualifiers ever employed by BAL.

Accreditation Information

Table 1. Accredited method/matrix/analytes for TNI

Issued by: State of Florida Dept. of Health (The NELAC Institute 2016 Standard)
Issued on: July 1, 2021; Valid to: June 30, 2022
Certificate Number: E87982-37

Method	Matrix	TNI Accredited Analyte(s)
EPA 1638	Non-Potable Waters	Ag, Cd, Cu, Ni, Pb, Sb, Se, Tl, Zn
EPA 200.8	Non-Potable Waters	Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
EPA 6020	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
	Solids/Chemicals & Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, V, Zn
BAL-5000	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn, Hardness
	Solids/Chemicals	Ag, As, B, Be, Cd, Co, Cr, Cu, Pb, Mo, Ni, Sb, Se, Sn, Sr, Tl, V, Zn
	Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn
EPA 1640	Non-Potable Waters	Cd, Cu, Pb, Ni, Zn
EPA 1631E	Non-Potable Waters, Solids/Chemicals & Biological	Total Mercury
EPA 1630	Non-Potable Waters	Methyl Mercury
BAL-3200	Solids/Chemicals & Biological	Methyl Mercury
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs
BAL-4201	Non-Potable Waters	Se(IV), Se(VI)
BAL-4300	Non-Potable Waters Solid/Chemicals	Cr(VI)
SM2340B	Non-Potable Waters	Hardness

Accreditation Information

Table 2. Accredited method/matrix/analytes for ISO (1), Non-Governmental TNI (2), and DoD/DOE (3)

Issued by: ANAB

Issued on: September 21, 2021; Valid to: March 30, 2024

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 Hg (Biological Only)	Not Accredited
EPA 1640 Mod	Non-Potable Waters	Cd, Cu, Pb, Ni, Zn Ag, As, Cr, Co, Se, Tl, V (ISO Only)	Not Accredited
EPA 1631E Mod BAL-3100	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 (ISO Only)	Not Accredited
	Biological/Food Solids/Chemicals	Inorganic Arsenic (ISO Only)	Not Accredited
AOAC 2015.01 Mod BAL-5000	Food	As, Cd, Hg, Pb	Not Accredited
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs	Not Accredited
	Biological by BAL-4117	Inorganic Arsenic, DMAs, MMAs (ISO Only)	Not Accredited
BAL-4101	Food by BAL-4117	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 BAL-0501	Solids/Chemicals & Biological	% Dry Weight	% Dry Weight

(1) ISO/IEC 17025:2017 – Certificate Number ADE-1447.02

(2) Non-Governmental NELAC Institute 2016 Standard – Certificate Number ADE-1447.01

(3) Department of Defense/Energy Consolidated Quality Systems Manual v. 5.3 – Certificate Numbers ADE-1447 for DoD, ADE-1447.03 for DOE.

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_M13_WS_LAEMP_EVO_2021-12-14_N	2112284-01	WS	Sample	12/14/2021	12/23/2021
RG_M13_WS_LAEMP_EVO_2021-12-14_N_NAL	2112284-02	WS	Sample	12/14/2021	12/23/2021
RG_M13_WS_LAEMP_EVO_2021-12-14_N_NAL	2112284-03	WS	Sample	12/14/2021	12/23/2021
RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_N	2112284-04	WS	Sample	12/14/2021	12/23/2021
RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_N_NAL	2112284-05	WS	Sample	12/14/2021	12/23/2021
RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_N_NAL	2112284-06	WS	Sample	12/14/2021	12/23/2021
RG_ERCK_WS_LAEMP_EVO_2021-12-14_N	2112284-07	WS	Sample	12/14/2021	12/23/2021
RG_ERCK_WS_LAEMP_EVO_2021-12-14_N_NAL	2112284-08	WS	Sample	12/14/2021	12/23/2021
RG_ERCK_WS_LAEMP_EVO_2021-12-14_N_NAL	2112284-09	WS	Sample	12/14/2021	12/23/2021
RG_RIVER_WS_LAEMP_EVO_2021-12-14_N	2112284-10	WS	Sample	12/14/2021	12/23/2021
RG_RIVER_WS_LAEMP_EVO_2021-12-14_N_NAL	2112284-11	WS	Sample	12/14/2021	12/23/2021
RG_RIVER_WS_LAEMP_EVO_2021-12-14_N_NAL	2112284-12	WS	Sample	12/14/2021	12/23/2021
RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_N	2112284-13	WS	Sample	12/15/2021	12/23/2021
RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_N_NAL	2112284-14	WS	Sample	12/15/2021	12/23/2021
RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_N_NAL	2112284-15	WS	Sample	12/15/2021	12/23/2021
RG_FBLANK_WS_LAEMP_EVO_2021-12-15_N	2112284-16	WS	Sample	12/15/2021	12/23/2021
RG_FBLANK_WS_LAEMP_EVO_2021-12-15_N_NAL	2112284-17	WS	Sample	12/15/2021	12/23/2021
RG_FBLANK_WS_LAEMP_EVO_2021-12-15_N_NAL	2112284-18	WS	Sample	12/15/2021	12/23/2021

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
DMSeO	Water	SOP BAL-4201	12/29/2021	12/30/2021	B213545	S211464
MeSe(IV)	Water	SOP BAL-4201	12/29/2021	12/30/2021	B213545	S211464
MeSe(VI)	Water	SOP BAL-4201	12/29/2021	12/30/2021	B213545	S211464
Se	Water	EPA 1638 Mod	01/03/2022	01/05/2022	B213542	S220018
Se(IV)	Water	SOP BAL-4201	12/29/2021	12/30/2021	B213545	S211464
Se(VI)	Water	SOP BAL-4201	12/29/2021	12/30/2021	B213545	S211464
SeCN	Water	SOP BAL-4201	12/29/2021	12/30/2021	B213545	S211464
SeMet	Water	SOP BAL-4201	12/29/2021	12/30/2021	B213545	S211464
SeSO3	Water	SOP BAL-4201	12/29/2021	12/30/2021	B213545	S211464
Unk Se Sp	Water	SOP BAL-4201	12/29/2021	12/30/2021	B213545	S211464

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_M13_WS_LAEMP_EVO_2021-12-14_N										
2112284-01	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B213545	S211464
2112284-01	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B213545	S211464
2112284-01	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B213545	S211464
2112284-01	Se(IV)	WS	D	0.027	J	0.010	0.075	µg/L	B213545	S211464
2112284-01	Se(VI)	WS	D	1.71		0.010	0.055	µg/L	B213545	S211464
2112284-01	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B213545	S211464
2112284-01	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B213545	S211464
2112284-01	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B213545	S211464
2112284-01	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B213545	S211464
RG_M13_WS_LAEMP_EVO_2021-12-14_N_NAL										
2112284-02	Se	WS	TR	1.95		0.165	0.528	µg/L	B213542	S220018
RG_M13_WS_LAEMP_EVO_2021-12-14_N_NAL										
2112284-03	Se	WS	D	1.73		0.165	0.528	µg/L	B213542	S220018
RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_N										
2112284-04	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B213545	S211464
2112284-04	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B213545	S211464
2112284-04	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B213545	S211464
2112284-04	Se(IV)	WS	D	0.030	J	0.010	0.075	µg/L	B213545	S211464
2112284-04	Se(VI)	WS	D	139		0.010	0.055	µg/L	B213545	S211464
2112284-04	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B213545	S211464
2112284-04	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B213545	S211464
2112284-04	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B213545	S211464
2112284-04	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B213545	S211464
RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_N_NAL										
2112284-05	Se	WS	TR	137		0.165	0.528	µg/L	B213542	S220018
RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_N_NAL										
2112284-06	Se	WS	D	129		0.165	0.528	µg/L	B213542	S220018

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_ERCK_WS_LAEMP_EVO_2021-12-14_N										
2112284-07	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B213545	S211464
2112284-07	MeSe(IV)	WS	D	0.014	J	0.010	0.025	µg/L	B213545	S211464
2112284-07	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B213545	S211464
2112284-07	Se(IV)	WS	D	0.514		0.010	0.075	µg/L	B213545	S211464
2112284-07	Se(VI)	WS	D	61.7		0.010	0.055	µg/L	B213545	S211464
2112284-07	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B213545	S211464
2112284-07	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B213545	S211464
2112284-07	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B213545	S211464
2112284-07	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B213545	S211464
RG_ERCK_WS_LAEMP_EVO_2021-12-14_N_NAL										
2112284-08	Se	WS	TR	61.2		0.165	0.528	µg/L	B213542	S220018
RG_ERCK_WS_LAEMP_EVO_2021-12-14_N_NAL										
2112284-09	Se	WS	D	60.8		0.165	0.528	µg/L	B213542	S220018
RG_RIVER_WS_LAEMP_EVO_2021-12-14_N										
2112284-10	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B213545	S211464
2112284-10	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B213545	S211464
2112284-10	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B213545	S211464
2112284-10	Se(IV)	WS	D	0.024	J	0.010	0.075	µg/L	B213545	S211464
2112284-10	Se(VI)	WS	D	134		0.010	0.055	µg/L	B213545	S211464
2112284-10	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B213545	S211464
2112284-10	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B213545	S211464
2112284-10	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B213545	S211464
2112284-10	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B213545	S211464
RG_RIVER_WS_LAEMP_EVO_2021-12-14_N_NAL										
2112284-11	Se	WS	TR	138		0.165	0.528	µg/L	B213542	S220018
RG_RIVER_WS_LAEMP_EVO_2021-12-14_N_NAL										
2112284-12	Se	WS	D	135		0.165	0.528	µg/L	B213542	S220018

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_N										
2112284-13	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B213545	S211464
2112284-13	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B213545	S211464
2112284-13	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B213545	S211464
2112284-13	Se(IV)	WS	D	0.054	J	0.010	0.075	µg/L	B213545	S211464
2112284-13	Se(VI)	WS	D	94.4		0.010	0.055	µg/L	B213545	S211464
2112284-13	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B213545	S211464
2112284-13	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B213545	S211464
2112284-13	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B213545	S211464
2112284-13	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B213545	S211464
RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_N_NAL										
2112284-14	Se	WS	TR	129		0.165	0.528	µg/L	B213542	S220018
RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_N_NAL										
2112284-15	Se	WS	D	131		0.165	0.528	µg/L	B213542	S220018
RG_FBLANK_WS_LAEMP_EVO_2021-12-15_N										
2112284-16	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B213545	S211464
2112284-16	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B213545	S211464
2112284-16	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B213545	S211464
2112284-16	Se(IV)	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B213545	S211464
2112284-16	Se(VI)	WS	D	0.033	J	0.010	0.055	µg/L	B213545	S211464
2112284-16	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B213545	S211464
2112284-16	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B213545	S211464
2112284-16	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B213545	S211464
2112284-16	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B213545	S211464
RG_FBLANK_WS_LAEMP_EVO_2021-12-15_N_NAL										
2112284-17	Se	WS	TR	0.781		0.165	0.528	µg/L	B213542	S220018
RG_FBLANK_WS_LAEMP_EVO_2021-12-15_N_NAL										
2112284-18	Se	WS	D	≤ 0.165	U	0.165	0.528	µg/L	B213542	S220018

Accuracy & Precision Summary

Batch: B213542
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits		RPD & Limits	
B213542-BS1	**Blank Spike, (2128021)**								
	Se		200.0	176.3	µg/L	88%	75-125		
B213542-BS2	**Blank Spike, (2128021)**								
	Se		200.0	175.7	µg/L	88%	75-125		
B213542-BS3	**Blank Spike, (2128021)**								
	Se		200.0	178.2	µg/L	89%	75-125		
B213542-SRM1	**Reference Material (2145003, TMDA 51.5 Reference Standard - Bottle 2 - SRM)**								
	Se		14.30	12.64	µg/L	88%	75-125		
B213542-SRM2	**Reference Material (2145003, TMDA 51.5 Reference Standard - Bottle 2 - SRM)**								
	Se		14.30	12.74	µg/L	89%	75-125		
B213542-SRM3	**Reference Material (2145003, TMDA 51.5 Reference Standard - Bottle 2 - SRM)**								
	Se		14.30	12.16	µg/L	85%	75-125		
B213542-DUP2	**Duplicate, (2112279-02)**								
	Se	114.3		112.0	µg/L			2%	20
B213542-MS2	**Matrix Spike, (2112279-02)**								
	Se	114.3	220.0	311.7	µg/L	90%	75-125		
B213542-MSD2	**Matrix Spike Duplicate, (2112279-02)**								
	Se	114.3	220.0	321.7	µg/L	94%	75-125	3%	20
B213542-DUP3	**Duplicate, (2112284-14)**								
	Se	129.1		133.3	µg/L			3%	20
B213542-MS3	**Matrix Spike, (2112284-14)**								
	Se	129.1	220.0	335.8	µg/L	94%	75-125		

Accuracy & Precision Summary

Batch: B213542
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits		RPD & Limits	
B213542-MSD3	**Matrix Spike Duplicate, (2112284-14)**								
	Se	129.1	220.0	327.9	µg/L	90%	75-125	2%	20

Accuracy & Precision Summary

Batch: B213545
Lab Matrix: Water
Method: SOP BAL-4201

Sample	Analyte	Native	Spike	Result	Units	REC	REC Limits	RPD	RPD Limits
B213545-BS1	**Blank Spike, (2124033)**								
	MeSe(IV)		5.095	5.814	µg/L	114%	75-125		
	Se(IV)		5.000	4.736	µg/L	95%	75-125		
	Se(VI)		5.000	4.452	µg/L	89%	75-125		
	SeCN		5.015	4.689	µg/L	93%	75-125		
	SeMet		4.932	5.160	µg/L	105%	75-125		
B213545-DUP2	**Duplicate, (2112279-01)**								
	DMSeO	ND		ND	µg/L			N/C	25
	MeSe(IV)	ND		ND	µg/L			N/C	25
	MeSe(VI)	ND		ND	µg/L			N/C	25
	Se(IV)	0.189		0.191	µg/L			1%	25
	Se(VI)	129.3		126.2	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
B213545-MS2	**Matrix Spike, (2112279-01)**								
	Se(IV)	0.189	4.900	4.736	µg/L	93%	75-125		
	Se(VI)	129.3	5.100	133.4	µg/L	NR	75-125		
	SeCN	ND	1.962	1.829	µg/L	93%	75-125		
	SeMet	ND	1.977	2.065	µg/L	104%	75-125		
B213545-MSD2	**Matrix Spike Duplicate, (2112279-01)**								
	Se(IV)	0.189	4.900	4.781	µg/L	94%	75-125	1%	25
	Se(VI)	129.3	5.100	132.7	µg/L	NR	75-125	N/C	25
	SeCN	ND	1.962	1.857	µg/L	95%	75-125	2%	25
	SeMet	ND	1.977	2.068	µg/L	105%	75-125	0.2%	25

Method Blanks & Reporting Limits

Batch: B213542
Matrix: Water
Method: EPA 1638 Mod
Analyte: Se

Sample	Result	Units
B213542-BLK1	0.028	µg/L
B213542-BLK2	-0.064	µg/L
B213542-BLK3	-0.001	µg/L
B213542-BLK4	-0.068	µg/L
Average:	-0.026	
Limit:	0.480	

MDL: 0.150
MRL: 0.480

Method Blanks & Reporting Limits

Batch: B213545
Matrix: Water
Method: SOP BAL-4201
Analyte: DMSeO

Sample	Result	Units
B213545-BLK1	0.00	µg/L
B213545-BLK2	0.00	µg/L
B213545-BLK3	0.00	µg/L
B213545-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.005 **MRL:** 0.005

Analyte: MeSe(IV)

Sample	Result	Units
B213545-BLK1	0.00	µg/L
B213545-BLK2	0.00	µg/L
B213545-BLK3	0.00	µg/L
B213545-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.005 **MRL:** 0.005

Analyte: MeSe(VI)

Sample	Result	Units
B213545-BLK1	0.00	µg/L
B213545-BLK2	0.00	µg/L
B213545-BLK3	0.00	µg/L
B213545-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.005 **MRL:** 0.005

Method Blanks & Reporting Limits

Analyte: Se(IV)

Sample	Result	Units
B213545-BLK1	0.002	µg/L
B213545-BLK2	0.001	µg/L
B213545-BLK3	0.00	µg/L
B213545-BLK4	0.00	µg/L

Average: 0.001 **MDL:** 0.002
Limit: 0.015 **MRL:** 0.015

Analyte: Se(VI)

Sample	Result	Units
B213545-BLK1	0.002	µg/L
B213545-BLK2	0.001	µg/L
B213545-BLK3	0.00	µg/L
B213545-BLK4	0.00	µg/L

Average: 0.001 **MDL:** 0.002
Limit: 0.011 **MRL:** 0.011

Analyte: SeCN

Sample	Result	Units
B213545-BLK1	0.00	µg/L
B213545-BLK2	0.00	µg/L
B213545-BLK3	0.00	µg/L
B213545-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.010 **MRL:** 0.010

Analyte: SeMet

Sample	Result	Units
B213545-BLK1	0.00	µg/L
B213545-BLK2	0.00	µg/L
B213545-BLK3	0.00	µg/L
B213545-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.005 **MRL:** 0.005

Method Blanks & Reporting Limits

Analyte: SeSO3

Sample	Result	Units
B213545-BLK1	0.00	µg/L
B213545-BLK2	0.00	µg/L
B213545-BLK3	0.00	µg/L
B213545-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.011 **MRL:** 0.011

Analyte: Unk Se Sp

Sample	Result	Units
B213545-BLK1	0.00	µg/L
B213545-BLK2	0.00	µg/L
B213545-BLK3	0.00	µg/L
B213545-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.015 **MRL:** 0.015

Sample Containers

Lab ID: 2112284-01
Sample: RG_M13_WS_LAEMP_EVO_2021-12-14_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/14/2021
Received: 12/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15mL	N/A	None	N/A	N/A	Cooler #3 - 2112284
B	XTRA_VOL	15mL	N/A	None	N/A	N/A	Cooler #3 - 2112284
C	XTRA_VOL	60mL	N/A	None	N/A	N/A	Cooler #3 - 2112284

Lab ID: 2112284-02
Sample: RG_M13_WS_LAEMP_EVO_2021-12-14_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/14/2021
Received: 12/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	N/A	10% HNO3 (BAL)	2142027	<2	Cooler #3 - 2112284

Lab ID: 2112284-03
Sample: RG_M13_WS_LAEMP_EVO_2021-12-14_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/14/2021
Received: 12/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	N/A	10% HNO3 (BAL)	2142027	<2	Cooler #3 - 2112284

Lab ID: 2112284-04
Sample: RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/14/2021
Received: 12/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15mL	N/A	None	N/A	N/A	Cooler #3 - 2112284
B	XTRA_VOL	15mL	N/A	None	N/A	N/A	Cooler #3 - 2112284
C	XTRA_VOL	60mL	N/A	None	N/A	N/A	Cooler #3 - 2112284

Sample Containers

Lab ID: 2112284-05
Sample: RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/14/2021
Received: 12/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	N/A	10% HNO3 (BAL)	2142027	<2	Cooler #3 - 2112284

Lab ID: 2112284-06
Sample: RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/14/2021
Received: 12/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	N/A	10% HNO3 (BAL)	2142027	<2	Cooler #3 - 2112284

Lab ID: 2112284-07
Sample: RG_ERCK_WS_LAEMP_EVO_2021-12-14_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/14/2021
Received: 12/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15mL	N/A	None	N/A	N/A	Cooler #3 - 2112284
B	XTRA_VOL	15mL	N/A	None	N/A	N/A	Cooler #3 - 2112284
C	XTRA_VOL	60mL	N/A	None	N/A	N/A	Cooler #3 - 2112284

Lab ID: 2112284-08
Sample: RG_ERCK_WS_LAEMP_EVO_2021-12-14_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/14/2021
Received: 12/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	N/A	10% HNO3 (BAL)	2142027	<2	Cooler #3 - 2112284

Sample Containers

Lab ID: 2112284-09
Sample: RG_ERCK_WS_LAEMP_EVO_2021-12-14_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/14/2021
Received: 12/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	N/A	10% HNO3 (BAL)	2142027	<2	Cooler #3 - 2112284

Lab ID: 2112284-10
Sample: RG_RIVER_WS_LAEMP_EVO_2021-12-14_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/14/2021
Received: 12/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15mL	N/A	None	N/A	N/A	Cooler #3 - 2112284
B	XTRA_VOL	15mL	N/A	None	N/A	N/A	Cooler #3 - 2112284
C	XTRA_VOL	60mL	N/A	None	N/A	N/A	Cooler #3 - 2112284

Lab ID: 2112284-11
Sample: RG_RIVER_WS_LAEMP_EVO_2021-12-14_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/14/2021
Received: 12/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	N/A	10% HNO3 (BAL)	2142027	<2	Cooler #3 - 2112284

Lab ID: 2112284-12
Sample: RG_RIVER_WS_LAEMP_EVO_2021-12-14_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/14/2021
Received: 12/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	N/A	10% HNO3 (BAL)	2142027	<2	Cooler #3 - 2112284

Sample Containers

Lab ID: 2112284-13
Sample: RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/15/2021
Received: 12/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15mL	N/A	None	N/A	N/A	Cooler #3 - 2112284
B	XTRA_VOL	15mL	N/A	None	N/A	N/A	Cooler #3 - 2112284
C	XTRA_VOL	60mL	N/A	None	N/A	N/A	Cooler #3 - 2112284

Lab ID: 2112284-14
Sample: RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/15/2021
Received: 12/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	N/A	10% HNO3 (BAL)	2142027	<2	Cooler #3 - 2112284

Lab ID: 2112284-15
Sample: RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/15/2021
Received: 12/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	N/A	10% HNO3 (BAL)	2142027	<2	Cooler #3 - 2112284

Lab ID: 2112284-16
Sample: RG_FBLANK_WS_LAEMP_EVO_2021-12-15_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/15/2021
Received: 12/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15mL	N/A	None	N/A	N/A	Cooler #3 - 2112284
B	XTRA_VOL	15mL	N/A	None	N/A	N/A	Cooler #3 - 2112284
C	XTRA_VOL	60mL	N/A	None	N/A	N/A	Cooler #3 - 2112284

Sample Containers

Lab ID: 2112284-17
Sample: RG_FBLANK_WS_LAEMP_EVO_2021-12-15_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/15/2021
Received: 12/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	N/A	10% HNO3 (BAL)	2142027	<2	Cooler #3 - 2112284

Lab ID: 2112284-18
Sample: RG_FBLANK_WS_LAEMP_EVO_2021-12-15_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/15/2021
Received: 12/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	40mL	N/A	10% HNO3 (BAL)	2142027	<2	Cooler #3 - 2112284

Shipping Containers

Cooler #3 - 2112284

Received: December 23, 2021 7:13
Tracking No: PAPS# RWHV85287 via Courier
Coolant Type: Ice
Temperature: 1.1 °C

Description: Styrofoam Cooler
Damaged in transit? No
Returned to client? No
Comments: IR# 31

Custody seals present? No
Custody seals intact? No
COC present? Yes

Teck

COC ID: December EVO LAEMP | **TURNAROUND TIME:** Regular

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	Elkview Operations			Lab Name	Brooks Applied Labs			Report Format / Distribution	Excel	PDF	EDD
Project Manager	Allie Ferguson			Lab Contact	Ben Wozniak			Email 1: Allie.Ferguson@teck.com	x	x	x
Email	allie.ferguson@teck.com			Email	ben@brooksapplied.com			Email 2: Jessica.ritz@teck.com	x	x	x
Address	421 Pine Avenue			Address	18804 North Creek Parkway			Email 3: teckcoal@equisonline.com			x
								Email 4: lbowron@minnow.ca	x	x	x
City	Sparwood	Province	BC	City	Bothell	Province	WA	Email 5: tyler.Mehler@minnow.ca	x	x	x
Postal Code	V0B 2G0	Country	Canada	Postal Code	98011	Country	USA	Email 5:			
Phone Number	250-910-8755			Phone Number	206-632-6206			PO number: VPO00748540			

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.	Total Selenium (F)	Dissolved Selenium (F)	Selenium Speciation
RG_M13_WS_LAEMP_EVO_2021-12-14_N	RG_M13	WS	No	14-Dec-21	15:30	G	1			1
RG_M13_WS_LAEMP_EVO_2021-12-14_N_NAL	RG_M13	WS	No	14-Dec-21	15:30	G	2	1	1	
RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_N	RG_ERCKUT	WS	No	14-Dec-21	13:30	G	1			1
RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_N_NAL	RG_ERCKUT	WS	No	14-Dec-21	13:30	G	2	1	1	
RG_ERCK_WS_LAEMP_EVO_2021-12-14_N	RG_ERCK	WS	No	14-Dec-21	9:45	G	1			1
RG_ERCK_WS_LAEMP_EVO_2021-12-14_N_NAL	RG_ERCK	WS	No	14-Dec-21	9:45	G	2	1	1	
RG_RIVER_WS_LAEMP_EVO_2021-12-14_N	RG_RIVER	WS	No	14-Dec-21	13:30	G	1			1
RG_RIVER_WS_LAEMP_EVO_2021-12-14_N_NAL	RG_RIVER	WS	No	14-Dec-21	13:30	G	2	1	1	

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
PO VPO00748540	Alex McClymont, Minnow Env.	December 15, 2021	BAL	12/23/21 07:13

SERVICE REQUEST (rush - subject to availability)					
Regular (default) X	Sampler's Name	Alex McClymont	Mobile #	780-293-6750	587-597-1612
Priority (2-3 business days) - 50% surcharge					
Emergency (1 Business Day) - 100% surcharge	Sampler's Signature	AMC	Date/Time	December 15, 2021	
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

Teck

COC ID:	December EVO LAEMP	TURNAROUND TIME:	Regular

PROJECT/CLIENT INFO

Facility Name / Job#	Elkview Operations
Project Manager	Allie Ferguson
Email	allie.ferguson@teck.com
Address	421 Pine Avenue
City	Sparwood
Province	BC
Postal Code	V0B 2G0
Country	Canada
Phone Number	250-910-8755

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:	Allie.Ferguson@teck.com	x	x	x
Email 2:	Jessica.ritz@teck.com	x	x	x
Email 3:	teckcoal@equisonline.com			x
Email 4:	lbowron@minnow.ca	x	x	x
Email 5:	tyler.Mehler@minnow.ca	x	x	x
Email 5:				
PO number	VPO00748540			

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.	Total Selenium (F)	Dissolved Selenium (F)	Selenium Speciation
RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_N	RG_ERCKDT	WS	N	15-Dec-21	12:00	G	1			1
RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_N_NAL	RG_ERCKDT	WS	N	15-Dec-21	12:00	G	2	X	X	
RG_FBLANK_WS_LAEMP_EVO_2021-12-15_N	RG_FBLANK	WS	N	15-Dec-21	16:00	G	1			
RG_FBLANK_WS_LAEMP_EVO_2021-12-15_N_NAL	RG FBLANK	WS	N	15-Dec-21	16:00	G	2	1	1	

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

PO

VPO00748540

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Alex McClymont, Minnow Env.	December 15, 2021	BAL	12/23/21 07:13

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	Alex McClymont	Mobile #	780-293-6750 or
Sampler's Signature		Date/Time	December 15, 2021

587-597-1612

STRAIGHT BILL OF LADING
NOT NEGOTIABLE

RW HOT SHOT SERVICE INC.
250-425-7447
24 Hour Hot Shot Service

No. 85287

Sparwood, BC · Terrace, BC · Red Deer, AB · Vancouver, BC · Calgary, AB · Montreal, QC · Prince George, BC · Edmonton, AB · Spokane, WA · Elkford, BC · Ft. McMurray, AB · Shelby, MT · Tumbler Ridge, BC · Hinton, AB · Gillette, WY

INVOICE TO

DATE Dec 22 21

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	[illegible]	62 Lbs
	PAPS# RWHV85287	

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 0713

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 O.R.D 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 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 consignee at the said destination, subject to the rates and classification in effect on the date of shipment. It is mutually agreed, as to each carrier of all or any of the goods over all or any portion of the route to destination, and as to each party of any time interested in all or any of the goods, that every service to be performed hereunder shall be subject to all the conditions standard Bill of Lading, in power at the date of issuing, which are hereto agreed by the consignor and accepted for himself and his assigns. Printed or written, including conditions set aside by the standard Bill of Lading, in power at the date of issuing, which are hereby agreed by the consignor and accepted for himself and his assigns. The Contract for the carriage of the goods listed in the Bill of Lading is governed by regulation in force in the jurisdiction at the time and place of shipment and is subject to the conditions set out in such conditions

SHIPPER PRINT

CONSIGNEE PRINT

DATE

SHIPPER SIGN

CONSIGNEE SIGN

TIME

NUMBER OF PIECES RECEIVED 3

WHITE: Office YELLOW: Carrier PINK: Consignee GOLDENROAD: Shipper GST #864540398RT0001

AMIGOS PRINTING

ce ASG 12/23/21

Cooler ID: Cooler #3 COC (Y/N) Temperature: 2.1 1.1°C IR: 31

Coolant Type: Ice Blue Ice Ambient

Notes:

Sampling Locations:

	EV		RG		GH				
Sample Types:	T/D	SP	T/D	SP	T/D	SP	T/D	SP	T/D	SP
Container Types:		Comp plastic	40 mL	Comp HDPE plastic		40mL				

Opened By: ASG Date: 12/23/21

2112284

004

Effective 7/29/20

COPY

STRAIGHT BILL OF LADING
NOT NEGOTIABLE

RW HOT SHOT SERVICE INC.
250-425-7447
24 Hour Hot Shot Service

No. 85287

Sparwood, BC | Vancouver, BC | Prince George, BC | Elkford, BC | Tumbler Ridge, BC
Terrace, BC | Calgary, AB | Edmonton, AB | Ft. McMurray, AB | Hinton, AB
Red Deer, AB | Montreal, QC | Spokane, WA | Shelby, MT | Gillette, WY

INVOICE TO | DATE

BILL OF LADING # | PURCHASE ORDER NUMBER

SHIPPER (FROM) | CONSIGNEE (TO)

STREET | STREET

CITY/PROVINCE | POSTAL CODE | CITY/PROVINCE | POSTAL CODE

SPECIAL INSTRUCTIONS

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)
3		62 LBS
	PAPS# RWHV85287	

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 OR 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 0713

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 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
NUMBER OF PIECES RECEIVED 3

WHITE: Office YELLOW: Carrier PINK: Consignee GOLDENROAD: Shipper GST #864540398RT0001

AMIGOS PRINTING

Cooler ID: Cooler #1 COC (Y/N) Temperature: 1.0 IR: 30

Coolant Type: Ice Blue Ice Ambient

Notes:

Sampling Locations:	WL		RG		MIM					
Sample Types:	T/D	SP	T/D	SP	T/D	SP	T/D	SP	T/D	SP
Container Types:	40mL Glass	125mL Plastic		125mL Glass		125mL Glass				

Opened By: [signature] Date: 12/23/21

COPY

Effective 7/29/20

Revision 004

SELENIUM SPECIATION

BAL Final Report 2112283

(Finalized January 13, 2022)

BROOKS APPLIED LABS

18804 North Creek Parkway, Ste 100, Bothell, WA 98011 • USA • T: 206 632 6206 F: 206 632 6017 • info@brooksapplied.com

January 13, 2022

Teck Resources Limited - Vancouver
Allie Ferguson
421 Pine Avenue
Sparwood, B.C. CANADA V0B2G0
allie.ferguson@teck.com

Re: Elkview Operations

Dear Allie Ferguson,

On December 23, 2021, Brooks Applied Labs (BAL) received five (5) aqueous samples. The samples were logged-in for the analysis of volatile selenium (Se) speciation, in accordance with the chain-of-custody (COC) form.

The volatile selenium fraction for sample *RG_ERCKUT_WS_LAEMP_EVO_20 21-12-14_N* (2112283-02) was received in an empty container. There was no sample volume available for quantitation. No results are reported for *RG_ERCKUT_WS_LAEMP_EVO_20 21-12-14_N* (2112283-02).

Each sample requesting volatile Se speciation had been field-filtered into bottles containing isopropanol preservative (provided by BAL). All sample fractions were stored according to BAL SOPs and EPA methodology.

Volatile Selenium Speciation
Each aqueous sample was analyzed for volatile selenium speciation using high performance liquid chromatography inductively coupled plasma collision reaction cell mass spectrometry (HPLC-ICP-CRC-MS). Volatile selenium species are chromatographically separated on a reversed phase 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.

In accordance with the quotation issued for this project, volatile selenium species were defined as dissolved dimethylselenide [DMeSe] and dimethyldiselenide [DMDSe].

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) values are not considered valid indicators of data quality. In such instances, the recoveries of the laboratory fortified blank (BS) demonstrates 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**).

Except for concentration qualifiers, all data were reported without qualification. All associated quality control sample results met the acceptance criteria.

BAL, an accredited laboratory, certifies that the reported results of all analyses for which BAL is NELAP accredited meet all NELAP requirements. For more information, please see the *Report Information* page.

Please feel free to contact us if you have any questions regarding this report.

Sincerely,

Jeremy Maute
Senior Project Manager
Jeremy@brooksapplied.com

Report Information

Laboratory Accreditation

BAL is accredited by the *National Environmental Laboratory Accreditation Program* (NELAP) through the State of Florida Department of Health, Bureau of Laboratories (E87982) and is certified to perform many environmental analyses. BAL is also certified by many other states to perform environmental analyses. For a current list of our accreditations/certifications, please visit our website at <http://www.brooksapplied.com/resources/certificates-permits/> or review Tables 1 and 2 in our Accreditation Information. Results reported relate only to the samples listed in the report.

Field Quality Control Samples

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

Common Abbreviations

AR	as received	**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 <u>SOW ILM03.0</u>, Exhibit B, Section III, pg. B-18, and the <u>USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review; USEPA; January 2010</u>. These supersede all previous qualifiers ever employed by BAL.

Accreditation Information

Table 1. Accredited method/matrix/analytes for TNI

Issued by: State of Florida Dept. of Health (The NELAC Institute 2016 Standard)
Issued on: July 1, 2021; Valid to: June 30, 2022
Certificate Number: E87982-37

Method	Matrix	TNI Accredited Analyte(s)
EPA 1638	Non-Potable Waters	Ag, Cd, Cu, Ni, Pb, Sb, Se, Tl, Zn
EPA 200.8	Non-Potable Waters	Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
EPA 6020	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
	Solids/Chemicals & Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, V, Zn
BAL-5000	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn, Hardness
	Solids/Chemicals	Ag, As, B, Be, Cd, Co, Cr, Cu, Pb, Mo, Ni, Sb, Se, Sn, Sr, Tl, V, Zn
	Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn
EPA 1640	Non-Potable Waters	Cd, Cu, Pb, Ni, Zn
EPA 1631E	Non-Potable Waters, Solids/Chemicals & Biological	Total Mercury
EPA 1630	Non-Potable Waters	Methyl Mercury
BAL-3200	Solids/Chemicals & Biological	Methyl Mercury
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs
BAL-4201	Non-Potable Waters	Se(IV), Se(VI)
BAL-4300	Non-Potable Waters Solid/Chemicals	Cr(VI)
SM2340B	Non-Potable Waters	Hardness

Accreditation Information

Table 2. Accredited method/matrix/analytes for ISO (1), Non-Governmental TNI (2), and DoD/DOE (3)

Issued by: ANAB

Issued on: September 21, 2021; Valid to: March 30, 2024

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 Hg (Biological Only)	Not Accredited
EPA 1640 Mod	Non-Potable Waters	Cd, Cu, Pb, Ni, Zn Ag, As, Cr, Co, Se, Tl, V (ISO Only)	Not Accredited
EPA 1631E Mod BAL-3100	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 (ISO Only)	Not Accredited
	Biological/Food Solids/Chemicals	Inorganic Arsenic (ISO Only)	Not Accredited
AOAC 2015.01 Mod BAL-5000	Food	As, Cd, Hg, Pb	Not Accredited
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs	Not Accredited
	Biological by BAL-4117	Inorganic Arsenic, DMAs, MMAs (ISO Only)	Not Accredited
BAL-4101	Food by BAL-4117	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 BAL-0501	Solids/Chemicals & Biological	% Dry Weight	% Dry Weight

(1) ISO/IEC 17025:2017 – Certificate Number ADE-1447.02

(2) Non-Governmental NELAC Institute 2016 Standard – Certificate Number ADE-1447.01

(3) Department of Defense/Energy Consolidated Quality Systems Manual v. 5.3 – Certificate Numbers ADE-1447 for DoD, ADE-1447.03 for DOE.

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_M13_WS_LAEMP_EVO_2021-12-14_N	2112283-01	WS	Sample	12/14/2021	12/23/2021
RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_N	2112283-02	WS	Sample	12/14/2021	12/23/2021
RG_ERCK_WS_LAEMP_EVO_2021-12-14_N	2112283-03	WS	Sample	12/14/2021	12/23/2021
RG_RIVER_WS_LAEMP_EVO_2021-12-14_N	2112283-04	WS	Sample	12/14/2021	12/23/2021
RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_N	2112283-05	WS	Sample	12/15/2021	12/23/2021
RG_FBLANK_WS_LAEMP_EVO_2021-12-15_N	2112283-06	WS	Sample	12/15/2021	12/23/2021

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
DMDSe	Water	HPLC-ICP-MS	01/06/2021	01/06/2022	B213555	S220009
DMeSe	Water	HPLC-ICP-MS	01/06/2021	01/06/2022	B213555	S220009

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_M13_WS_LAEMP_EVO_2021-12-14_N										
2112283-01	DMDSe	WS	D	≤ 0.022	U	0.022	0.222	µg/L	B213555	S220009
2112283-01	DMeSe	WS	D	≤ 0.022	U	0.022	0.222	µg/L	B213555	S220009
RG_ERCK_WS_LAEMP_EVO_2021-12-14_N										
2112283-03	DMDSe	WS	D	≤ 0.022	U	0.022	0.222	µg/L	B213555	S220009
2112283-03	DMeSe	WS	D	≤ 0.022	U	0.022	0.222	µg/L	B213555	S220009
RG_RIVER_WS_LAEMP_EVO_2021-12-14_N										
2112283-04	DMDSe	WS	D	≤ 0.022	U	0.022	0.222	µg/L	B213555	S220009
2112283-04	DMeSe	WS	D	≤ 0.022	U	0.022	0.222	µg/L	B213555	S220009
RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_N										
2112283-05	DMDSe	WS	D	≤ 0.022	U	0.022	0.222	µg/L	B213555	S220009
2112283-05	DMeSe	WS	D	≤ 0.022	U	0.022	0.222	µg/L	B213555	S220009
RG_FBLANK_WS_LAEMP_EVO_2021-12-15_N										
2112283-06	DMDSe	WS	D	≤ 0.022	U	0.022	0.222	µg/L	B213555	S220009
2112283-06	DMeSe	WS	D	≤ 0.022	U	0.022	0.222	µg/L	B213555	S220009

Accuracy & Precision Summary

Batch: B213555
Lab Matrix: Water
Method: HPLC-ICP-MS

Sample	Analyte	Native	Spike	Result	Units	REC & Limits		RPD & Limits	
B213555-BS1	**Blank Spike, (2107050)**								
	DMDSe		4.991	4.429	µg/L	89%	80-120		
	DMeSe		5.005	4.870	µg/L	97%	80-120		
B213555-DUP2	**Duplicate, (2112283-05)**								
	DMDSe	ND		ND	µg/L			N/C	25
	DMeSe	ND		ND	µg/L			N/C	25
B213555-MS2	**Matrix Spike, (2112283-05)**								
	DMDSe	ND	5.547	5.250	µg/L	95%	75-125		
	DMeSe	ND	5.542	5.188	µg/L	94%	75-125		
B213555-MSD2	**Matrix Spike Duplicate, (2112283-05)**								
	DMDSe	ND	5.547	5.172	µg/L	93%	75-125	2%	25
	DMeSe	ND	5.542	5.137	µg/L	93%	75-125	1%	25

Method Blanks & Reporting Limits

Batch: B213555
Matrix: Water
Method: HPLC-ICP-MS
Analyte: DMDSe

Sample	Result	Units
B213555-BLK1	0.00	µg/L
B213555-BLK2	0.00	µg/L
B213555-BLK3	0.00	µg/L
B213555-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.010
Limit: 0.100 **MRL:** 0.100

Analyte: DMeSe

Sample	Result	Units
B213555-BLK1	0.0002	µg/L
B213555-BLK2	-0.0003	µg/L
B213555-BLK3	0.0003	µg/L
B213555-BLK4	0.0007	µg/L

Average: 0.000 **MDL:** 0.010
Limit: 0.100 **MRL:** 0.100

Sample Containers

Lab ID: 2112283-01
Sample: RG_M13_WS_LAEMP_EVO_2021-12-14_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/14/2021
Received: 12/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Vial Glass	40mL	N/A	4mL Isopropanol (PP)	1828013	N/A	Cooler #3 - 2112283

Lab ID: 2112283-02
Sample: RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/14/2021
Received: 12/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Vial Glass	40mL	N/A	4mL Isopropanol (PP)	1828013	N/A	Cooler #3 - 2112283

Lab ID: 2112283-03
Sample: RG_ERCK_WS_LAEMP_EVO_2021-12-14_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/14/2021
Received: 12/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Vial Glass	40mL	N/A	4mL Isopropanol (PP)	1828013	N/A	Cooler #3 - 2112283

Lab ID: 2112283-04
Sample: RG_RIVER_WS_LAEMP_EVO_2021-12-14_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/14/2021
Received: 12/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Vial Glass	40mL	N/A	4mL Isopropanol (PP)	1828013	N/A	Cooler #3 - 2112283

Lab ID: 2112283-05
Sample: RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/15/2021
Received: 12/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Vial Glass	40mL	N/A	4mL Isopropanol (PP)	1828013	N/A	Cooler #3 - 2112283

Sample Containers

Lab ID: 2112283-06
Sample: RG_FBLANK_WS_LAEMP_EVO_2021-12-15_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/15/2021
Received: 12/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Vial Glass	40mL	N/A	4mL Isopropanol (PP)	1828013	N/A	Cooler #3 - 2112283

Shipping Containers

Cooler #3 - 2112283

Received: December 23, 2021 7:13
Tracking No: PAPS#RWHV85287 via Courier
Coolant Type: Ice
Temperature: 1.1 °C

Description: Styrofoam Cooler
Damaged in transit? No
Returned to client? No
Comments: IR# 31

Custody seals present? No
Custody seals intact? No
COC present? Yes

COC ID:	December EVO LAEMP	TURNAROUND TIME:	Regular

PROJECT/CLIENT INFO

Facility Name / Job#	Elkview Operations
Project Manager	Allie Ferguson
Email	allie.ferguson@teck.com
Address	421 Pine Avenue
City	Sparwood
Province	BC
Postal Code	V0B 2G0
Country	Canada
Phone Number	250-910-8755

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:	Allie.Ferguson@teck.com	X	X	X
Email 2:	Jessica.ritz@teck.com	X	X	X
Email 3:	teckcoal@equisonline.com			X
Email 4:	lbowron@minnow.ca	X	X	X
Email 5:	tyler.Mehler@minnow.ca	X	X	X
Email 5:				
PO number	VPO00748540			

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.	Volatile Selenium (F/P)
RG_M13_WS_LAEMP_EVO_2021-12-14_N	RG_M13	WS	No	14-Dec-21	15:30	G	1	1
RG_ERCKUT_WS_LAEMP_EVO_2021-12-14_N	RG_ERCKUT	WS	No	14-Dec-21	13:30	G	1	1
RG_ERCK_WS_LAEMP_EVO_2021-12-14_N	RG_ERCK	WS	No	14-Dec-21	9:45	G	1	1
RG_RIVER_WS_LAEMP_EVO_2021-12-14_N	RG_RIVER	WS	No	14-Dec-21	13:30	G	1	1
RG_ERCKDT_WS_LAEMP_EVO_2021-12-15_N	RG_ERCKDT	WS	No	15-Dec-21	12:00	G	1	1
RG_FBLANK_WS_LAEMP_EVO_2021-12-15_N	RG_FBLANK	WS	No	15-Dec-21	16:00	G	1	1

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

PO
VPO 00748540

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Alex McClymont, Minnow Env.	December 15, 2021	BAL	12/23/21 07:13

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	Alex McClymont	Mobile #	587-597-1612
Sampler's Signature		Date/Time	December 15, 2021

STRAIGHT BILL OF LADING
NOT NEGOTIABLE

RW HOT SHOT SERVICE INC.
250-425-7447
24 Hour Hot Shot Service

No. 85287

Sparwood, BC | Vancouver, BC | Prince George, BC | Elkford, BC | Tumbler Ridge, BC
Terrace, BC | Calgary, AB | Edmonton, AB | Ft. McMurray, AB | Hinton, AB
Red Deer, AB | Montreal, QC | Spokane, WA | Shelby, MT | Gillette, WY

INVOICE TO

DATE Dec 22 21

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		62 LBS

PAPS# RWHV85287

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 OR STAMP 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 0712

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 consignee at the said destination, subject to the rates and classification in effect on the date of shipment. It is mutually agreed, as to each carrier of all or any of the goods over all or any portion of the route to destination, and as to each party of any time interested in all or any of the goods, that every service to be performed hereunder shall be subject to all the conditions standard Bill of Lading, in power at the date of issuing, which are hereto agreed by the consignor and accepted for himself and his assigns. Printed or written, including conditions set aside by the standard Bill of Lading, in power at the date of issuing, which are hereby agreed by the consignor and accepted for himself and his assigns.
The Contract for the carriage of the goods listed in the Bill of Lading is governed by regulation in force in the jurisdiction at the time and place of shipment and is subject to the conditions set out in such conditions.

SHIPPER PRINT | CONSIGNEE PRINT | DATE
SHIPPER SIGN | CONSIGNEE SIGN | TIME

NUMBER OF PIECES RECEIVED 3

WHITE: Office YELLOW: Carrier PINK: Consignee GOLDENROD: Shipper GST #864540398RT0001

AMIGOS PRINTING

ce ASG 12/23/21

Cooler ID: Cooler #3 COC (Y/N) Temperature: ~~2.1~~ 1.1°C IR: 31

Coolant Type: Ice Blue Ice Ambient

Notes:

Sampling Locations:	EV		RG		GH				
Sample Types:	T/D	SP	T/D	SP	T/D	SP	T/D	SP	T/D	SP
Container Types:		Comp plastic	40 mL	Comp HDPE plastic		40 mL				

Opened By: ASG Date: 12/23/21

2112283

COPY

Effective 7/29/20

SELENIUM SPECIATION

BAL Final Report 2112280

(Finalized January 13, 2022)

BROOKS APPLIED LABS
18804 North Creek Parkway, Ste 100, Bothell, WA 98011 • USA • T: 206 632 6206 F: 206 632 6017 • info@brooksapplied.com

January 13, 2022

Teck Resources Limited - Vancouver
Allie Ferguson
421 Pine Avenue
Sparwood, B.C. CANADA V0B2G0
allie.ferguson@teck.com

Re: Elkview Operations

Dear Allie Ferguson,

On December 23, 2021, Brooks Applied Labs (BAL) received one (1) aqueous sample. The sample was logged-in for the analysis of volatile selenium (Se) speciation, in accordance with the chain-of-custody (COC) form.

Each sample requesting volatile Se speciation had been field-filtered into bottles containing isopropanol preservative (provided by BAL). All sample fractions were stored according to BAL SOPs and EPA methodology.

Volatile Selenium Speciation
Each aqueous sample was analyzed for volatile selenium speciation using high performance liquid chromatography inductively coupled plasma collision reaction cell mass spectrometry (HPLC-ICP-CRC-MS). Volatile selenium species are chromatographically separated on a reversed phase 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.

In accordance with the quotation issued for this project, volatile selenium species were defined as dissolved dimethylselenide [DMeSe] and dimethyldiselenide [DMDSe].

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) values are not considered valid indicators of data quality. In such instances, the recoveries of the laboratory fortified blank (BS) demonstrates 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**).

Except for concentration qualifiers, all data were reported without qualification. All associated quality control sample results met the acceptance criteria.

BAL, an accredited laboratory, certifies that the reported results of all analyses for which BAL is NELAP accredited meet all NELAP requirements. For more information, please see the *Report Information* page.

Please feel free to contact us if you have any questions regarding this report.

Sincerely,

Jeremy Maute
Senior Project Manager
Jeremy@brooksapplied.com

Report Information

Laboratory Accreditation

BAL is accredited by the *National Environmental Laboratory Accreditation Program* (NELAP) through the State of Florida Department of Health, Bureau of Laboratories (E87982) and is certified to perform many environmental analyses. BAL is also certified by many other states to perform environmental analyses. For a current list of our accreditations/certifications, please visit our website at <http://www.brooksapplied.com/resources/certificates-permits/> or review Tables 1 and 2 in our Accreditation Information. Results reported relate only to the samples listed in the report.

Field Quality Control Samples

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

Common Abbreviations

AR	as received	**MS**	matrix spike
BAL	Brooks Applied Labs	**MSD**	matrix spike duplicate
BLK	method blank	**ND**	non-detect
BS	blank spike	**NR**	non-reportable
CAL	calibration standard	**N/C**	not calculated
CCB	continuing calibration blank	**PS**	post preparation spike
CCV	continuing calibration verification	**REC**	percent recovery
COC	chain of custody record	**RPD**	relative percent difference
D	dissolved fraction	**SCV**	secondary calibration verification
DUP	duplicate	**SOP**	standard operating procedure
IBL	instrument blank	**SRM**	reference material
ICV	initial calibration verification	**T**	total fraction
MDL	method detection limit	**TR**	total recoverable fraction
MRL	method reporting limit		

Definition of Data Qualifiers

(Effective 3/23/2020)

E	An estimated value due to the presence of interferences. A full explanation is presented in the narrative.
H	Holding time and/or preservation requirements not met. Please see narrative for explanation.
J	Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate.
J-1	Estimated value. A full explanation is presented in the narrative.
M	Duplicate precision (RPD) was not within acceptance criteria. Please see narrative for explanation.
N	Spike recovery was not within acceptance criteria. Please see narrative for explanation.
R	Rejected, unusable value. A full explanation is presented in the narrative.
U	Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL.
X	Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch. Result is estimated.
Z	Holding time and/or preservation requirements not established for this method; however, BAL recommendations for holding time were not followed. Please see narrative for explanation.

These qualifiers are based on those previously utilized by Brooks Applied Labs, those found in the EPA SOW ILM03.0, Exhibit B, Section III, pg. B-18, and the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review; USEPA; January 2010. These supersede all previous qualifiers ever employed by BAL.

Accreditation Information

Table 1. Accredited method/matrix/analytes for TNI

Issued by: State of Florida Dept. of Health (The NELAC Institute 2016 Standard)
Issued on: July 1, 2021; Valid to: June 30, 2022
Certificate Number: E87982-37

Method	Matrix	TNI Accredited Analyte(s)
EPA 1638	Non-Potable Waters	Ag, Cd, Cu, Ni, Pb, Sb, Se, Tl, Zn
EPA 200.8	Non-Potable Waters	Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
EPA 6020	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
	Solids/Chemicals & Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, V, Zn
BAL-5000	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn, Hardness
	Solids/Chemicals	Ag, As, B, Be, Cd, Co, Cr, Cu, Pb, Mo, Ni, Sb, Se, Sn, Sr, Tl, V, Zn
	Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn
EPA 1640	Non-Potable Waters	Cd, Cu, Pb, Ni, Zn
EPA 1631E	Non-Potable Waters, Solids/Chemicals & Biological	Total Mercury
EPA 1630	Non-Potable Waters	Methyl Mercury
BAL-3200	Solids/Chemicals & Biological	Methyl Mercury
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs
BAL-4201	Non-Potable Waters	Se(IV), Se(VI)
BAL-4300	Non-Potable Waters Solid/Chemicals	Cr(VI)
SM2340B	Non-Potable Waters	Hardness

Accreditation Information

Table 2. Accredited method/matrix/analytes for ISO (1), Non-Governmental TNI (2), and DoD/DOE (3)

Issued by: ANAB

Issued on: September 21, 2021; Valid to: March 30, 2024

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 Hg (Biological Only)	Not Accredited
EPA 1640 Mod	Non-Potable Waters	Cd, Cu, Pb, Ni, Zn Ag, As, Cr, Co, Se, Tl, V (ISO Only)	Not Accredited
EPA 1631E Mod BAL-3100	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 (ISO Only)	Not Accredited
	Biological/Food Solids/Chemicals	Inorganic Arsenic (ISO Only)	Not Accredited
AOAC 2015.01 Mod BAL-5000	Food	As, Cd, Hg, Pb	Not Accredited
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs	Not Accredited
	Biological by BAL-4117	Inorganic Arsenic, DMAs, MMAs (ISO Only)	Not Accredited
BAL-4101	Food by BAL-4117	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 BAL-0501	Solids/Chemicals & Biological	% Dry Weight	% Dry Weight

(1) ISO/IEC 17025:2017 – Certificate Number ADE-1447.02

(2) Non-Governmental NELAC Institute 2016 Standard – Certificate Number ADE-1447.01

(3) Department of Defense/Energy Consolidated Quality Systems Manual v. 5.3 – Certificate Numbers ADE-1447 for DoD, ADE-1447.03 for DOE.

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
EV_EC_FLOW2_WS_LAEMP_EVO_2021-12-15_N	2112280-01	WS	Sample	12/15/2021	12/23/2021

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
DMDSe	Water	HPLC-ICP-MS	01/06/2021	01/06/2022	B213555	S220009
DMeSe	Water	HPLC-ICP-MS	01/06/2021	01/06/2022	B213555	S220009

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
EV_EC_FLOW2_WS_LAEMP_EVO_2021-12-15_N										
2112280-01	DMDSe	WS	D	≤ 0.022	U	0.022	0.222	µg/L	B213555	S220009
2112280-01	DMeSe	WS	D	≤ 0.022	U	0.022	0.222	µg/L	B213555	S220009

BROOKS APPLIED LABS

Accuracy & Precision Summary

Batch: B213555
Lab Matrix: Water
Method: HPLC-ICP-MS

Sample	Analyte	Native	Spike	Result	Units	REC & Limits		RPD & Limits	
B213555-BS1	**Blank Spike, (2107050)**								
	DMDSe		4.991	4.429	µg/L	89%	80-120		
	DMeSe		5.005	4.870	µg/L	97%	80-120		
B213555-DUP1	**Duplicate, (2112282-01)**								
	DMDSe	ND		ND	µg/L			N/C	25
	DMeSe	ND		ND	µg/L			N/C	25
B213555-MS1	**Matrix Spike, (2112282-01)**								
	DMDSe	ND	5.547	5.354	µg/L	97%	75-125		
	DMeSe	ND	5.542	5.192	µg/L	94%	75-125		
B213555-MSD1	**Matrix Spike Duplicate, (2112282-01)**								
	DMDSe	ND	5.547	5.244	µg/L	95%	75-125	2%	25
	DMeSe	ND	5.542	5.084	µg/L	92%	75-125	2%	25

Method Blanks & Reporting Limits

Batch: B213555
Matrix: Water
Method: HPLC-ICP-MS
Analyte: DMDSe

Sample	Result	Units
B213555-BLK1	0.00	µg/L
B213555-BLK2	0.00	µg/L
B213555-BLK3	0.00	µg/L
B213555-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.010
Limit: 0.100 **MRL:** 0.100

Analyte: DMeSe

Sample	Result	Units
B213555-BLK1	0.0002	µg/L
B213555-BLK2	-0.0003	µg/L
B213555-BLK3	0.0003	µg/L
B213555-BLK4	0.0007	µg/L

Average: 0.000 **MDL:** 0.010
Limit: 0.100 **MRL:** 0.100

Sample Containers

Lab ID: 2112280-01
Sample: EV_EC_FLOW2_WS_LAEMP_EVO_2021-12-15_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/15/2021
Received: 12/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Vial Glass	40 mL	na	10% Isopropanol (PP)	1828013	na	Cooler #4 - 2112280

Shipping Containers

Cooler #4 - 2112280

Received: December 23, 2021 7:13
Tracking No: PAPS#RWHV85287 via Courier
Coolant Type: Blue Ice
Temperature: 1.5 °C

Description: Styrofoam Cooler
Damaged in transit? No
Returned to client? No
Comments: IR# 31

Custody seals present? No
Custody seals intact? No
COC present? Yes

COC ID:	December EVO LAEMP	TURNAROUND TIME:	Regular

PROJECT/CLIENT INFO

Facility Name / Job#	Elkview Operations		
Project Manager	Allie Ferguson		
Email	allie.ferguson@teck.com		
Address	421 Pine Avenue		
City	Sparwood	Province	BC
Postal Code	V0B 2G0	Country	Canada
Phone Number	250-910-8755		

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:	Allie.Ferguson@teck.com	x	x	x
Email 2:	Jessica.ritz@teck.com	x	x	x
Email 3:	teckcoal@equisonline.com			x
Email 4:	lbowron@minnow.ca	x	x	x
Email 5:	tyler.Mehler@minnow.ca	x	x	x
Email 5:				
PO number	VPO00748540			

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.	Volatile Selenium (PRESERV: F/P)
EV_EC_FLOW2_WS_LAEMP_EVO_2021-12-15_N	EV_EC_FLOW2	WS	N	15-Dec-21	14:00	G	1	1

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

PO

VPO 00748540

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Alex McClymont, Minnow Env.	December 15, 2021	BAL	12/23/21 07:13

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	Alex McClymont	Mobile #	587-597-1612
Sampler's Signature		Date/Time	December 15, 2021

2112280

RW HOT SHOT SERVICE INC.
250-425-7447
24 Hour Hot Shot Service

STRAIGHT BILL OF LADING
NOT NEGOTIABLE

No. 85288

Sparwood, BC | Vancouver, BC | Prince George, BC | Elkford, BC | Tumbler Ridge, BC
Terrace, BC | Calgary, AB | Edmonton, AB | Ft. McMurray, AB | Hinton, AB
Red Deer, AB | Montreal, QC | Spokane, WA | Shelby, MT | Gillette, WY

DATE: Dec 22-21

INVOICE TO

BILL OF LADING #

PURCHASE ORDER NUMBER

SHIPPER (FROM): Teck Coal Ltd.
STREET: Elkview - Whse 50
CITY/PROVINCE: Sparwood BC
POSTAL CODE

CONSIGNEE (TO): Brooks Applied Labs
STREET: 18804 N. Creek Parkway
CITY/PROVINCE: Bothell WA
POSTAL CODE: 98011

SPECIAL INSTRUCTIONS

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)
2	Coolers - Water Samples	42 LBS
	PAPS# RWHV85287	

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: 0713

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 respect of such loss, damage or delay is given in writing to the originating carrier or the delivering carrier within sixty (60) days after the delivery of the goods, or in the case of failure to make delivery within nine (9) months from the date of shipment. (b)The final statement of the claim must be filed within nine (9) months from the date of shipment together with a copy of the paid freight bill. RECEIVED at the point of origin on the date specified from the consignor mentioned herein, the property herein described, in apparent good order, except as noted (contents and condition of contents of package unknown) marked, consigned and destined as indicated below, which the carrier agrees to carry and to deliver to the consignee at the said destination, subject to the rates and classification in effect on the date of shipment. It is mutually agreed, as to each carrier of all or any of the goods over all or any portion of the route to destination, and as to each party of any time interested in all or any of the goods, that every service to be performed hereunder shall be subject 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: 12/23/21

SHIPPER SIGN

CONSIGNEE SIGN

TIME: 7:13

NUMBER OF PIECES RECEIVED: 2

GST # 864540398RT0001

WHITE: Office YELLOW: Carrier PINK: Consignee GOLDENROAD: Shipper

AMACOS PRINTING

Cooler ID: Cooler #4

COC (Y/N)

Temperature: 2.5 1.5°C ce ASG 12/23/21

IR: 31

Coolant Type: Ice Blue Ice Ambient

Notes:

Sampling Locations:	EV		F2							
Sample Types:	T/D	SP	T/D	SP	T/D	SP	T/D	SP	T/D	SP
Container Types:	40ml amber	125ml plastic	40ml amber	125ml plastic						

Opened By: ASG

Date: 12/23/21

COPY

2112280

Effective 7/29/20

SELENIUM SPECIATION

BAL Final Report 2112279
(Finalized January 13, 2022)

BROOKS APPLIED LABS
18804 North Creek Parkway, Ste 100, Bothell, WA 98011 • USA • T: 206 632 6206 F: 206 632 6017 • info@brooksapplied.com

January 13, 2022

Teck Resources Limited - Vancouver
Allie Ferguson
421 Pine Avenue
Sparwood, B.C. CANADA V0B2G0
allie.ferguson@teck.com

Re: Elkview Operations

Dear Allie Ferguson,

On December 23, 2021, Brooks Applied Labs (BAL) received two (2) aqueous samples. The samples were logged-in for total recoverable selenium [*Se*], dissolved Se, and Se speciation analyses, according to the chain-of-custody (COC) form.

The sample fractions logged in for Se speciation and dissolved Se had been field-filtered prior to receipt at BAL. All samples were stored according to BAL SOPs.

Total Recoverable and Dissolved Se

Each aqueous sample fraction for total recoverable or dissolved Se was digested in a closed vessel (bomb) with nitric and hydrochloric acids. The resulting digests were analyzed for Se content via inductively coupled plasma triple quadrupole mass spectrometry (ICP-QQQ-MS). The ICP-QQQ-MS instrumentation uses advanced interference removal techniques to ensure accuracy of the sample results. For more information, please visit the *Interference Reduction Technology* section on our website, brooksapplied.com.

Se Speciation

Each aqueous sample was analyzed for Se speciation using ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS). Selenium species are chromatographically separated on an ion exchange column and then quantified using inductively coupled plasma collision reaction cell mass spectrometry (ICP-CRC-MS); for more information on this determinative technique, please visit the *Interference Reduction Technology* section on our website. The chromatographic method applied for the analyses provides greater retention of methylseleninic acid and selenomethionine, allowing for more definitive quantitation of these species.

In accordance with the quotation issued for this project, selenium speciation was defined as dissolved selenite [Se(IV)], selenate [Se(VI)], selenocyanate [SeCN], methylseleninic acid [MeSe(IV)], methaneselenonic acid [MeSe(VI)], selenomethionine [SeMet], selenosulfate [SeSO3], and dimethylselenoxide [DMSeO]. Unknown Se species was defined as the total concentration of all unknown Se species observed during the analysis. This item is identified on the report as [Unk Se Sp].

DMSeO elutes early in the chromatographic run due to the nature of the molecule and the applied chromatographic separation method. Since this species elutes near the dead volume, additional

Se species may coelute. Alternate methods can be applied, upon client request, to increase the separation of DMSeO from potentially co-eluting Se species.

The results were not method blank corrected, as described in the calculations section of the relevant BAL SOPs and were evaluated using reporting limits adjusted to account for sample aliquot size. Please refer to the *Sample Results* page for sample-specific MDLs, MRLs, and other details.

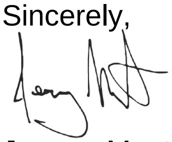
In instances when a matrix spike/matrix spike duplicate (MS/MSD) set was spiked at a level less than the native sample concentration, the recoveries and the relative percent difference (RPD) are not considered valid indicators of data quality. In such instances, the recoveries of the laboratory fortified blanks (BS) and/or standard reference materials (SRM) demonstrate the accuracy of the applied methods. When the spiking level was less than 25% of the native sample concentration, the spike recovery was not reported (NR) and the RPD of the MS/MSD set was not calculated (N/C).

Except for concentration qualifiers, all data were reported without qualification. All associated quality control sample results met the acceptance criteria.

BAL, an accredited laboratory, certifies that the reported results of all analyses for which BAL is NELAP accredited met all NELAP requirements. For more information, please see the *Report Information* page.

Please feel free to contact us if you have any questions regarding this report.

Sincerely,



Jeremy Maute
Senior Project Manager
Brooks Applied Labs
Jeremy@brooksapplied.com

Report Information

Laboratory Accreditation

BAL is accredited by the *National Environmental Laboratory Accreditation Program* (NELAP) through the State of Florida Department of Health, Bureau of Laboratories (E87982) and is certified to perform many environmental analyses. BAL is also certified by many other states to perform environmental analyses. For a current list of our accreditations/certifications, please visit our website at <http://www.brooksapplied.com/resources/certificates-permits/> or review Tables 1 and 2 in our Accreditation Information. Results reported relate only to the samples listed in the report.

Field Quality Control Samples

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

Common Abbreviations

AR	as received	**MS**	matrix spike
BAL	Brooks Applied Labs	**MSD**	matrix spike duplicate
BLK	method blank	**ND**	non-detect
BS	blank spike	**NR**	non-reportable
CAL	calibration standard	**N/C**	not calculated
CCB	continuing calibration blank	**PS**	post preparation spike
CCV	continuing calibration verification	**REC**	percent recovery
COC	chain of custody record	**RPD**	relative percent difference
D	dissolved fraction	**SCV**	secondary calibration verification
DUP	duplicate	**SOP**	standard operating procedure
IBL	instrument blank	**SRM**	reference material
ICV	initial calibration verification	**T**	total fraction
MDL	method detection limit	**TR**	total recoverable fraction
MRL	method reporting limit		

Definition of Data Qualifiers

(Effective 3/23/2020)

E	An estimated value due to the presence of interferences. A full explanation is presented in the narrative.
H	Holding time and/or preservation requirements not met. Please see narrative for explanation.
J	Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate.
J-1	Estimated value. A full explanation is presented in the narrative.
M	Duplicate precision (RPD) was not within acceptance criteria. Please see narrative for explanation.
N	Spike recovery was not within acceptance criteria. Please see narrative for explanation.
R	Rejected, unusable value. A full explanation is presented in the narrative.
U	Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL.
X	Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch. Result is estimated.
Z	Holding time and/or preservation requirements not established for this method; however, BAL recommendations for holding time were not followed. Please see narrative for explanation.

These qualifiers are based on those previously utilized by Brooks Applied Labs, those found in the EPA SOW ILM03.0, Exhibit B, Section III, pg. B-18, and the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review; USEPA; January 2010. These supersede all previous qualifiers ever employed by BAL.

Accreditation Information

Table 1. Accredited method/matrix/analytes for TNI

Issued by: State of Florida Dept. of Health (The NELAC Institute 2016 Standard)
Issued on: July 1, 2021; Valid to: June 30, 2022
Certificate Number: E87982-37

Method	Matrix	TNI Accredited Analyte(s)
EPA 1638	Non-Potable Waters	Ag, Cd, Cu, Ni, Pb, Sb, Se, Tl, Zn
EPA 200.8	Non-Potable Waters	Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
EPA 6020	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
	Solids/Chemicals & Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, V, Zn
BAL-5000	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn, Hardness
	Solids/Chemicals	Ag, As, B, Be, Cd, Co, Cr, Cu, Pb, Mo, Ni, Sb, Se, Sn, Sr, Tl, V, Zn
	Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn
EPA 1640	Non-Potable Waters	Cd, Cu, Pb, Ni, Zn
EPA 1631E	Non-Potable Waters, Solids/Chemicals & Biological	Total Mercury
EPA 1630	Non-Potable Waters	Methyl Mercury
BAL-3200	Solids/Chemicals & Biological	Methyl Mercury
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs
BAL-4201	Non-Potable Waters	Se(IV), Se(VI)
BAL-4300	Non-Potable Waters Solid/Chemicals	Cr(VI)
SM2340B	Non-Potable Waters	Hardness

Accreditation Information

Table 2. Accredited method/matrix/analytes for ISO (1), Non-Governmental TNI (2), and DoD/DOE (3)

Issued by: ANAB

Issued on: September 21, 2021; Valid to: March 30, 2024

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 Hg (Biological Only)	Not Accredited
EPA 1640 Mod	Non-Potable Waters	Cd, Cu, Pb, Ni, Zn Ag, As, Cr, Co, Se, Tl, V (ISO Only)	Not Accredited
EPA 1631E Mod BAL-3100	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 (ISO Only)	Not Accredited
	Biological/Food Solids/Chemicals	Inorganic Arsenic (ISO Only)	Not Accredited
AOAC 2015.01 Mod BAL-5000	Food	As, Cd, Hg, Pb	Not Accredited
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs	Not Accredited
	Biological by BAL-4117	Inorganic Arsenic, DMAs, MMAs (ISO Only)	Not Accredited
BAL-4101	Food by BAL-4117	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 BAL-0501	Solids/Chemicals & Biological	% Dry Weight	% Dry Weight

(1) ISO/IEC 17025:2017 – Certificate Number ADE-1447.02

(2) Non-Governmental NELAC Institute 2016 Standard – Certificate Number ADE-1447.01

(3) Department of Defense/Energy Consolidated Quality Systems Manual v. 5.3 – Certificate Numbers ADE-1447 for DoD, ADE-1447.03 for DOE.

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
EV_EC_FLOW2_WS_LAEMP_EVO_2021-12-15_N	2112279-01	WS	Sample	12/15/2021	12/23/2021
EV_EC_FLOW2_WS_LAEMP_EVO_2021-12-15_N_NAL	2112279-02	WS	Sample	12/15/2021	12/23/2021
EV_EC_FLOW2_WS_LAEMP_EVO_2021-12-15_N_NAL	2112279-03	WS	Sample	12/15/2021	12/23/2021

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
DMSeO	Water	SOP BAL-4201	12/29/2021	12/29/2021	B213545	S211464
MeSe(IV)	Water	SOP BAL-4201	12/29/2021	12/29/2021	B213545	S211464
MeSe(VI)	Water	SOP BAL-4201	12/29/2021	12/29/2021	B213545	S211464
Se	Water	EPA 1638 Mod	01/03/2022	01/05/2022	B213542	S220018
Se(IV)	Water	SOP BAL-4201	12/29/2021	12/29/2021	B213545	S211464
Se(VI)	Water	SOP BAL-4201	12/29/2021	12/29/2021	B213545	S211464
SeCN	Water	SOP BAL-4201	12/29/2021	12/29/2021	B213545	S211464
SeMet	Water	SOP BAL-4201	12/29/2021	12/29/2021	B213545	S211464
SeSO3	Water	SOP BAL-4201	12/29/2021	12/29/2021	B213545	S211464
Unk Se Sp	Water	SOP BAL-4201	12/29/2021	12/29/2021	B213545	S211464

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
EV_EC_FLOW2_WS_LAEMP_EVO_2021-12-15_N										
2112279-01	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B213545	S211464
2112279-01	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B213545	S211464
2112279-01	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B213545	S211464
2112279-01	Se(IV)	WS	D	0.189		0.010	0.075	µg/L	B213545	S211464
2112279-01	Se(VI)	WS	D	129		0.010	0.055	µg/L	B213545	S211464
2112279-01	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B213545	S211464
2112279-01	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B213545	S211464
2112279-01	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B213545	S211464
2112279-01	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B213545	S211464
EV_EC_FLOW2_WS_LAEMP_EVO_2021-12-15_N_NAL										
2112279-02	Se	WS	TR	114		0.165	0.528	µg/L	B213542	S220018
EV_EC_FLOW2_WS_LAEMP_EVO_2021-12-15_N_NAL										
2112279-03	Se	WS	D	132		0.165	0.528	µg/L	B213542	S220018

Accuracy & Precision Summary

Batch: B213542
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits		RPD & Limits	
B213542-BS1	**Blank Spike, (2128021)**								
	Se		200.0	176.3	µg/L	88%	75-125		
B213542-BS2	**Blank Spike, (2128021)**								
	Se		200.0	175.7	µg/L	88%	75-125		
B213542-BS3	**Blank Spike, (2128021)**								
	Se		200.0	178.2	µg/L	89%	75-125		
B213542-SRM1	**Reference Material (2145003, TMDA 51.5 Reference Standard - Bottle 2 - SRM)**								
	Se		14.30	12.64	µg/L	88%	75-125		
B213542-SRM2	**Reference Material (2145003, TMDA 51.5 Reference Standard - Bottle 2 - SRM)**								
	Se		14.30	12.74	µg/L	89%	75-125		
B213542-SRM3	**Reference Material (2145003, TMDA 51.5 Reference Standard - Bottle 2 - SRM)**								
	Se		14.30	12.16	µg/L	85%	75-125		
B213542-DUP2	**Duplicate, (2112279-02)**								
	Se	114.3		112.0	µg/L			2%	20
B213542-MS2	**Matrix Spike, (2112279-02)**								
	Se	114.3	220.0	311.7	µg/L	90%	75-125		
B213542-MSD2	**Matrix Spike Duplicate, (2112279-02)**								
	Se	114.3	220.0	321.7	µg/L	94%	75-125	3%	20

Accuracy & Precision Summary

Batch: B213545
Lab Matrix: Water
Method: SOP BAL-4201

Sample	Analyte	Native	Spike	Result	Units	REC & Limits		RPD & Limits	
B213545-BS1	**Blank Spike, (2124033)**								
	MeSe(IV)		5.095	5.814	µg/L	114%	75-125		
	Se(IV)		5.000	4.736	µg/L	95%	75-125		
	Se(VI)		5.000	4.452	µg/L	89%	75-125		
	SeCN		5.015	4.689	µg/L	93%	75-125		
	SeMet		4.932	5.160	µg/L	105%	75-125		
B213545-DUP2	**Duplicate, (2112279-01)**								
	DMSeO	ND		ND	µg/L			N/C	25
	MeSe(IV)	ND		ND	µg/L			N/C	25
	MeSe(VI)	ND		ND	µg/L			N/C	25
	Se(IV)	0.189		0.191	µg/L			1%	25
	Se(VI)	129.3		126.2	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
B213545-MS2	**Matrix Spike, (2112279-01)**								
	Se(IV)	0.189	4.900	4.736	µg/L	93%	75-125		
	Se(VI)	129.3	5.100	133.4	µg/L	NR	75-125		
	SeCN	ND	1.962	1.829	µg/L	93%	75-125		
	SeMet	ND	1.977	2.065	µg/L	104%	75-125		
B213545-MSD2	**Matrix Spike Duplicate, (2112279-01)**								
	Se(IV)	0.189	4.900	4.781	µg/L	94%	75-125	1%	25
	SeCN	ND	1.962	1.857	µg/L	95%	75-125	2%	25
	SeMet	ND	1.977	2.068	µg/L	105%	75-125	0.2%	25

Method Blanks & Reporting Limits

Batch: B213542
Matrix: Water
Method: EPA 1638 Mod
Analyte: Se

Sample	Result	Units
B213542-BLK1	0.028	µg/L
B213542-BLK2	-0.064	µg/L
B213542-BLK3	-0.001	µg/L
B213542-BLK4	-0.068	µg/L
Average:	-0.026	
Limit:	0.480	

MDL: 0.150
MRL: 0.480

Method Blanks & Reporting Limits

Batch: B213545
Matrix: Water
Method: SOP BAL-4201
Analyte: DMSeO

Sample	Result	Units
B213545-BLK1	0.00	µg/L
B213545-BLK2	0.00	µg/L
B213545-BLK3	0.00	µg/L
B213545-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.005 **MRL:** 0.005

Analyte: MeSe(IV)

Sample	Result	Units
B213545-BLK1	0.00	µg/L
B213545-BLK2	0.00	µg/L
B213545-BLK3	0.00	µg/L
B213545-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.005 **MRL:** 0.005

Analyte: MeSe(VI)

Sample	Result	Units
B213545-BLK1	0.00	µg/L
B213545-BLK2	0.00	µg/L
B213545-BLK3	0.00	µg/L
B213545-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.005 **MRL:** 0.005

Method Blanks & Reporting Limits

Analyte: Se(IV)

Sample	Result	Units
B213545-BLK1	0.002	µg/L
B213545-BLK2	0.001	µg/L
B213545-BLK3	0.00	µg/L
B213545-BLK4	0.00	µg/L

Average: 0.001 **MDL:** 0.002
Limit: 0.015 **MRL:** 0.015

Analyte: Se(VI)

Sample	Result	Units
B213545-BLK1	0.002	µg/L
B213545-BLK2	0.001	µg/L
B213545-BLK3	0.00	µg/L
B213545-BLK4	0.00	µg/L

Average: 0.001 **MDL:** 0.002
Limit: 0.011 **MRL:** 0.011

Analyte: SeCN

Sample	Result	Units
B213545-BLK1	0.00	µg/L
B213545-BLK2	0.00	µg/L
B213545-BLK3	0.00	µg/L
B213545-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.010 **MRL:** 0.010

Analyte: SeMet

Sample	Result	Units
B213545-BLK1	0.00	µg/L
B213545-BLK2	0.00	µg/L
B213545-BLK3	0.00	µg/L
B213545-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.005 **MRL:** 0.005

Method Blanks & Reporting Limits

Analyte: SeSO3

Sample	Result	Units
B213545-BLK1	0.00	µg/L
B213545-BLK2	0.00	µg/L
B213545-BLK3	0.00	µg/L
B213545-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.011 **MRL:** 0.011

Analyte: Unk Se Sp

Sample	Result	Units
B213545-BLK1	0.00	µg/L
B213545-BLK2	0.00	µg/L
B213545-BLK3	0.00	µg/L
B213545-BLK4	0.00	µg/L

Average: 0.000 **MDL:** 0.002
Limit: 0.015 **MRL:** 0.015

Sample Containers

Lab ID: 2112279-01
Sample: EV_EC_FLOW2_WS_LAEMP_EVO_2021-12-15_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/15/2021
Received: 12/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Cooler #4 - 2112279
B	XTRA_VOL	15 mL	na	none	na	na	Cooler #4 - 2112279
C	XTRA_VOL	60 mL	na	none	na	na	Cooler #4 - 2112279

Lab ID: 2112279-02
Sample: EV_EC_FLOW2_WS_LAEMP_EVO_2021-12-15_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/15/2021
Received: 12/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2142027	<2	Cooler #4 - 2112279

Lab ID: 2112279-03
Sample: EV_EC_FLOW2_WS_LAEMP_EVO_2021-12-15_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/15/2021
Received: 12/23/2021

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2142027	<2	Cooler #4 - 2112279

Shipping Containers

Cooler #4 - 2112279

Received: December 23, 2021 7:13
Tracking No: PAPS#RWHV85287 via Courier
Coolant Type: Blue Ice
Temperature: 1.5 °C

Description: Styrofoam Cooler
Damaged in transit? No
Returned to client? No
Comments: IR #31

Custody seals present? No
Custody seals intact? No
COC present? Yes

Teck

Page 1 of 1

COC ID:	December EVO LAEMP	TURNAROUND TIME:	Regular

PROJECT/CLIENT INFO

Facility Name / Job#	Elkview Operations
Project Manager	Allie Ferguson
Email	allie.ferguson@teck.com
Address	421 Pine Avenue
City	Sparwood
Province	BC
Postal Code	V0B 2G0
Country	Canada
Phone Number	250-910-8755

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:	Allie.Ferguson@teck.com	x	x	x
Email 2:	Jessica.ritz@teck.com	x	x	x
Email 3:	teckcoal@equisonline.com			x
Email 4:	lbowron@minnow.ca	x	x	x
Email 5:	tyler.Mehler@minnow.ca	x	x	x
Email 5:				
PO number				

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.	Total Selenium (F)	Dissolved Selenium (F)	Selenium Speciation
EV_EC_FLOW2_WS_LAEMP_EVO_2021-12-15_N	EV_EC_FLOW2	WS	N	15-Dec-21	14:00	G	1			X
EV_EC_FLOW2_WS_LAEMP_EVO_2021-12-15_N_NAL	EV_EC_FLOW2	WS	N	15-Dec-21	14:00	G	2	X	X	

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

PO

VPO 00748540

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Alex McClymont, Minnow Env.	December 15, 2021	BAL	12/23/21 07:13

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	Alex McClymont	Mobile #	780-293-6750 (or 587-597-1612)
Sampler's Signature	AMC	Date/Time	December 15, 2021

STRAIGHT BILL OF LADING
NOT NEGOTIABLE

RW HOT SHOT SERVICE INC.
250-425-7447
24 Hour Hot Shot Service

No. 85288

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 22-21

INVOICE TO

BILL OF LADING #

PURCHASE ORDER NUMBER

SHIPPER (FROM) Teck Coal Ltd.

STREET Elkview - WHSE 50

CITY/PROVINCE Sparwood BC

POSTAL CODE

CONSIGNEE (TO) Brooks Applied Labs

STREET 18804 N. Creek Parkway

CITY/PROVINCE Bothell WA

POSTAL CODE 98011

SPECIAL INSTRUCTIONS

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)
2	Coolers - Water Samples	42 LBS
	PAPS# RWHV85287	

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 0713

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 consignee at the said destination, subject to the rates and classification in effect on the date of shipment. It is mutually agreed, as to each carrier of all or any of the goods over all or any portion of the route to destination, and as to each party of any time interested in all or any of the goods, that every service to be performed hereunder shall be subject to all the conditions standard Bill of Lading, in power at the date of issuing, which are hereto agreed by the consignor and accepted for himself and his assigns. Printed or written, including conditions set aside by the standard Bill of Lading, in power at the date of issuing, which are hereby agreed by the consignor and accepted for himself and his assigns. The Contract for the carriage of the goods listed in the Bill of Lading is governed by regulation in force in the jurisdiction at the time and place of shipment and is subject to the conditions set out in such conditions.

SHIPPER PRINT

SHIPPER SIGN

CONSIGNEE PRINT

CONSIGNEE SIGN

DATE 12/23/21

TIME 13

NUMBER OF PIECES RECEIVED 2

GST # 864540398RT0001

WHITE: Office YELLOW: Carrier PINK: Consignee GOLDENROAD: Shipper

AMBOS PRINTING

Cooler ID: Cooler #4

COC (Y/N)

Temperature: 2.5 1.5°C see ASG 12/23/21

IR: 31

Coolant Type: Ice Blue Ice Ambient

Notes:

Sampling Locations:	EV		F2							
Sample Types:	T/D	SP	T/D	SP	T/D	SP	T/D	SP	T/D	SP
Container Types:	40ml amber	125ml plastic	40ml amber	125ml plastic						

Opened By: ASG

Date: 12/23/21

COPY

2112279

Effective 7/29/20

SEDIMENT CHEMISTRY

ALS Laboratory Report L2641269
(Finalized October 5, 2021)

Teck Coal Ltd.
ATTN: Allie Ferguson
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 16-SEP-21
Report Date: 05-OCT-21 13:40 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2641269
Project P.O. #: VPO00750546
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: September EVO LAEMP
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2641269-1	L2641269-2	L2641269-3	L2641269-4	L2641269-5
	Description	SE	SE	SE	SE	SE
	Sampled Date	13-SEP-21	13-SEP-21	13-SEP-21	13-SEP-21	13-SEP-21
	Sampled Time	09:45	10:45	12:15	14:15	15:45
	Client ID	RG_MICOMP_SE-1_2021-09-13_0945	RG_MICOMP_SE-2_2021-09-13_1045	RG_MICOMP_SE-3_2021-09-13_1215	RG_MICOMP_SE-4_2021-09-13_1415	RG_MICOMP_SE-5_2021-09-13_1545
SOIL						
Physical Tests	Moisture (%)	86.2	75.3	95.1	66.7	96.1
	pH (1:2 soil:water) (pH)	8.24	8.17	7.80	8.25	7.88
Particle Size	% Gravel (>2mm) (%)	<1.0 PSAL	<1.0 PSAL	<1.0 PSAL	<1.0	<1.0 PSAL
	% Sand (2.00mm - 1.00mm) (%)	3.5 PSAL	2.4 PSAL	<1.0 PSAL	<1.0	4.5 PSAL
	% Sand (1.00mm - 0.50mm) (%)	8.4 PSAL	6.5 PSAL	6.0 PSAL	<1.0	5.2 PSAL
	% Sand (0.50mm - 0.25mm) (%)	11.0 PSAL	19.0 PSAL	23.5 PSAL	3.4	3.7 PSAL
	% Sand (0.25mm - 0.125mm) (%)	7.6 PSAL	15.3 PSAL	15.2 PSAL	14.8	3.6 PSAL
	% Sand (0.125mm - 0.063mm) (%)	7.1 PSAL	9.6 PSAL	7.7 PSAL	18.5	5.6 PSAL
	% Silt (0.063mm - 0.0312mm) (%)	25.7 PSAL	20.1 PSAL	19.5 PSAL	29.6	33.1 PSAL
	% Silt (0.0312mm - 0.004mm) (%)	30.1 PSAL	22.1 PSAL	22.6 PSAL	29.9	36.9 PSAL
	% Clay (<4um) (%)	6.7 PSAL	5.0 PSAL	4.5 PSAL	3.5	7.3 PSAL
	Texture	Silt loam	Sandy loam	Sandy loam	Silt loam	Silt loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	5.74	4.40	4.98	4.36	6.17
Metals	Aluminum (Al) (mg/kg)	5600	5780	5940	6180	5020
	Antimony (Sb) (mg/kg)	0.64	0.59	0.56	0.64	0.53
	Arsenic (As) (mg/kg)	4.72	4.71	4.17	4.27	3.92
	Barium (Ba) (mg/kg)	228	216	267	202	170
	Beryllium (Be) (mg/kg)	0.47	0.45	0.42	0.45	0.46
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	7.0	6.0	7.2	5.3	5.5
	Cadmium (Cd) (mg/kg)	1.35	1.21	1.78	1.15	2.12
	Calcium (Ca) (mg/kg)	43300	39300	64800	34200	52200
	Chromium (Cr) (mg/kg)	10.4	10.7	11.1	11.8	9.99
	Cobalt (Co) (mg/kg)	8.26	7.57	7.86	6.03	9.17
	Copper (Cu) (mg/kg)	12.0	12.0	13.7	11.9	12.5
	Iron (Fe) (mg/kg)	13700	12800	11100	11300	12000
	Lead (Pb) (mg/kg)	8.40	9.41	7.77	8.19	7.08
	Lithium (Li) (mg/kg)	7.5	7.1	7.2	7.5	7.6
	Magnesium (Mg) (mg/kg)	5280	5190	5460	5260	9570
	Manganese (Mn) (mg/kg)	357	313	324	206	727
	Mercury (Hg) (mg/kg)	0.0399	0.0417	0.0531	0.0453	0.0406
	Molybdenum (Mo) (mg/kg)	1.19	1.03	1.20	0.95	1.24
	Nickel (Ni) (mg/kg)	37.5	33.4	30.7	27.3	61.1
	Phosphorus (P) (mg/kg)	1000	981	1020	946	1060
	Potassium (K) (mg/kg)	1220	1260	1480	1370	1320
	Selenium (Se) (mg/kg)	2.28	1.66	4.98	2.00	1.97
	Silver (Ag) (mg/kg)	0.18	0.16	0.16	0.18	0.16

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2641269-6				
	Description	SE				
	Sampled Date	13-SEP-21				
	Sampled Time	10:45				
	Client ID	RG_RIVER_SE_2021-09-13_1045				
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	72.1				
	pH (1:2 soil:water) (pH)	8.18				
Particle Size	% Gravel (>2mm) (%)	<1.0 PSAL				
	% Sand (2.00mm - 1.00mm) (%)	<1.0 PSAL				
	% Sand (1.00mm - 0.50mm) (%)	1.5 PSAL				
	% Sand (0.50mm - 0.25mm) (%)	3.0 PSAL				
	% Sand (0.25mm - 0.125mm) (%)	3.8 PSAL				
	% Sand (0.125mm - 0.063mm) (%)	5.6 PSAL				
	% Silt (0.063mm - 0.0312mm) (%)	37.4 PSAL				
	% Silt (0.0312mm - 0.004mm) (%)	40.5 PSAL				
	% Clay (<4um) (%)	7.9 PSAL				
	Texture	Silt loam				
Organic / Inorganic Carbon	Total Organic Carbon (%)	7.17				
Metals	Aluminum (Al) (mg/kg)	4660				
	Antimony (Sb) (mg/kg)	0.63				
	Arsenic (As) (mg/kg)	4.79				
	Barium (Ba) (mg/kg)	202				
	Beryllium (Be) (mg/kg)	0.42				
	Bismuth (Bi) (mg/kg)	<0.20				
	Boron (B) (mg/kg)	<5.0				
	Cadmium (Cd) (mg/kg)	1.20				
	Calcium (Ca) (mg/kg)	42400				
	Chromium (Cr) (mg/kg)	8.99				
	Cobalt (Co) (mg/kg)	7.12				
	Copper (Cu) (mg/kg)	11.8				
	Iron (Fe) (mg/kg)	12400				
	Lead (Pb) (mg/kg)	8.76				
	Lithium (Li) (mg/kg)	6.4				
	Magnesium (Mg) (mg/kg)	5120				
	Manganese (Mn) (mg/kg)	309				
	Mercury (Hg) (mg/kg)	0.0443				
	Molybdenum (Mo) (mg/kg)	1.07				
	Nickel (Ni) (mg/kg)	32.1				
	Phosphorus (P) (mg/kg)	1040				
	Potassium (K) (mg/kg)	900				
	Selenium (Se) (mg/kg)	1.57				
	Silver (Ag) (mg/kg)	0.16				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2641269-1	L2641269-2	L2641269-3	L2641269-4	L2641269-5
	Description	SE	SE	SE	SE	SE
	Sampled Date	13-SEP-21	13-SEP-21	13-SEP-21	13-SEP-21	13-SEP-21
	Sampled Time	09:45	10:45	12:15	14:15	15:45
	Client ID	RG_MICOMP_SE-1_2021-09-13_0945	RG_MICOMP_SE-2_2021-09-13_1045	RG_MICOMP_SE-3_2021-09-13_1215	RG_MICOMP_SE-4_2021-09-13_1415	RG_MICOMP_SE-5_2021-09-13_1545
Grouping	**Analyte**					
SOIL						
Metals	Sodium (Na) (mg/kg)	82	72	103	67	67
	Strontium (Sr) (mg/kg)	74.7	67.6	89.7	58.8	60.2
	Sulfur (S) (mg/kg)	<1000	<1000	<1000	<1000	<1000
	Thallium (Tl) (mg/kg)	0.195	0.193	0.193	0.204	0.177
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	17.5	16.3	14.8	23.5	8.9
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	0.967	0.875	1.34	0.825	0.901
	Vanadium (V) (mg/kg)	25.8	27.2	26.3	29.4	23.8
	Zinc (Zn) (mg/kg)	91.9	90.1	99.2	82.5	156
	Zirconium (Zr) (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.018 DLHM	<0.025 DLCI	<0.050 DLHM	<0.025 DLCI	<0.050 DLHM
	Acenaphthylene (mg/kg)	<0.018 DLHM	0.011 DLHM	<0.050 DLHM	<0.015 DLCI	<0.050 DLHM
	Acridine (mg/kg)	0.037 DLHM	<0.030 DLCI	<0.10 DLHM	<0.030 DLCI	<0.10 DLHM
	Anthracene (mg/kg)	<0.014 DLHM	0.0119 DLHM	<0.040 DLHM	<0.0040	<0.040 DLHM
	Benz(a)anthracene (mg/kg)	0.041 DLHM	0.042 DLHM	<0.10 DLHM	0.052	<0.10 DLHM
	Benzo(a)pyrene (mg/kg)	<0.035 DLHM	0.036 DLHM	<0.10 DLHM	0.037	<0.10 DLHM
	Benzo(b&j)fluoranthene (mg/kg)	0.086 DLHM	0.090 DLHM	<0.10 DLHM	0.102	<0.10 DLHM
	Benzo(b+j+k)fluoranthene (mg/kg)	0.086	0.090	<0.14	0.121	<0.14
	Benzo(e)pyrene (mg/kg)	0.077 DLHM	0.074 DLHM	<0.10 DLHM	0.082	<0.10 DLHM
	Benzo(g,h,i)perylene (mg/kg)	<0.035 DLHM	0.032 DLHM	<0.10 DLHM	0.041	<0.10 DLHM
	Benzo(k)fluoranthene (mg/kg)	<0.035 DLHM	<0.020 DLHM	<0.10 DLHM	0.019	<0.10 DLHM
	Chrysene (mg/kg)	0.074 DLHM	0.067 DLHM	0.14 DLHM	0.111	<0.10 DLHM
	Dibenz(a,h)anthracene (mg/kg)	<0.018 DLHM	<0.010 DLHM	<0.050 DLHM	0.0128	<0.050 DLHM
	Fluoranthene (mg/kg)	0.046 DLHM	<0.050 DLCI	<0.10 DLHM	<0.070 DLCI	<0.10 DLHM
	Fluorene (mg/kg)	0.043 DLHM	<0.050 DLCI	<0.10 DLHM	0.034	<0.10 DLHM
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.035 DLHM	<0.020 DLHM	<0.10 DLHM	0.023	<0.10 DLHM
	1-Methylnaphthalene (mg/kg)	0.166 DLHM	0.166 DLHM	<0.30 DLCI	0.208	0.28 DLHM
	2-Methylnaphthalene (mg/kg)	0.247 DLHM	0.234 DLHM	0.45 DLHM	0.290	0.34 DLHM
	Naphthalene (mg/kg)	0.136 DLHM	0.113 DLHM	0.17 DLHM	0.159	<0.10 DLHM
	Perylene (mg/kg)	<0.035 DLHM	<0.020 DLHM	<0.10 DLHM	0.018	<0.10 DLHM
	Phenanthrene (mg/kg)	0.300 DLHM	0.291 DLHM	0.39 DLHM	0.365	0.42 DLHM
	Pyrene (mg/kg)	0.054 DLHM	0.055 DLHM	<0.10 DLHM	<0.070 DLCI	<0.10 DLHM
	Quinoline (mg/kg)	<0.035 DLHM	<0.020 DLHM	<0.10 DLHM	<0.050	<0.10 DLHM
	Surrogate: d10-Acenaphthene (%)	98.6	99.3	98.1	98.5	104.5
	Surrogate: d12-Chrysene (%)	111.2	111.1	108.0	107.4	112.1

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2641269-6				
	Description	SE				
	Sampled Date	13-SEP-21				
	Sampled Time	10:45				
	Client ID	RG_RIVER_SE_2021-09-13_1045				
Grouping	**Analyte**					
SOIL						
Metals	Sodium (Na) (mg/kg)	67				
	Strontium (Sr) (mg/kg)	69.8				
	Sulfur (S) (mg/kg)	<1000				
	Thallium (Tl) (mg/kg)	0.173				
	Tin (Sn) (mg/kg)	<2.0				
	Titanium (Ti) (mg/kg)	9.1				
	Tungsten (W) (mg/kg)	<0.50				
	Uranium (U) (mg/kg)	0.892				
	Vanadium (V) (mg/kg)	23.0				
	Zinc (Zn) (mg/kg)	87.5				
	Zirconium (Zr) (mg/kg)	<1.0				
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	DLCI <0.015				
	Acenaphthylene (mg/kg)	DLHM <0.0085				
	Acridine (mg/kg)	DLHM 0.019				
	Anthracene (mg/kg)	DLHM <0.0068				
	Benz(a)anthracene (mg/kg)	DLHM 0.026				
	Benzo(a)pyrene (mg/kg)	DLHM 0.020				
	Benzo(b&j)fluoranthene (mg/kg)	DLHM 0.056				
	Benzo(b+j+k)fluoranthene (mg/kg)	0.056				
	Benzo(e)pyrene (mg/kg)	DLHM 0.054				
	Benzo(g,h,i)perylene (mg/kg)	DLHM <0.017				
	Benzo(k)fluoranthene (mg/kg)	DLHM <0.017				
	Chrysene (mg/kg)	DLHM 0.050				
	Dibenz(a,h)anthracene (mg/kg)	DLHM <0.0085				
	Fluoranthene (mg/kg)	DLHM 0.038				
	Fluorene (mg/kg)	DLHM 0.035				
	Indeno(1,2,3-c,d)pyrene (mg/kg)	DLHM <0.017				
	1-Methylnaphthalene (mg/kg)	DLHM 0.131				
	2-Methylnaphthalene (mg/kg)	DLHM 0.201				
	Naphthalene (mg/kg)	DLHM 0.099				
	Perylene (mg/kg)	DLHM <0.017				
	Phenanthrene (mg/kg)	DLHM 0.233				
	Pyrene (mg/kg)	DLCI <0.050				
	Quinoline (mg/kg)	DLHM <0.017				
	Surrogate: d10-Acenaphthene (%)	101.0				
	Surrogate: d12-Chrysene (%)	109.8				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2641269-1	L2641269-2	L2641269-3	L2641269-4	L2641269-5
	Description	SE	SE	SE	SE	SE
	Sampled Date	13-SEP-21	13-SEP-21	13-SEP-21	13-SEP-21	13-SEP-21
	Sampled Time	09:45	10:45	12:15	14:15	15:45
	Client ID	RG_MICOMP_SE-1_2021-09-13_0945	RG_MICOMP_SE-2_2021-09-13_1045	RG_MICOMP_SE-3_2021-09-13_1215	RG_MICOMP_SE-4_2021-09-13_1415	RG_MICOMP_SE-5_2021-09-13_1545
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d8-Naphthalene (%)	81.3	92.4	87.3	90.7	90.2
	Surrogate: d10-Phenanthrene (%)	105.1	107.7	102.6	105.1	107.4
	IACR:Coarse	<0.050	<0.050	0.063	<0.050	0.062
	IACR:Fine	0.069	0.061	0.12	0.084	<0.12
	B(a)P Total Potency Equivalent (mg/kg)	0.043	0.057	0.097	0.071	<0.096
	IACR (CCME)	0.90	0.91	1.1	1.13	<1.1

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2641269-6				
	Description	SE				
	Sampled Date	13-SEP-21				
	Sampled Time	10:45				
	Client ID	RG_RIVER_SE_2021-09-13_1045				
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d8-Naphthalene (%)	94.6				
	Surrogate: d10-Phenanthrene (%)	104.8				
	IACR:Coarse	<0.050				
	IACR:Fine	<0.050				
	B(a)P Total Potency Equivalent (mg/kg)	0.035				
	IACR (CCME)	0.58				

* 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 Particle Size Analysis (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.

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:

September EVO LAEMP

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: Allie Ferguson

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TIC-PCT-SK	**Soil**							
Batch R5598776								
WG3622536-4 IRM		**08-109_SOIL**						
Inorganic Carbon			91.2		%		80-120	24-SEP-21
WG3622536-2 LCS		**0.5**						
Inorganic Carbon			96.2		%		90-110	24-SEP-21
WG3622536-3 MB								
Inorganic Carbon			<0.050		%		0.05	24-SEP-21
C-TOT-LECO-SK	**Soil**							
Batch R5599818								
WG3622204-2 IRM		**08-109_SOIL**						
Total Carbon by Combustion			99.3		%		80-120	22-SEP-21
WG3622204-4 LCS		**SULFADIAZINE**						
Total Carbon by Combustion			106.0		%		90-110	22-SEP-21
WG3622204-3 MB								
Total Carbon by Combustion			<0.05		%		0.05	22-SEP-21
HG-200.2-CVAA-CL	**Soil**							
Batch R5605501								
WG3627462-4 CRM		**TILL-2**						
Mercury (Hg)			98.1		%		70-130	30-SEP-21
WG3627462-9 CRM		**TILL-2**						
Mercury (Hg)			101.0		%		70-130	30-SEP-21
WG3627462-3 LCS								
Mercury (Hg)			94.4		%		80-120	30-SEP-21
WG3627462-8 LCS								
Mercury (Hg)			98.4		%		80-120	30-SEP-21
WG3627462-1 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	30-SEP-21
WG3627462-6 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	30-SEP-21
MET-200.2-CCMS-CL	**Soil**							
Batch R5605699								
WG3627462-4 CRM		**TILL-2**						
Aluminum (Al)			89.5		%		70-130	30-SEP-21
Antimony (Sb)			102.3		%		70-130	30-SEP-21
Arsenic (As)			103.1		%		70-130	30-SEP-21
Barium (Ba)			103.0		%		70-130	30-SEP-21
Beryllium (Be)			91.6		%		70-130	30-SEP-21
Bismuth (Bi)			99.5		%		70-130	30-SEP-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5605699								
WG3627462-4 CRM		**TILL-2**						
Cadmium (Cd)			99.6		%		70-130	30-SEP-21
Calcium (Ca)			97.1		%		70-130	30-SEP-21
Chromium (Cr)			100.6		%		70-130	30-SEP-21
Cobalt (Co)			100.0		%		70-130	30-SEP-21
Copper (Cu)			101.8		%		70-130	30-SEP-21
Iron (Fe)			99.8		%		70-130	30-SEP-21
Lead (Pb)			100.2		%		70-130	30-SEP-21
Lithium (Li)			94.4		%		70-130	30-SEP-21
Magnesium (Mg)			92.5		%		70-130	30-SEP-21
Manganese (Mn)			97.0		%		70-130	30-SEP-21
Molybdenum (Mo)			92.8		%		70-130	30-SEP-21
Nickel (Ni)			102.6		%		70-130	30-SEP-21
Phosphorus (P)			91.0		%		70-130	30-SEP-21
Potassium (K)			100.1		%		70-130	30-SEP-21
Selenium (Se)			0.42		mg/kg		0.15-0.55	30-SEP-21
Silver (Ag)			0.26		mg/kg		0.16-0.36	30-SEP-21
Sodium (Na)			90.8		%		70-130	30-SEP-21
Strontium (Sr)			97.4		%		70-130	30-SEP-21
Thallium (Tl)			106.3		%		70-130	30-SEP-21
Tin (Sn)			2.3		mg/kg		0.2-4.2	30-SEP-21
Titanium (Ti)			98.0		%		70-130	30-SEP-21
Tungsten (W)			1.39		mg/kg		1-2	30-SEP-21
Uranium (U)			99.6		%		70-130	30-SEP-21
Vanadium (V)			97.7		%		70-130	30-SEP-21
Zinc (Zn)			103.4		%		70-130	30-SEP-21
Zirconium (Zr)			98.3		%		70-130	30-SEP-21
WG3627462-9 CRM		**TILL-2**						
Aluminum (Al)			77.6		%		70-130	01-OCT-21
Antimony (Sb)			96.9		%		70-130	01-OCT-21
Arsenic (As)			92.2		%		70-130	01-OCT-21
Barium (Ba)			87.5		%		70-130	01-OCT-21
Beryllium (Be)			86.6		%		70-130	01-OCT-21
Bismuth (Bi)			94.4		%		70-130	01-OCT-21
Cadmium (Cd)			95.8		%		70-130	01-OCT-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5605699								
WG3627462-9 CRM		**TILL-2**						
Calcium (Ca)			84.0		%		70-130	01-OCT-21
Chromium (Cr)			90.0		%		70-130	01-OCT-21
Cobalt (Co)			92.5		%		70-130	01-OCT-21
Copper (Cu)			93.5		%		70-130	01-OCT-21
Iron (Fe)			92.3		%		70-130	01-OCT-21
Lead (Pb)			93.3		%		70-130	01-OCT-21
Lithium (Li)			90.7		%		70-130	01-OCT-21
Magnesium (Mg)			85.8		%		70-130	01-OCT-21
Manganese (Mn)			87.8		%		70-130	01-OCT-21
Molybdenum (Mo)			86.4		%		70-130	01-OCT-21
Nickel (Ni)			95.0		%		70-130	01-OCT-21
Phosphorus (P)			93.0		%		70-130	01-OCT-21
Potassium (K)			83.1		%		70-130	01-OCT-21
Selenium (Se)			0.36		mg/kg		0.15-0.55	01-OCT-21
Silver (Ag)			0.24		mg/kg		0.16-0.36	01-OCT-21
Sodium (Na)			79.9		%		70-130	01-OCT-21
Strontium (Sr)			87.6		%		70-130	01-OCT-21
Thallium (Tl)			92.0		%		70-130	01-OCT-21
Tin (Sn)			2.1		mg/kg		0.2-4.2	01-OCT-21
Titanium (Ti)			76.9		%		70-130	01-OCT-21
Tungsten (W)			1.30		mg/kg		1-2	01-OCT-21
Uranium (U)			91.1		%		70-130	01-OCT-21
Vanadium (V)			87.6		%		70-130	01-OCT-21
Zinc (Zn)			93.9		%		70-130	01-OCT-21
Zirconium (Zr)			90.3		%		70-130	01-OCT-21
WG3627462-3 LCS								
Aluminum (Al)			95.1		%		80-120	30-SEP-21
Antimony (Sb)			99.8		%		80-120	30-SEP-21
Arsenic (As)			101.2		%		80-120	30-SEP-21
Barium (Ba)			103.4		%		80-120	30-SEP-21
Beryllium (Be)			94.4		%		80-120	30-SEP-21
Bismuth (Bi)			92.3		%		80-120	30-SEP-21
Boron (B)			91.1		%		80-120	30-SEP-21
Cadmium (Cd)			102.2		%		80-120	30-SEP-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5605699								
WG3627462-3 LCS								
Calcium (Ca)			91.1		%		80-120	30-SEP-21
Chromium (Cr)			101.0		%		80-120	30-SEP-21
Cobalt (Co)			101.7		%		80-120	30-SEP-21
Copper (Cu)			98.3		%		80-120	30-SEP-21
Iron (Fe)			104.8		%		80-120	30-SEP-21
Lead (Pb)			93.6		%		80-120	30-SEP-21
Lithium (Li)			96.3		%		80-120	30-SEP-21
Magnesium (Mg)			97.2		%		80-120	30-SEP-21
Manganese (Mn)			102.4		%		80-120	30-SEP-21
Molybdenum (Mo)			94.4		%		80-120	30-SEP-21
Nickel (Ni)			101.9		%		80-120	30-SEP-21
Phosphorus (P)			98.5		%		80-120	30-SEP-21
Potassium (K)			104.0		%		80-120	30-SEP-21
Selenium (Se)			103.1		%		80-120	30-SEP-21
Silver (Ag)			96.4		%		80-120	30-SEP-21
Sodium (Na)			102.4		%		80-120	30-SEP-21
Strontium (Sr)			93.1		%		80-120	30-SEP-21
Sulfur (S)			102.0		%		80-120	30-SEP-21
Thallium (Tl)			92.8		%		80-120	30-SEP-21
Tin (Sn)			94.4		%		80-120	30-SEP-21
Titanium (Ti)			99.2		%		80-120	30-SEP-21
Tungsten (W)			99.2		%		80-120	30-SEP-21
Uranium (U)			96.0		%		80-120	30-SEP-21
Vanadium (V)			100.2		%		80-120	30-SEP-21
Zinc (Zn)			102.2		%		80-120	30-SEP-21
Zirconium (Zr)			96.6		%		80-120	30-SEP-21
WG3627462-8 LCS								
Aluminum (Al)			89.4		%		80-120	01-OCT-21
Antimony (Sb)			96.2		%		80-120	01-OCT-21
Arsenic (As)			94.9		%		80-120	01-OCT-21
Barium (Ba)			93.9		%		80-120	01-OCT-21
Beryllium (Be)			94.8		%		80-120	01-OCT-21
Bismuth (Bi)			90.8		%		80-120	01-OCT-21
Boron (B)			87.7		%		80-120	01-OCT-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5605699								
WG3627462-8 LCS								
Cadmium (Cd)			94.7		%		80-120	01-OCT-21
Calcium (Ca)			88.4		%		80-120	01-OCT-21
Chromium (Cr)			95.5		%		80-120	01-OCT-21
Cobalt (Co)			97.4		%		80-120	01-OCT-21
Copper (Cu)			93.6		%		80-120	01-OCT-21
Iron (Fe)			99.8		%		80-120	01-OCT-21
Lead (Pb)			91.7		%		80-120	01-OCT-21
Lithium (Li)			97.2		%		80-120	01-OCT-21
Magnesium (Mg)			94.1		%		80-120	01-OCT-21
Manganese (Mn)			96.7		%		80-120	01-OCT-21
Molybdenum (Mo)			91.6		%		80-120	01-OCT-21
Nickel (Ni)			98.5		%		80-120	01-OCT-21
Phosphorus (P)			97.4		%		80-120	01-OCT-21
Potassium (K)			96.6		%		80-120	01-OCT-21
Selenium (Se)			95.3		%		80-120	01-OCT-21
Silver (Ag)			92.7		%		80-120	01-OCT-21
Sodium (Na)			95.8		%		80-120	01-OCT-21
Strontium (Sr)			92.9		%		80-120	01-OCT-21
Sulfur (S)			82.2		%		80-120	01-OCT-21
Thallium (Tl)			88.9		%		80-120	01-OCT-21
Tin (Sn)			92.9		%		80-120	01-OCT-21
Titanium (Ti)			84.6		%		80-120	01-OCT-21
Tungsten (W)			94.9		%		80-120	01-OCT-21
Uranium (U)			93.9		%		80-120	01-OCT-21
Vanadium (V)			95.7		%		80-120	01-OCT-21
Zinc (Zn)			92.0		%		80-120	01-OCT-21
Zirconium (Zr)			92.5		%		80-120	01-OCT-21
WG3627462-1 MB								
Aluminum (Al)			<50		mg/kg		50	30-SEP-21
Antimony (Sb)			<0.10		mg/kg		0.1	30-SEP-21
Arsenic (As)			<0.10		mg/kg		0.1	30-SEP-21
Barium (Ba)			<0.50		mg/kg		0.5	30-SEP-21
Beryllium (Be)			<0.10		mg/kg		0.1	30-SEP-21
Bismuth (Bi)			<0.20		mg/kg		0.2	30-SEP-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5605699								
WG3627462-1 MB								
Boron (B)			<5.0		mg/kg		5	30-SEP-21
Cadmium (Cd)			<0.020		mg/kg		0.02	30-SEP-21
Calcium (Ca)			<50		mg/kg		50	30-SEP-21
Chromium (Cr)			<0.50		mg/kg		0.5	30-SEP-21
Cobalt (Co)			<0.10		mg/kg		0.1	30-SEP-21
Copper (Cu)			<0.50		mg/kg		0.5	30-SEP-21
Iron (Fe)			<50		mg/kg		50	30-SEP-21
Lead (Pb)			<0.50		mg/kg		0.5	30-SEP-21
Lithium (Li)			<2.0		mg/kg		2	30-SEP-21
Magnesium (Mg)			<20		mg/kg		20	30-SEP-21
Manganese (Mn)			<1.0		mg/kg		1	30-SEP-21
Molybdenum (Mo)			<0.10		mg/kg		0.1	30-SEP-21
Nickel (Ni)			<0.50		mg/kg		0.5	30-SEP-21
Phosphorus (P)			<50		mg/kg		50	30-SEP-21
Potassium (K)			<100		mg/kg		100	30-SEP-21
Selenium (Se)			<0.20		mg/kg		0.2	30-SEP-21
Silver (Ag)			<0.10		mg/kg		0.1	30-SEP-21
Sodium (Na)			<50		mg/kg		50	30-SEP-21
Strontium (Sr)			<0.50		mg/kg		0.5	30-SEP-21
Sulfur (S)			<1000		mg/kg		1000	30-SEP-21
Thallium (Tl)			<0.050		mg/kg		0.05	30-SEP-21
Tin (Sn)			<2.0		mg/kg		2	30-SEP-21
Titanium (Ti)			<1.0		mg/kg		1	30-SEP-21
Tungsten (W)			<0.50		mg/kg		0.5	30-SEP-21
Uranium (U)			<0.050		mg/kg		0.05	30-SEP-21
Vanadium (V)			<0.20		mg/kg		0.2	30-SEP-21
Zinc (Zn)			<2.0		mg/kg		2	30-SEP-21
Zirconium (Zr)			<1.0		mg/kg		1	30-SEP-21
WG3627462-6 MB								
Aluminum (Al)			<50		mg/kg		50	01-OCT-21
Antimony (Sb)			<0.10		mg/kg		0.1	01-OCT-21
Arsenic (As)			<0.10		mg/kg		0.1	01-OCT-21
Barium (Ba)			<0.50		mg/kg		0.5	01-OCT-21
Beryllium (Be)			<0.10		mg/kg		0.1	01-OCT-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5605699								
WG3627462-6 MB								
Bismuth (Bi)			<0.20		mg/kg		0.2	01-OCT-21
Boron (B)			<5.0		mg/kg		5	01-OCT-21
Cadmium (Cd)			<0.020		mg/kg		0.02	01-OCT-21
Calcium (Ca)			<50		mg/kg		50	01-OCT-21
Chromium (Cr)			<0.50		mg/kg		0.5	01-OCT-21
Cobalt (Co)			<0.10		mg/kg		0.1	01-OCT-21
Copper (Cu)			<0.50		mg/kg		0.5	01-OCT-21
Iron (Fe)			<50		mg/kg		50	01-OCT-21
Lead (Pb)			<0.50		mg/kg		0.5	01-OCT-21
Lithium (Li)			<2.0		mg/kg		2	01-OCT-21
Magnesium (Mg)			<20		mg/kg		20	01-OCT-21
Manganese (Mn)			<1.0		mg/kg		1	01-OCT-21
Molybdenum (Mo)			<0.10		mg/kg		0.1	01-OCT-21
Nickel (Ni)			<0.50		mg/kg		0.5	01-OCT-21
Phosphorus (P)			<50		mg/kg		50	01-OCT-21
Potassium (K)			<100		mg/kg		100	01-OCT-21
Selenium (Se)			<0.20		mg/kg		0.2	01-OCT-21
Silver (Ag)			<0.10		mg/kg		0.1	01-OCT-21
Sodium (Na)			<50		mg/kg		50	01-OCT-21
Strontium (Sr)			<0.50		mg/kg		0.5	01-OCT-21
Sulfur (S)			<1000		mg/kg		1000	01-OCT-21
Thallium (Tl)			<0.050		mg/kg		0.05	01-OCT-21
Tin (Sn)			<2.0		mg/kg		2	01-OCT-21
Titanium (Ti)			<1.0		mg/kg		1	01-OCT-21
Tungsten (W)			<0.50		mg/kg		0.5	01-OCT-21
Uranium (U)			<0.050		mg/kg		0.05	01-OCT-21
Vanadium (V)			<0.20		mg/kg		0.2	01-OCT-21
Zinc (Zn)			<2.0		mg/kg		2	01-OCT-21
Zirconium (Zr)			<1.0		mg/kg		1	01-OCT-21
MOISTURE-CL	**Soil**							
Batch R5600336								
WG3625226-2 LCS								
Moisture			99.4		%		90-110	27-SEP-21
WG3625226-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-CL	**Soil**							
Batch R5600336								
WG3625226-1 MB								
Moisture			<0.25		%		0.25	27-SEP-21
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5603578								
WG3626733-4 IRM		**ALS PAH RM2**						
Acenaphthene			84.8		%		60-130	27-SEP-21
Acenaphthylene			101.9		%		60-130	27-SEP-21
Anthracene			107.6		%		60-130	27-SEP-21
Acridine			116.5		%		60-130	27-SEP-21
Benz(a)anthracene			103.0		%		60-130	27-SEP-21
Benzo(a)pyrene			103.6		%		60-130	27-SEP-21
Benzo(b&j)fluoranthene			98.0		%		60-130	27-SEP-21
Benzo(e)pyrene			104.0		%		60-130	27-SEP-21
Benzo(g,h,i)perylene			91.4		%		60-130	27-SEP-21
Benzo(k)fluoranthene			80.6		%		60-130	27-SEP-21
Chrysene			99.7		%		60-130	27-SEP-21
Dibenz(a,h)anthracene			91.3		%		60-130	27-SEP-21
Fluoranthene			87.0		%		60-130	27-SEP-21
Fluorene			88.5		%		60-130	27-SEP-21
Indeno(1,2,3-c,d)pyrene			116.1		%		60-130	27-SEP-21
2-Methylnaphthalene			83.4		%		60-130	27-SEP-21
Naphthalene			78.6		%		50-130	27-SEP-21
Perylene			103.9		%		60-130	27-SEP-21
Phenanthrene			89.7		%		60-130	27-SEP-21
Pyrene			90.3		%		60-130	27-SEP-21
1-Methylnaphthalene			82.5		%		60-130	27-SEP-21
WG3626733-6 IRM		**ALS PAH RM2**						
Acenaphthene			93.6		%		60-130	27-SEP-21
Acenaphthylene			107.4		%		60-130	27-SEP-21
Anthracene			116.1		%		60-130	27-SEP-21
Acridine			111.2		%		60-130	27-SEP-21
Benz(a)anthracene			106.0		%		60-130	27-SEP-21
Benzo(a)pyrene			102.6		%		60-130	27-SEP-21
Benzo(b&j)fluoranthene			101.7		%		60-130	27-SEP-21
Benzo(e)pyrene			96.6		%		60-130	27-SEP-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5603578								
WG3626733-6 IRM		**ALS PAH RM2**						
Benzo(g,h,i)perylene			95.0		%		60-130	27-SEP-21
Benzo(k)fluoranthene			87.8		%		60-130	27-SEP-21
Chrysene			102.8		%		60-130	27-SEP-21
Dibenz(a,h)anthracene			96.7		%		60-130	27-SEP-21
Fluoranthene			92.5		%		60-130	27-SEP-21
Fluorene			98.4		%		60-130	27-SEP-21
Indeno(1,2,3-c,d)pyrene			69.6		%		60-130	27-SEP-21
2-Methylnaphthalene			92.5		%		60-130	27-SEP-21
Naphthalene			86.2		%		50-130	27-SEP-21
Perylene			84.2		%		60-130	27-SEP-21
Phenanthrene			97.9		%		60-130	27-SEP-21
Pyrene			95.5		%		60-130	27-SEP-21
1-Methylnaphthalene			91.3		%		60-130	27-SEP-21
WG3626733-9 IRM		**ALS PAH RM2**						
Acenaphthene			87.0		%		60-130	28-SEP-21
Acenaphthylene			98.8		%		60-130	28-SEP-21
Anthracene			108.2		%		60-130	28-SEP-21
Acridine			106.5		%		60-130	28-SEP-21
Benz(a)anthracene			97.5		%		60-130	28-SEP-21
Benzo(a)pyrene			94.3		%		60-130	28-SEP-21
Benzo(b&j)fluoranthene			93.3		%		60-130	28-SEP-21
Benzo(e)pyrene			97.8		%		60-130	28-SEP-21
Benzo(g,h,i)perylene			87.6		%		60-130	28-SEP-21
Benzo(k)fluoranthene			89.4		%		60-130	28-SEP-21
Chrysene			93.8		%		60-130	28-SEP-21
Dibenz(a,h)anthracene			83.5		%		60-130	28-SEP-21
Fluoranthene			83.6		%		60-130	28-SEP-21
Fluorene			86.4		%		60-130	28-SEP-21
Indeno(1,2,3-c,d)pyrene			109.6		%		60-130	28-SEP-21
2-Methylnaphthalene			84.8		%		60-130	28-SEP-21
Naphthalene			82.3		%		50-130	28-SEP-21
Perylene			98.3		%		60-130	28-SEP-21
Phenanthrene			87.9		%		60-130	28-SEP-21
Pyrene			86.9		%		60-130	28-SEP-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5603578								
WG3626733-9 IRM		**ALS PAH RM2**						
1-Methylnaphthalene			83.4		%		60-130	28-SEP-21
WG3626733-3 LCS								
Acenaphthene			104.8		%		60-130	27-SEP-21
Acenaphthylene			101.8		%		60-130	27-SEP-21
Anthracene			110.1		%		60-130	27-SEP-21
Acridine			91.6		%		60-130	27-SEP-21
Benz(a)anthracene			115.1		%		60-130	27-SEP-21
Benzo(a)pyrene			105.5		%		60-130	27-SEP-21
Benzo(b&j)fluoranthene			109.0		%		60-130	27-SEP-21
Benzo(e)pyrene			112.1		%		60-130	27-SEP-21
Benzo(g,h,i)perylene			98.5		%		60-130	27-SEP-21
Benzo(k)fluoranthene			103.7		%		60-130	27-SEP-21
Chrysene			106.2		%		60-130	27-SEP-21
Dibenz(a,h)anthracene			95.6		%		60-130	27-SEP-21
Fluoranthene			104.3		%		60-130	27-SEP-21
Fluorene			105.0		%		60-130	27-SEP-21
Indeno(1,2,3-c,d)pyrene			100.6		%		60-130	27-SEP-21
2-Methylnaphthalene			107.0		%		60-130	27-SEP-21
Naphthalene			101.6		%		50-130	27-SEP-21
Perylene			99.6		%		60-130	27-SEP-21
Phenanthrene			110.2		%		60-130	27-SEP-21
Pyrene			105.5		%		60-130	27-SEP-21
1-Methylnaphthalene			107.9		%		60-130	27-SEP-21
Quinoline			86.7		%		60-130	27-SEP-21
WG3626733-5 LCS								
Acenaphthene			107.5		%		60-130	27-SEP-21
Acenaphthylene			104.6		%		60-130	27-SEP-21
Anthracene			114.7		%		60-130	27-SEP-21
Acridine			112.8		%		60-130	27-SEP-21
Benz(a)anthracene			119.5		%		60-130	27-SEP-21
Benzo(a)pyrene			110.0		%		60-130	27-SEP-21
Benzo(b&j)fluoranthene			111.3		%		60-130	27-SEP-21
Benzo(e)pyrene			118.1		%		60-130	27-SEP-21
Benzo(g,h,i)perylene			103.3		%		60-130	27-SEP-21
Benzo(k)fluoranthene			110.3		%		60-130	27-SEP-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5603578								
WG3626733-5 LCS								
Chrysene			112.7		%		60-130	27-SEP-21
Dibenz(a,h)anthracene			100.2		%		60-130	27-SEP-21
Fluoranthene			108.9		%		60-130	27-SEP-21
Fluorene			112.1		%		60-130	27-SEP-21
Indeno(1,2,3-c,d)pyrene			80.6		%		60-130	27-SEP-21
2-Methylnaphthalene			113.5		%		60-130	27-SEP-21
Naphthalene			106.5		%		50-130	27-SEP-21
Perylene			108.2		%		60-130	27-SEP-21
Phenanthrene			115.4		%		60-130	27-SEP-21
Pyrene			110.2		%		60-130	27-SEP-21
1-Methylnaphthalene			110.8		%		60-130	27-SEP-21
Quinoline			103.2		%		60-130	27-SEP-21
WG3626733-1 MB								
Acenaphthene			<0.0050		mg/kg		0.005	27-SEP-21
Acenaphthylene			<0.0050		mg/kg		0.005	27-SEP-21
Anthracene			<0.0040		mg/kg		0.004	27-SEP-21
Acridine			<0.010		mg/kg		0.01	27-SEP-21
Benz(a)anthracene			<0.010		mg/kg		0.01	27-SEP-21
Benzo(a)pyrene			<0.010		mg/kg		0.01	27-SEP-21
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	27-SEP-21
Benzo(e)pyrene			<0.010		mg/kg		0.01	27-SEP-21
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	27-SEP-21
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	27-SEP-21
Chrysene			<0.010		mg/kg		0.01	27-SEP-21
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	27-SEP-21
Fluoranthene			<0.010		mg/kg		0.01	27-SEP-21
Fluorene			<0.010		mg/kg		0.01	27-SEP-21
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	27-SEP-21
2-Methylnaphthalene			<0.010		mg/kg		0.01	27-SEP-21
Naphthalene			<0.010		mg/kg		0.01	27-SEP-21
Perylene			<0.010		mg/kg		0.01	27-SEP-21
Phenanthrene			<0.010		mg/kg		0.01	27-SEP-21
Pyrene			<0.010		mg/kg		0.01	27-SEP-21
1-Methylnaphthalene			<0.050		mg/kg		0.05	27-SEP-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5603578								
WG3626733-1 MB								
Quinoline			<0.050		mg/kg		0.05	27-SEP-21
Surrogate: d8-Naphthalene			84.6		%		50-130	27-SEP-21
Surrogate: d10-Acenaphthene			89.8		%		60-130	27-SEP-21
Surrogate: d10-Phenanthrene			91.4		%		60-130	27-SEP-21
Surrogate: d12-Chrysene			93.8		%		60-130	27-SEP-21
WG3626733-10 MB								
Acenaphthene			<0.0050		mg/kg		0.005	28-SEP-21
Acenaphthylene			<0.0050		mg/kg		0.005	28-SEP-21
Anthracene			<0.0040		mg/kg		0.004	28-SEP-21
Acridine			<0.010		mg/kg		0.01	28-SEP-21
Benz(a)anthracene			<0.010		mg/kg		0.01	28-SEP-21
Benzo(a)pyrene			<0.010		mg/kg		0.01	28-SEP-21
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	28-SEP-21
Benzo(e)pyrene			<0.010		mg/kg		0.01	28-SEP-21
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	28-SEP-21
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	28-SEP-21
Chrysene			<0.010		mg/kg		0.01	28-SEP-21
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	28-SEP-21
Fluoranthene			<0.010		mg/kg		0.01	28-SEP-21
Fluorene			<0.010		mg/kg		0.01	28-SEP-21
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	28-SEP-21
2-Methylnaphthalene			<0.010		mg/kg		0.01	28-SEP-21
Naphthalene			<0.010		mg/kg		0.01	28-SEP-21
Perylene			<0.010		mg/kg		0.01	28-SEP-21
Phenanthrene			<0.010		mg/kg		0.01	28-SEP-21
Pyrene			<0.010		mg/kg		0.01	28-SEP-21
1-Methylnaphthalene			<0.050		mg/kg		0.05	28-SEP-21
Quinoline			<0.050		mg/kg		0.05	28-SEP-21
Surrogate: d8-Naphthalene			82.5		%		50-130	28-SEP-21
Surrogate: d10-Acenaphthene			94.5		%		60-130	28-SEP-21
Surrogate: d10-Phenanthrene			95.0		%		60-130	28-SEP-21
Surrogate: d12-Chrysene			99.1		%		60-130	28-SEP-21
WG3626733-7 MB								
Acenaphthene			<0.0050		mg/kg		0.005	27-SEP-21
Acenaphthylene			<0.0050		mg/kg		0.005	27-SEP-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5603578								
WG3626733-7 MB								
Anthracene			<0.0040		mg/kg		0.004	27-SEP-21
Acridine			<0.010		mg/kg		0.01	27-SEP-21
Benz(a)anthracene			<0.010		mg/kg		0.01	27-SEP-21
Benzo(a)pyrene			<0.010		mg/kg		0.01	27-SEP-21
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	27-SEP-21
Benzo(e)pyrene			<0.010		mg/kg		0.01	27-SEP-21
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	27-SEP-21
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	27-SEP-21
Chrysene			<0.010		mg/kg		0.01	27-SEP-21
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	27-SEP-21
Fluoranthene			<0.010		mg/kg		0.01	27-SEP-21
Fluorene			<0.010		mg/kg		0.01	27-SEP-21
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	27-SEP-21
2-Methylnaphthalene			<0.010		mg/kg		0.01	27-SEP-21
Naphthalene			<0.010		mg/kg		0.01	27-SEP-21
Perylene			<0.010		mg/kg		0.01	27-SEP-21
Phenanthrene			<0.010		mg/kg		0.01	27-SEP-21
Pyrene			<0.010		mg/kg		0.01	27-SEP-21
1-Methylnaphthalene			<0.050		mg/kg		0.05	27-SEP-21
Quinoline			<0.050		mg/kg		0.05	27-SEP-21
Surrogate: d8-Naphthalene			85.4		%		50-130	27-SEP-21
Surrogate: d10-Acenaphthene			94.6		%		60-130	27-SEP-21
Surrogate: d10-Phenanthrene			98.6		%		60-130	27-SEP-21
Surrogate: d12-Chrysene			102.3		%		60-130	27-SEP-21
PH-1:2-CL	**Soil**							
Batch R5604712								
WG3627849-5 IRM		**SAL-STD11**						
pH (1:2 soil:water)			7.99		pH		7.7-8.3	29-SEP-21
WG3627849-4 LCS								
pH (1:2 soil:water)			7.00		pH		6.8-7.2	29-SEP-21
PSA-PIPET-DETAIL-SK	**Soil**							
Batch R5602040								
WG3622187-2 IRM		**2020-PSA_SOIL**						
% Sand (2.00mm - 1.00mm)			2.3		%		0-7.2	27-SEP-21
% Sand (1.00mm - 0.50mm)			2.9		%		0-8.7	27-SEP-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PSA-PIPET-DETAIL-SK	**Soil**							
Batch R5602040								
WG3622187-2 IRM		**2020-PSA_SOIL**						
% Sand (0.50mm - 0.25mm)			8.9		%		4-14	27-SEP-21
% Sand (0.25mm - 0.125mm)			16.6		%		11.7-21.7	27-SEP-21
% Sand (0.125mm - 0.063mm)			13.4		%		8.4-18.4	27-SEP-21
% Silt (0.063mm - 0.0312mm)			13.4		%		8.5-18.5	27-SEP-21
% Silt (0.0312mm - 0.004mm)			21.1		%		15.1-25.1	27-SEP-21
% Clay (<4um)			21.4		%		16.5-26.5	27-SEP-21

Quality Control Report

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:

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

Page 1 of 1

COC ID:	September EVO LAEMP 2021	TURNAROUND TIME:

PROJECT/CLIENT INFO

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L2641269-COFC

SAMPLE DETAILS / ANALYSIS REQUESTED

Sample ID	Sample Location	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
Filtered								N	N	N	N	N
Preserved								NONE	NONE	NONE	NONE	NONE
RG_MICOMP_SE-1_2021-09-13_0945	RG_MICOMP	SE	No	9/13/2021	945	G	2	X	X	X	X	X
RG_MICOMP_SE-2_2021-09-13_1045	RG_MICOMP	SE	No	9/13/2021	1045	G	2	X	X	X	X	X
RG_MICOMP_SE-3_2021-09-13_1215	RG_MICOMP	SE	No	9/13/2021	1215	G	2	X	X	X	X	X
RG_MICOMP_SE-4_2021-09-13_1415	RG_MICOMP	SE	No	9/13/2021	1415	G	2	X	X	X	X	X
RG_MICOMP_SE-5_2021-09-13_1545	RG_MICOMP	SE	No	9/13/2021	1545	G	2	X	X	X	X	X
RG_RIVER_SE_2021-09-13_1045	RG_RIVER	SE	No	9/13/2021	1045	G	2	X	X	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

ALS PO 750546

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	
Jennifer Ings/Minnow	################		9/16 1030

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	Jennifer Ings	Mobile #	519-500-3444
Sampler's Signature		Date/Time	September 15, 2021

6

SEDIMENT CHEMISTRY

ALS Laboratory Report L2641071

(Finalized October 11, 2021)

Teck Coal Ltd.
ATTN: Allie Ferguson
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 14-SEP-21
Report Date: 11-OCT-21 18:05 (MT)
Version: FINAL REV. 3

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2641071

Project P.O. #: VPO00750546
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: September EVO LAEMP
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2641071-1	L2641071-2	L2641071-3	L2641071-4	L2641071-5
	Description	SE	SE	SE	SE	SE
	Sampled Date	09-SEP-21	09-SEP-21	09-SEP-21	09-SEP-21	09-SEP-21
	Sampled Time	11:30	15:40	16:00	16:00	16:15
	Client ID	RG_MIDER_SE-1_2021-09-09_1130	RG_MIDER_SE-2_2021-09-09_1540	RG_MIDER_SE-3_2021-09-09_1600	RG_MIDER_SE-4_2021-09-09_1600	RG_MIDER_SE-5_2021-09-09_1615
SOIL						
Physical Tests	Moisture (%)	74.1	64.0	75.9	68.9	73.5
	pH (1:2 soil:water) (pH)	7.15	7.21	7.30	7.52	7.53
Particle Size	% Gravel (>2mm) (%)	15.2 PSAL	<1.0 PSAL	3.8 PSAL	<1.0 PSAL	1.2 PSAL
	% Sand (2.00mm - 1.00mm) (%)	15.6 PSAL	1.7 PSAL	2.9 PSAL	3.7 PSAL	5.4 PSAL
	% Sand (1.00mm - 0.50mm) (%)	15.2 PSAL	3.2 PSAL	3.9 PSAL	13.4 PSAL	12.1 PSAL
	% Sand (0.50mm - 0.25mm) (%)	9.9 PSAL	9.4 PSAL	11.4 PSAL	13.0 PSAL	9.3 PSAL
	% Sand (0.25mm - 0.125mm) (%)	7.6 PSAL	6.4 PSAL	10.0 PSAL	6.8 PSAL	5.3 PSAL
	% Sand (0.125mm - 0.063mm) (%)	7.4 PSAL	8.5 PSAL	11.7 PSAL	8.5 PSAL	6.1 PSAL
	% Silt (0.063mm - 0.0312mm) (%)	12.3 PSAL	29.1 PSAL	23.9 PSAL	22.0 PSAL	25.5 PSAL
	% Silt (0.0312mm - 0.004mm) (%)	14.0 PSAL	34.0 PSAL	27.2 PSAL	26.5 PSAL	29.5 PSAL
	% Clay (<4um) (%)	2.9 PSAL	7.7 PSAL	5.3 PSAL	5.5 PSAL	5.5 PSAL
	Texture	Sandy loam	Silt loam	Silt loam	Sandy loam	Silt loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	3.14	6.68	3.94	3.70	4.97
Metals	Aluminum (Al) (mg/kg)	6100	6350	7510	7580	5650
	Antimony (Sb) (mg/kg)	0.88	1.07	0.74	0.76	0.81
	Arsenic (As) (mg/kg)	6.49	8.44	9.64	5.65	5.95
	Barium (Ba) (mg/kg)	193	207	262	225	183
	Beryllium (Be) (mg/kg)	0.49	0.52	0.56	0.56	0.52
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	6.3	6.0	8.8	8.6	6.4
	Cadmium (Cd) (mg/kg)	1.37	1.38	1.64	1.40	1.24
	Calcium (Ca) (mg/kg)	39400	38500	47200	36900	41200
	Chromium (Cr) (mg/kg)	13.5	15.7	15.0	14.8	12.4
	Cobalt (Co) (mg/kg)	6.72	7.18	8.84	7.32	7.11
	Copper (Cu) (mg/kg)	12.4	12.9	13.7	12.4	11.6
	Iron (Fe) (mg/kg)	15500	14500	14400	14300	13600
	Lead (Pb) (mg/kg)	8.54	8.87	9.36	9.85	8.72
	Lithium (Li) (mg/kg)	7.3	7.3	8.7	9.0	8.0
	Magnesium (Mg) (mg/kg)	5880	6440	6510	5870	5410
	Manganese (Mn) (mg/kg)	258	267	344	272	271
	Mercury (Hg) (mg/kg)	0.0502	0.0455	0.0525	0.0480	0.0363
	Molybdenum (Mo) (mg/kg)	1.61	2.61	1.44	1.40	1.55
	Nickel (Ni) (mg/kg)	29.2	30.9	35.9	30.9	29.3
	Phosphorus (P) (mg/kg)	1230	1160	1180	1210	1100
	Potassium (K) (mg/kg)	1220	1280	1560	1660	1120
	Selenium (Se) (mg/kg)	1.43	1.36	1.95	1.70	1.78
	Silver (Ag) (mg/kg)	0.17	0.29	0.21	0.19	0.16

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2641071-6	L2641071-7	L2641071-8	L2641071-9	L2641071-10
	Description	SE	SE	SE	SE	SE
	Sampled Date	10-SEP-21	10-SEP-21	10-SEP-21	10-SEP-21	10-SEP-21
	Sampled Time	10:00	10:10	10:20	10:30	10:40
	Client ID	RG_ERCK_1_SE-1_2021-09-10_1000	RG_ERCK_1_SE-2_2021-09-10_1010	RG_ERCK_1_SE-3_2021-09-10_1020	RG_ERCK_1_SE-4_2021-09-10_1030	RG_ERCK_1_SE-5_2021-09-10_1040
SOIL						
Physical Tests	Moisture (%)	61.3	44.8	55.4	40.8	47.1
	pH (1:2 soil:water) (pH)	6.95	7.44	7.12	7.55	7.42
Particle Size	% Gravel (>2mm) (%)	4.7 PSAL	2.0	3.3 PSAL	<1.0	<1.0
	% Sand (2.00mm - 1.00mm) (%)	7.4 PSAL	2.9	5.6 PSAL	<1.0	1.1
	% Sand (1.00mm - 0.50mm) (%)	8.2 PSAL	5.9	7.3 PSAL	1.3	5.0
	% Sand (0.50mm - 0.25mm) (%)	15.6 PSAL	19.4	21.8 PSAL	20.8	20.2
	% Sand (0.25mm - 0.125mm) (%)	27.3 PSAL	30.6	30.4 PSAL	36.5	19.5
	% Sand (0.125mm - 0.063mm) (%)	13.9 PSAL	13.8	11.1 PSAL	15.4	12.4
	% Silt (0.063mm - 0.0312mm) (%)	11.1 PSAL	11.7	9.4 PSAL	12.0	17.8
	% Silt (0.0312mm - 0.004mm) (%)	10.0 PSAL	11.4	9.2 PSAL	11.1	19.6
	% Clay (<4um) (%)	1.7 PSAL	2.2	1.9 PSAL	2.3	3.5
	Texture	Loamy sand	Loamy sand	Loamy sand	Loamy sand	Sandy loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	2.4	2.1	2.2	2.33	4.58
Metals	Aluminum (Al) (mg/kg)	4360	3550	1360	6550	5920
	Antimony (Sb) (mg/kg)	0.49	0.42	0.19	0.76	0.56
	Arsenic (As) (mg/kg)	3.77	3.63	1.47	6.23	5.35
	Barium (Ba) (mg/kg)	127	109	81.2	129	126
	Beryllium (Be) (mg/kg)	0.32	0.30	0.12	0.54	0.43
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	5.5	<5.0	<5.0	6.1	5.9
	Cadmium (Cd) (mg/kg)	0.651	0.571	0.320	0.839	0.791
	Calcium (Ca) (mg/kg)	123000	103000	149000	48000	59200
	Chromium (Cr) (mg/kg)	8.66	7.11	2.81	11.6	10.9
	Cobalt (Co) (mg/kg)	11.0	18.2	28.3	12.8	17.3
	Copper (Cu) (mg/kg)	7.37	7.02	2.67	10.8	10.7
	Iron (Fe) (mg/kg)	9180	7680	3540	13000	13000
	Lead (Pb) (mg/kg)	5.96	5.54	2.03	8.68	7.77
	Lithium (Li) (mg/kg)	6.2	5.2	2.5	8.9	7.5
	Magnesium (Mg) (mg/kg)	5760	4910	3600	6160	7020
	Manganese (Mn) (mg/kg)	188	401	643	346	399
	Mercury (Hg) (mg/kg)	0.0191	0.0225	<0.0050 RRV	0.0412	0.0335
	Molybdenum (Mo) (mg/kg)	1.35	1.00	0.62	1.72	1.58
	Nickel (Ni) (mg/kg)	37.0	51.8	52.2	45.8	54.4
	Phosphorus (P) (mg/kg)	869	782	337	1030	942
	Potassium (K) (mg/kg)	1160	890	400	1430	1300
	Selenium (Se) (mg/kg)	8.18	1.90	1.58	1.72	1.51
	Silver (Ag) (mg/kg)	<0.10	<0.10	<0.10	0.16	0.14

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2641071-11	L2641071-12	L2641071-13	L2641071-14	L2641071-15
	Description	SE	SE	SE	SE	SE
	Sampled Date	12-SEP-21	12-SEP-21	12-SEP-21	12-SEP-21	12-SEP-21
	Sampled Time	10:00	11:10	13:00	15:00	14:30
	Client ID	RG_ALUSM_SE-1_2021-09-12_1000	RG_ALUSM_SE-2_2021-09-12_1110	RG_ALUSM_SE-3_2021-09-12_1300	RG_MI3_SE-1_2021-09-10_1500	RG_MI3_SE-2_2021-09-12_1430
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	34.1	65.0	82.7	31.8	53.3
	pH (1:2 soil:water) (pH)	7.63	7.26	7.32	7.56	7.30
Particle Size	% Gravel (>2mm) (%)	1.7	19.4 PSAL	8.5 PSAL	6.8	8.4 PSAL
	% Sand (2.00mm - 1.00mm) (%)	4.5	3.2 PSAL	<1.0 PSAL	4.8	4.0 PSAL
	% Sand (1.00mm - 0.50mm) (%)	10.9	<1.0 PSAL	<1.0 PSAL	20.2	7.5 PSAL
	% Sand (0.50mm - 0.25mm) (%)	19.1	1.3 PSAL	1.3 PSAL	37.7	16.0 PSAL
	% Sand (0.25mm - 0.125mm) (%)	16.9	5.7 PSAL	4.0 PSAL	17.4	19.1 PSAL
	% Sand (0.125mm - 0.063mm) (%)	11.5	11.5 PSAL	7.7 PSAL	4.4	12.5 PSAL
	% Silt (0.063mm - 0.0312mm) (%)	15.1	25.7 PSAL	32.2 PSAL	3.7	14.9 PSAL
	% Silt (0.0312mm - 0.004mm) (%)	16.4	28.0 PSAL	39.1 PSAL	3.9	15.0 PSAL
	% Clay (<4um) (%)	3.8	4.3 PSAL	6.6 PSAL	1.1	2.6 PSAL
	Texture	Sandy loam	Silt loam	Silt loam	Sand	Sandy loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	2.23	5.89	7.50	1.13	2.56
Metals	Aluminum (Al) (mg/kg)	9240	7250	7260	7460	7230
	Antimony (Sb) (mg/kg)	0.40	0.36	0.60	1.05	0.89
	Arsenic (As) (mg/kg)	7.23	4.30	6.75	9.30	7.86
	Barium (Ba) (mg/kg)	149	149	177	205	220
	Beryllium (Be) (mg/kg)	0.60	0.50	0.54	0.60	0.51
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	8.5	7.2	7.4	6.2	6.3
	Cadmium (Cd) (mg/kg)	0.505	0.731	0.972	1.17	1.10
	Calcium (Ca) (mg/kg)	28800	34000	41000	38300	28500
	Chromium (Cr) (mg/kg)	13.8	13.6	14.9	14.6	16.7
	Cobalt (Co) (mg/kg)	5.61	5.12	6.18	5.83	5.85
	Copper (Cu) (mg/kg)	12.8	12.0	14.6	12.8	10.9
	Iron (Fe) (mg/kg)	19900	13800	17800	20400	14600
	Lead (Pb) (mg/kg)	10.9	10.2	11.3	9.13	8.82
	Lithium (Li) (mg/kg)	14.3	10.8	10.9	8.4	7.5
	Magnesium (Mg) (mg/kg)	8450	9590	9250	6810	4920
	Manganese (Mn) (mg/kg)	137	222	388	280	213
	Mercury (Hg) (mg/kg)	0.0252	0.0393	0.0467	0.0262	0.0458
	Molybdenum (Mo) (mg/kg)	1.71	1.01	1.58	2.02	1.73
	Nickel (Ni) (mg/kg)	18.4	18.7	21.9	23.7	25.9
	Phosphorus (P) (mg/kg)	1020	1040	1200	1360	1130
	Potassium (K) (mg/kg)	2090	1520	1460	1670	1600
	Selenium (Se) (mg/kg)	0.55	1.51	1.98	0.64	1.00
	Silver (Ag) (mg/kg)	<0.10	0.13	0.16	0.16	0.16

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2641071-16	L2641071-17			
	Description	SE	SE			
	Sampled Date	12-SEP-21	12-SEP-21			
	Sampled Time	14:40	14:40			
	Client ID	RG_MI3_SE-3_2021-09-12_1440	RG_RIVER_SE-4_2021-09-12_1440			
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	44.5	45.2			
	pH (1:2 soil:water) (pH)	7.33	7.32			
Particle Size	% Gravel (>2mm) (%)	4.3 PSAL	1.9 PSAL			
	% Sand (2.00mm - 1.00mm) (%)	3.3 PSAL	2.0 PSAL			
	% Sand (1.00mm - 0.50mm) (%)	7.3 PSAL	3.4 PSAL			
	% Sand (0.50mm - 0.25mm) (%)	8.3 PSAL	5.9 PSAL			
	% Sand (0.25mm - 0.125mm) (%)	16.6 PSAL	17.7 PSAL			
	% Sand (0.125mm - 0.063mm) (%)	23.2 PSAL	26.2 PSAL			
	% Silt (0.063mm - 0.0312mm) (%)	18.4 PSAL	21.3 PSAL			
	% Silt (0.0312mm - 0.004mm) (%)	16.2 PSAL	18.8 PSAL			
	% Clay (<4um) (%)	2.4 PSAL	2.8 PSAL			
	Texture	Sandy loam	Sandy loam			
Organic / Inorganic Carbon	Total Organic Carbon (%)	3.22	5.81			
Metals	Aluminum (Al) (mg/kg)	7920	7900			
	Antimony (Sb) (mg/kg)	0.84	0.86			
	Arsenic (As) (mg/kg)	6.18	6.03			
	Barium (Ba) (mg/kg)	219	247			
	Beryllium (Be) (mg/kg)	0.58	0.57			
	Bismuth (Bi) (mg/kg)	<0.20	<0.20			
	Boron (B) (mg/kg)	6.5	6.4			
	Cadmium (Cd) (mg/kg)	1.40	1.46			
	Calcium (Ca) (mg/kg)	29100	29000			
	Chromium (Cr) (mg/kg)	15.7	16.2			
	Cobalt (Co) (mg/kg)	6.82	6.55			
	Copper (Cu) (mg/kg)	12.7	13.1			
	Iron (Fe) (mg/kg)	14300	14200			
	Lead (Pb) (mg/kg)	10.3	9.07			
	Lithium (Li) (mg/kg)	8.6	7.6			
	Magnesium (Mg) (mg/kg)	5400	5210			
	Manganese (Mn) (mg/kg)	215	233			
	Mercury (Hg) (mg/kg)	0.0385	0.0640			
	Molybdenum (Mo) (mg/kg)	1.39	1.51			
	Nickel (Ni) (mg/kg)	28.0	27.4			
	Phosphorus (P) (mg/kg)	1150	1260			
	Potassium (K) (mg/kg)	1670	1720			
	Selenium (Se) (mg/kg)	1.08	1.18			
	Silver (Ag) (mg/kg)	0.18	0.18			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2641071-1	L2641071-2	L2641071-3	L2641071-4	L2641071-5
	Description	SE	SE	SE	SE	SE
	Sampled Date	09-SEP-21	09-SEP-21	09-SEP-21	09-SEP-21	09-SEP-21
	Sampled Time	11:30	15:40	16:00	16:00	16:15
	Client ID	RG_MIDER_SE-1_2021-09-09_1130	RG_MIDER_SE-2_2021-09-09_1540	RG_MIDER_SE-3_2021-09-09_1600	RG_MIDER_SE-4_2021-09-09_1600	RG_MIDER_SE-5_2021-09-09_1615
Grouping	**Analyte**					
SOIL						
Metals	Sodium (Na) (mg/kg)	82	82	117	93	92
	Strontium (Sr) (mg/kg)	66.5	64.0	76.9	68.3	66.3
	Sulfur (S) (mg/kg)	<1000	<1000	<1000	<1000	<1000
	Thallium (Tl) (mg/kg)	0.222	0.212	0.271	0.263	0.216
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	28.8	32.4	31.2	34.8	22.1
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	0.983	1.00	0.997	1.04	1.00
	Vanadium (V) (mg/kg)	31.6	33.6	33.2	34.6	27.9
	Zinc (Zn) (mg/kg)	94.7	103	109	99.9	93.4
	Zirconium (Zr) (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	DLHM <0.010	DLHM <0.010	DLHM 0.011	DLHM 0.011	DLHM <0.010
	Acenaphthylene (mg/kg)	DLHM <0.010	DLHM <0.010	DLHM <0.010	DLHM <0.010	DLHM <0.010
	Acridine (mg/kg)	DLHM <0.020	DLHM <0.020	DLHM <0.020	DLHM <0.020	DLHM <0.020
	Anthracene (mg/kg)	DLHM <0.0080	DLHM <0.0080	DLHM <0.0080	DLHM <0.0080	DLHM <0.0080
	Benz(a)anthracene (mg/kg)	DLHM 0.022	DLHM <0.020	DLHM 0.028	DLHM <0.020	DLHM <0.020
	Benzo(a)pyrene (mg/kg)	DLHM <0.020	DLHM <0.020	DLHM <0.020	DLHM <0.020	DLHM <0.020
	Benzo(b&j)fluoranthene (mg/kg)	DLHM 0.039	DLHM 0.022	DLHM 0.049	DLHM 0.029	DLHM 0.026
	Benzo(b+j+k)fluoranthene (mg/kg)	0.039	<0.028	0.049	0.029	<0.028
	Benzo(e)pyrene (mg/kg)	DLHM 0.041	DLHM <0.020	DLHM 0.043	DLHM 0.029	DLHM 0.025
	Benzo(g,h,i)perylene (mg/kg)	DLHM <0.020	DLHM <0.020	DLHM <0.020	DLHM <0.020	DLHM <0.020
	Benzo(k)fluoranthene (mg/kg)	DLHM <0.020	DLHM <0.020	DLHM <0.020	DLHM <0.020	DLHM <0.020
	Chrysene (mg/kg)	DLHM 0.078	DLHM 0.038	DLHM 0.095	DLHM 0.063	DLHM 0.045
	Dibenz(a,h)anthracene (mg/kg)	DLHM <0.010	DLHM <0.010	DLHM <0.010	DLHM <0.010	DLHM <0.010
	Fluoranthene (mg/kg)	DLHM 0.041	DLHM 0.022	DLHM 0.049	DLHM 0.034	DLHM 0.030
	Fluorene (mg/kg)	DLHM 0.025	DLHM <0.020	DLHM 0.022	DLHM <0.020	DLHM <0.020
	Indeno(1,2,3-c,d)pyrene (mg/kg)	DLHM <0.020	DLHM <0.020	DLHM <0.020	DLHM <0.020	DLHM <0.020
	1-Methylnaphthalene (mg/kg)	DLHM 0.107	DLHM 0.048	DLHM 0.115	DLHM 0.074	DLHM 0.052
	2-Methylnaphthalene (mg/kg)	DLHM 0.132	DLHM 0.065	DLHM 0.139	DLHM 0.098	DLHM 0.087
	Naphthalene (mg/kg)	DLHM 0.062	DLHM 0.030	DLHM 0.054	DLHM 0.039	DLHM 0.035
	Perylene (mg/kg)	DLHM <0.020	DLHM <0.020	DLHM <0.020	DLHM <0.020	DLHM <0.020
	Phenanthrene (mg/kg)	DLHM 0.211	DLHM 0.096	DLHM 0.227	DLHM 0.148	DLHM 0.125
	Pyrene (mg/kg)	DLHM 0.045	DLHM 0.021	DLHM 0.051	DLHM 0.031	DLHM 0.030
	Quinoline (mg/kg)	DLHM <0.020	DLHM <0.020	DLHM <0.020	DLHM <0.020	DLHM <0.020
	Surrogate: d10-Acenaphthene (%)	87.4	79.2	81.3	82.2	84.7
	Surrogate: d12-Chrysene (%)	100.7	90.4	96.2	95.1	97.9

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2641071-6	L2641071-7	L2641071-8	L2641071-9	L2641071-10
	Description	SE	SE	SE	SE	SE
	Sampled Date	10-SEP-21	10-SEP-21	10-SEP-21	10-SEP-21	10-SEP-21
	Sampled Time	10:00	10:10	10:20	10:30	10:40
	Client ID	RG_ERCK_1_SE-1_2021-09-10_1000	RG_ERCK_1_SE-2_2021-09-10_1010	RG_ERCK_1_SE-3_2021-09-10_1020	RG_ERCK_1_SE-4_2021-09-10_1030	RG_ERCK_1_SE-5_2021-09-10_1040
SOIL						
Metals	Sodium (Na) (mg/kg)	94	71	72	80	84
	Strontium (Sr) (mg/kg)	84.1	72.2	86.0	66.5	76.1
	Sulfur (S) (mg/kg)	3100	1900	2900	<1000	1000
	Thallium (Tl) (mg/kg)	0.162	0.216	0.102	0.252	0.230
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	27.3	23.0	8.8	29.2	23.1
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	1.68	1.27	1.20	1.19	1.03
	Vanadium (V) (mg/kg)	21.6	17.3	6.73	29.9	25.4
	Zinc (Zn) (mg/kg)	58.4	47.3	23.0	75.0	70.7
	Zirconium (Zr) (mg/kg)	<1.0	1.1	<1.0	1.2	1.1
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	0.0064	<0.0050	<0.0050	<0.0050	<0.0050
	Acenaphthylene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Acridine (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Anthracene (mg/kg)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Benz(a)anthracene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(b&j)fluoranthene (mg/kg)	0.023	0.012	<0.010	0.017	0.018
	Benzo(b+j+k)fluoranthene (mg/kg)	0.023	<0.015	<0.015	0.017	0.018
	Benzo(e)pyrene (mg/kg)	0.021	0.013	<0.010	0.018	0.018
	Benzo(g,h,i)perylene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Chrysene (mg/kg)	0.036	0.021	<0.010	0.038	0.039
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Fluoranthene (mg/kg)	0.017	0.011	<0.010	0.013	0.011
	Fluorene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	1-Methylnaphthalene (mg/kg)	<0.050	<0.050	<0.050	0.052	0.053
	2-Methylnaphthalene (mg/kg)	0.046	0.050	0.042	0.065	0.071
	Naphthalene (mg/kg)	0.028	0.024	0.023	0.030	0.029
	Perylene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Phenanthrene (mg/kg)	0.098	0.076	0.040	0.101	0.100
	Pyrene (mg/kg)	0.016	0.012	<0.010	0.016	0.016
	Quinoline (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Surrogate: d10-Acenaphthene (%)	100.4	79.4	85.9	84.0	83.0
	Surrogate: d12-Chrysene (%)	110.2	90.3	97.4	94.4	94.5

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2641071-11	L2641071-12	L2641071-13	L2641071-14	L2641071-15
	Description	SE	SE	SE	SE	SE
	Sampled Date	12-SEP-21	12-SEP-21	12-SEP-21	12-SEP-21	12-SEP-21
	Sampled Time	10:00	11:10	13:00	15:00	14:30
	Client ID	RG_ALUSM_SE-1_2021-09-12_1000	RG_ALUSM_SE-2_2021-09-12_1110	RG_ALUSM_SE-3_2021-09-12_1300	RG_MI3_SE-1_2021-09-10_1500	RG_MI3_SE-2_2021-09-12_1430
Grouping	**Analyte**					
SOIL						
Metals	Sodium (Na) (mg/kg)	177	100	100	80	73
	Strontium (Sr) (mg/kg)	66.4	45.7	59.5	71.1	62.9
	Sulfur (S) (mg/kg)	<1000	<1000	<1000	<1000	<1000
	Thallium (Tl) (mg/kg)	0.216	0.224	0.228	0.215	0.231
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	17.6	16.5	20.9	35.8	38.2
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	0.661	0.754	0.996	1.13	1.05
	Vanadium (V) (mg/kg)	23.3	18.5	23.7	41.3	38.9
	Zinc (Zn) (mg/kg)	85.9	89.4	103	97.5	90.2
	Zirconium (Zr) (mg/kg)	1.2	1.1	1.3	1.5	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0050	<0.0075 DLHM	<0.013 DLHM	<0.010 DLCI	<0.0050
	Acenaphthylene (mg/kg)	<0.0050	0.0153 DLHM	<0.013 DLHM	0.0051	<0.0050
	Acridine (mg/kg)	<0.010	<0.015 DLHM	<0.025 DLHM	<0.010	0.012
	Anthracene (mg/kg)	<0.0040	<0.0060 DLHM	0.010 DLHM	<0.0040	<0.0040
	Benz(a)anthracene (mg/kg)	<0.010	0.034 DLHM	0.091 DLHM	0.068	0.032
	Benzo(a)pyrene (mg/kg)	<0.010	<0.015 DLHM	<0.025 DLHM	<0.010	<0.010
	Benzo(b&j)fluoranthene (mg/kg)	<0.010	0.033 DLHM	0.067 DLHM	0.039	0.026
	Benzo(b+j+k)fluoranthene (mg/kg)	<0.015	0.033	0.067	0.039	0.026
	Benzo(e)pyrene (mg/kg)	<0.010	0.031 DLHM	0.052 DLHM	0.045	0.029
	Benzo(g,h,i)perylene (mg/kg)	<0.010	<0.015 DLHM	<0.025 DLHM	0.016	<0.010
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.015 DLHM	<0.025 DLHM	<0.010	<0.010
	Chrysene (mg/kg)	0.018	0.039 DLHM	0.056 DLHM	0.047	0.031
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	<0.0075 DLHM	<0.013 DLHM	0.0061	<0.0050
	Fluoranthene (mg/kg)	<0.010	<0.015 DLHM	<0.025 DLHM	0.024	<0.030 DLCI
	Fluorene (mg/kg)	<0.010	<0.015 DLHM	<0.025 DLHM	<0.010	0.010
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.015 DLHM	<0.025 DLHM	<0.010	<0.010
	1-Methylnaphthalene (mg/kg)	<0.050	0.048 DLHM	0.094 DLHM	0.100	0.076
	2-Methylnaphthalene (mg/kg)	0.012	0.092 DLHM	0.176 DLHM	0.122	0.097
	Naphthalene (mg/kg)	<0.010	0.038 DLHM	0.074 DLHM	0.076	<0.040 DLCI
	Perylene (mg/kg)	<0.010	0.034 DLHM	0.061 DLHM	<0.010	<0.010
	Phenanthrene (mg/kg)	0.026	0.130 DLHM	0.234 DLHM	0.221	0.145
	Pyrene (mg/kg)	<0.010	0.018 DLHM	0.033 DLHM	0.029	<0.030 DLCI
	Quinoline (mg/kg)	<0.050	<0.015 DLHM	<0.025 DLHM	<0.050	<0.050
	Surrogate: d10-Acenaphthene (%)	79.5	110.4	105.0	78.0	87.0
	Surrogate: d12-Chrysene (%)	86.0	N/A SMI	n/a SMI	N/A SMI	110.0

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2641071-16	L2641071-17			
	Description	SE	SE			
	Sampled Date	12-SEP-21	12-SEP-21			
	Sampled Time	14:40	14:40			
	Client ID	RG_MI3_SE-3_2021-09-12_1440	RG_RIVER_SE-4_2021-09-12_1440			
Grouping	**Analyte**					
SOIL						
Metals	Sodium (Na) (mg/kg)	88	89			
	Strontium (Sr) (mg/kg)	61.7	71.8			
	Sulfur (S) (mg/kg)	<1000	<1000			
	Thallium (Tl) (mg/kg)	0.233	0.271			
	Tin (Sn) (mg/kg)	<2.0	<2.0			
	Titanium (Ti) (mg/kg)	40.3	37.9			
	Tungsten (W) (mg/kg)	<0.50	<0.50			
	Uranium (U) (mg/kg)	1.11	1.31			
	Vanadium (V) (mg/kg)	41.3	41.9			
	Zinc (Zn) (mg/kg)	96.9	96.4			
	Zirconium (Zr) (mg/kg)	1.1	1.1			
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	0.0173	DLCI <0.020			
	Acenaphthylene (mg/kg)	0.0052	0.0053			
	Acridine (mg/kg)	DLCI <0.020	DLCI <0.020			
	Anthracene (mg/kg)	<0.0040	0.0044			
	Benz(a)anthracene (mg/kg)	0.029	0.024			
	Benzo(a)pyrene (mg/kg)	0.015	<0.010			
	Benzo(b&j)fluoranthene (mg/kg)	0.052	0.040			
	Benzo(b+j+k)fluoranthene (mg/kg)	0.052	0.040			
	Benzo(e)pyrene (mg/kg)	0.057	0.048			
	Benzo(g,h,i)perylene (mg/kg)	0.017	0.013			
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010			
	Chrysene (mg/kg)	0.111	0.085			
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	<0.0050			
	Fluoranthene (mg/kg)	0.042	DLCI <0.040			
	Fluorene (mg/kg)	DLCI <0.030	DLCI <0.020			
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010			
	1-Methylnaphthalene (mg/kg)	0.294	0.215			
	2-Methylnaphthalene (mg/kg)	0.372	0.257			
	Naphthalene (mg/kg)	0.159	0.127			
	Perylene (mg/kg)	<0.010	<0.010			
	Phenanthrene (mg/kg)	0.370	0.330			
	Pyrene (mg/kg)	0.046	DLCI <0.040			
	Quinoline (mg/kg)	<0.050	<0.050			
	Surrogate: d10-Acenaphthene (%)	81.7	86.6			
	Surrogate: d12-Chrysene (%)	103.3	107.4			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2641071-1	L2641071-2	L2641071-3	L2641071-4	L2641071-5
	Description	SE	SE	SE	SE	SE
	Sampled Date	09-SEP-21	09-SEP-21	09-SEP-21	09-SEP-21	09-SEP-21
	Sampled Time	11:30	15:40	16:00	16:00	16:15
	Client ID	RG_MIDER_SE-1_2021-09-09_1130	RG_MIDER_SE-2_2021-09-09_1540	RG_MIDER_SE-3_2021-09-09_1600	RG_MIDER_SE-4_2021-09-09_1600	RG_MIDER_SE-5_2021-09-09_1615
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d8-Naphthalene (%)	83.3	70.8	78.7	78.1	79.1
	Surrogate: d10-Phenanthrene (%)	94.9	88.6	90.0	91.3	91.0
	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)	0.024	0.021	0.026	0.022	0.021
	IACR (CCME)	0.46	0.31	0.55	0.36	0.33

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2641071-6	L2641071-7	L2641071-8	L2641071-9	L2641071-10
	Description	SE	SE	SE	SE	SE
	Sampled Date	10-SEP-21	10-SEP-21	10-SEP-21	10-SEP-21	10-SEP-21
	Sampled Time	10:00	10:10	10:20	10:30	10:40
	Client ID	RG_ERCK_1_SE-1_2021-09-10_1000	RG_ERCK_1_SE-2_2021-09-10_1010	RG_ERCK_1_SE-3_2021-09-10_1020	RG_ERCK_1_SE-4_2021-09-10_1030	RG_ERCK_1_SE-5_2021-09-10_1040
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d8-Naphthalene (%)	94.7	75.5	79.4	78.8	79.4
	Surrogate: d10-Phenanthrene (%)	107.5	86.1	92.7	88.6	88.7
	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	<0.020	<0.020	<0.020
	IACR (CCME)	0.23	0.16	<0.15	0.20	0.20

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2641071-11	L2641071-12	L2641071-13	L2641071-14	L2641071-15
	Description	SE	SE	SE	SE	SE
	Sampled Date	12-SEP-21	12-SEP-21	12-SEP-21	12-SEP-21	12-SEP-21
	Sampled Time	10:00	11:10	13:00	15:00	14:30
	Client ID	RG_ALUSM_SE-1_2021-09-12_1000	RG_ALUSM_SE-2_2021-09-12_1110	RG_ALUSM_SE-3_2021-09-12_1300	RG_MI3_SE-1_2021-09-10_1500	RG_MI3_SE-2_2021-09-12_1430
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d8-Naphthalene (%)	74.3	105.8	98.0	120.5	84.6
	Surrogate: d10-Phenanthrene (%)	82.6	122.0	118.8	72.0	101.1
	IACR:Coarse	<0.050	<0.050	<0.050	<0.050	<0.050
	IACR:Fine	<0.050	<0.050	0.061	<0.050	<0.050
	B(a)P Total Potency Equivalent (mg/kg)	<0.020	<0.020	0.038	0.023	<0.020
	IACR (CCME)	<0.15	0.42	0.86	0.55	0.33

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2641071-16	L2641071-17			
	Description	SE	SE			
	Sampled Date	12-SEP-21	12-SEP-21			
	Sampled Time	14:40	14:40			
	Client ID	RG_MI3_SE-3_2021-09-12_1440	RG_RIVER_SE-4_2021-09-12_1440			
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d8-Naphthalene (%)	83.6	84.5			
	Surrogate: d10-Phenanthrene (%)	95.0	100.1			
	IACR:Coarse	<0.050	<0.050			
	IACR:Fine	<0.050	<0.050			
	B(a)P Total Potency Equivalent (mg/kg)	0.028	<0.020			
	IACR (CCME)	0.55	0.43			

* 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)

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 Particle Size Analysis (100g minimum is standard). Measurement Uncertainty for PSA results may be higher than usual.
RRV	Reported Result Verified By Repeat Analysis
SMI	Surrogate recovery could not be measured due to sample matrix interference.

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.

ALS Test Code	Matrix	Test Description	Method Reference**
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)

ALS Test Code	Matrix	Test Description	Method Reference**
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.

ALS Test Code	Matrix	Test Description	Method Reference**
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.

ALS Test Code	Matrix	Test Description	Method Reference**
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.

ALS Test Code	Matrix	Test Description	Method Reference**
MOISTURE-CL	Soil	% Moisture	CCME PHC in Soil - Tier 1 (mod)

This analysis is carried out gravimetrically by drying the sample at 105 C

ALS Test Code	Matrix	Test Description	Method Reference**
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.

ALS Test Code	Matrix	Test Description	Method Reference**
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.

ALS Test Code	Matrix	Test Description	Method Reference**
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

September EVO LAEMP

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: Allie Ferguson

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TIC-PCT-SK	**Soil**							
Batch R5598779								
WG3622526-1 DUP		**L2641071-4**						
Inorganic Carbon		1.24	1.22		%	2.1	20	24-SEP-21
WG3622526-4 IRM		**08-109_SOIL**						
Inorganic Carbon			93.0		%		80-120	24-SEP-21
WG3622526-2 LCS		**0.5**						
Inorganic Carbon			99.4		%		90-110	24-SEP-21
WG3622526-3 MB								
Inorganic Carbon			<0.050		%		0.05	24-SEP-21
Batch R5602038								
WG3622533-4 IRM		**08-109_SOIL**						
Inorganic Carbon			108.1		%		80-120	27-SEP-21
WG3622533-2 LCS		**0.5**						
Inorganic Carbon			95.1		%		90-110	27-SEP-21
WG3622533-3 MB								
Inorganic Carbon			<0.050		%		0.05	27-SEP-21
C-TOT-LECO-SK	**Soil**							
Batch R5599816								
WG3622193-1 DUP		**L2641071-7**						
Total Carbon by Combustion		6.42	6.64		%	3.3	20	23-SEP-21
WG3622193-2 IRM		**08-109_SOIL**						
Total Carbon by Combustion			104.9		%		80-120	23-SEP-21
WG3622193-4 LCS		**SULFADIAZINE**						
Total Carbon by Combustion			102.2		%		90-110	23-SEP-21
WG3622193-3 MB								
Total Carbon by Combustion			<0.05		%		0.05	23-SEP-21
HG-200.2-CVAA-CL	**Soil**							
Batch R5599684								
WG3624986-4 CRM		**TILL-2**						
Mercury (Hg)			114.9		%		70-130	25-SEP-21
WG3624986-5 DUP		**L2641071-1**						
Mercury (Hg)		0.0502	0.0530		mg/kg	5.5	40	25-SEP-21
WG3624986-3 LCS								
Mercury (Hg)			110.0		%		80-120	25-SEP-21
WG3624986-2 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	25-SEP-21
MET-200.2-CCMS-CL	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5599716								
WG3624986-4 CRM		**TILL-2**						
Aluminum (Al)			88.6		%		70-130	25-SEP-21
Antimony (Sb)			87.5		%		70-130	25-SEP-21
Arsenic (As)			96.2		%		70-130	25-SEP-21
Barium (Ba)			88.9		%		70-130	25-SEP-21
Beryllium (Be)			85.3		%		70-130	25-SEP-21
Bismuth (Bi)			98.8		%		70-130	25-SEP-21
Cadmium (Cd)			92.8		%		70-130	25-SEP-21
Calcium (Ca)			91.1		%		70-130	25-SEP-21
Chromium (Cr)			94.3		%		70-130	25-SEP-21
Cobalt (Co)			95.2		%		70-130	25-SEP-21
Copper (Cu)			93.6		%		70-130	25-SEP-21
Iron (Fe)			93.1		%		70-130	25-SEP-21
Lead (Pb)			97.8		%		70-130	25-SEP-21
Lithium (Li)			94.0		%		70-130	25-SEP-21
Magnesium (Mg)			92.3		%		70-130	25-SEP-21
Manganese (Mn)			91.3		%		70-130	25-SEP-21
Molybdenum (Mo)			94.0		%		70-130	25-SEP-21
Nickel (Ni)			96.6		%		70-130	25-SEP-21
Phosphorus (P)			87.6		%		70-130	25-SEP-21
Potassium (K)			90.3		%		70-130	25-SEP-21
Selenium (Se)			0.32		mg/kg		0.15-0.55	25-SEP-21
Silver (Ag)			0.26		mg/kg		0.16-0.36	25-SEP-21
Sodium (Na)			110.7		%		70-130	25-SEP-21
Strontium (Sr)			96.9		%		70-130	25-SEP-21
Thallium (Tl)			92.7		%		70-130	25-SEP-21
Tin (Sn)			2.1		mg/kg		0.2-4.2	25-SEP-21
Titanium (Ti)			88.9		%		70-130	25-SEP-21
Tungsten (W)			1.40		mg/kg		1-2	25-SEP-21
Uranium (U)			94.9		%		70-130	25-SEP-21
Vanadium (V)			93.5		%		70-130	25-SEP-21
Zinc (Zn)			90.6		%		70-130	25-SEP-21
Zirconium (Zr)			107.9		%		70-130	25-SEP-21
WG3624986-5 DUP		**L2641071-1**						
Aluminum (Al)		6100	6650		mg/kg	8.5	40	25-SEP-21

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5599716								
WG3624986-5 DUP		**L2641071-1**						
Antimony (Sb)		0.88	0.95		mg/kg	7.8	30	25-SEP-21
Arsenic (As)		6.49	7.01		mg/kg	7.7	30	25-SEP-21
Barium (Ba)		193	228		mg/kg	16	40	25-SEP-21
Beryllium (Be)		0.49	0.56		mg/kg	13	30	25-SEP-21
Bismuth (Bi)		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	25-SEP-21
Boron (B)		6.3	6.3		mg/kg	0.2	30	25-SEP-21
Cadmium (Cd)		1.37	1.53		mg/kg	11	30	25-SEP-21
Calcium (Ca)		39400	44700		mg/kg	13	30	25-SEP-21
Chromium (Cr)		13.5	15.2		mg/kg	11	30	25-SEP-21
Cobalt (Co)		6.72	7.46		mg/kg	10	30	25-SEP-21
Copper (Cu)		12.4	13.2		mg/kg	6.7	30	25-SEP-21
Iron (Fe)		15500	17100		mg/kg	9.7	30	25-SEP-21
Lead (Pb)		8.54	9.64		mg/kg	12	40	25-SEP-21
Lithium (Li)		7.3	7.8		mg/kg	5.9	30	25-SEP-21
Magnesium (Mg)		5880	6980		mg/kg	17	30	25-SEP-21
Manganese (Mn)		258	297		mg/kg	14	30	25-SEP-21
Molybdenum (Mo)		1.61	1.78		mg/kg	9.9	40	25-SEP-21
Nickel (Ni)		29.2	32.2		mg/kg	10	30	25-SEP-21
Phosphorus (P)		1230	1280		mg/kg	3.8	30	25-SEP-21
Potassium (K)		1220	1350		mg/kg	9.9	40	25-SEP-21
Selenium (Se)		1.43	1.60		mg/kg	11	30	25-SEP-21
Silver (Ag)		0.17	0.18		mg/kg	4.5	40	25-SEP-21
Sodium (Na)		82	92		mg/kg	12	40	25-SEP-21
Strontium (Sr)		66.5	76.4		mg/kg	14	40	25-SEP-21
Sulfur (S)		<1000	<1000	RPD-NA	mg/kg	N/A	30	25-SEP-21
Thallium (Tl)		0.222	0.242		mg/kg	8.8	30	25-SEP-21
Tin (Sn)		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	25-SEP-21
Titanium (Ti)		28.8	27.9		mg/kg	3.2	40	25-SEP-21
Tungsten (W)		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	25-SEP-21
Uranium (U)		0.983	1.06		mg/kg	7.3	30	25-SEP-21
Vanadium (V)		31.6	35.1		mg/kg	10	30	25-SEP-21
Zinc (Zn)		94.7	108		mg/kg	13	30	25-SEP-21
Zirconium (Zr)		<1.0	<1.0	RPD-NA	mg/kg	N/A	30	25-SEP-21
WG3624986-3 LCS								

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5599716								
WG3624986-3 LCS								
Aluminum (Al)			110.6		%		80-120	25-SEP-21
Antimony (Sb)			110.0		%		80-120	25-SEP-21
Arsenic (As)			111.5		%		80-120	25-SEP-21
Barium (Ba)			107.1		%		80-120	25-SEP-21
Beryllium (Be)			103.8		%		80-120	25-SEP-21
Bismuth (Bi)			106.6		%		80-120	25-SEP-21
Boron (B)			100.5		%		80-120	25-SEP-21
Cadmium (Cd)			111.7		%		80-120	25-SEP-21
Calcium (Ca)			105.3		%		80-120	25-SEP-21
Chromium (Cr)			112.2		%		80-120	25-SEP-21
Cobalt (Co)			111.3		%		80-120	25-SEP-21
Copper (Cu)			109.7		%		80-120	25-SEP-21
Iron (Fe)			118.7		%		80-120	25-SEP-21
Lead (Pb)			109.1		%		80-120	25-SEP-21
Lithium (Li)			105.9		%		80-120	25-SEP-21
Magnesium (Mg)			114.6		%		80-120	25-SEP-21
Manganese (Mn)			110.4		%		80-120	25-SEP-21
Molybdenum (Mo)			112.9		%		80-120	25-SEP-21
Nickel (Ni)			112.5		%		80-120	25-SEP-21
Potassium (K)			110.4		%		80-120	25-SEP-21
Selenium (Se)			107.7		%		80-120	25-SEP-21
Silver (Ag)			108.6		%		80-120	25-SEP-21
Sodium (Na)			112.3		%		80-120	25-SEP-21
Strontium (Sr)			113.0		%		80-120	25-SEP-21
Sulfur (S)			110.3		%		80-120	25-SEP-21
Thallium (Tl)			108.3		%		80-120	25-SEP-21
Tin (Sn)			110.9		%		80-120	25-SEP-21
Titanium (Ti)			112.3		%		80-120	25-SEP-21
Tungsten (W)			113.1		%		80-120	25-SEP-21
Uranium (U)			115.6		%		80-120	25-SEP-21
Vanadium (V)			112.0		%		80-120	25-SEP-21
Zinc (Zn)			107.7		%		80-120	25-SEP-21
Zirconium (Zr)			112.4		%		80-120	25-SEP-21
WG3624986-2 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5599716								
WG3624986-2 MB								
Aluminum (Al)			<50		mg/kg		50	25-SEP-21
Antimony (Sb)			<0.10		mg/kg		0.1	25-SEP-21
Arsenic (As)			<0.10		mg/kg		0.1	25-SEP-21
Barium (Ba)			<0.50		mg/kg		0.5	25-SEP-21
Beryllium (Be)			<0.10		mg/kg		0.1	25-SEP-21
Bismuth (Bi)			<0.20		mg/kg		0.2	25-SEP-21
Boron (B)			<5.0		mg/kg		5	25-SEP-21
Cadmium (Cd)			<0.020		mg/kg		0.02	25-SEP-21
Calcium (Ca)			<50		mg/kg		50	25-SEP-21
Chromium (Cr)			<0.50		mg/kg		0.5	25-SEP-21
Cobalt (Co)			<0.10		mg/kg		0.1	25-SEP-21
Copper (Cu)			<0.50		mg/kg		0.5	25-SEP-21
Iron (Fe)			<50		mg/kg		50	25-SEP-21
Lead (Pb)			<0.50		mg/kg		0.5	25-SEP-21
Lithium (Li)			<2.0		mg/kg		2	25-SEP-21
Magnesium (Mg)			<20		mg/kg		20	25-SEP-21
Manganese (Mn)			<1.0		mg/kg		1	25-SEP-21
Molybdenum (Mo)			<0.10		mg/kg		0.1	25-SEP-21
Nickel (Ni)			<0.50		mg/kg		0.5	25-SEP-21
Phosphorus (P)			<50		mg/kg		50	25-SEP-21
Potassium (K)			<100		mg/kg		100	25-SEP-21
Selenium (Se)			<0.20		mg/kg		0.2	25-SEP-21
Silver (Ag)			<0.10		mg/kg		0.1	25-SEP-21
Sodium (Na)			<50		mg/kg		50	25-SEP-21
Strontium (Sr)			<0.50		mg/kg		0.5	25-SEP-21
Sulfur (S)			<1000		mg/kg		1000	25-SEP-21
Thallium (Tl)			<0.050		mg/kg		0.05	25-SEP-21
Tin (Sn)			<2.0		mg/kg		2	25-SEP-21
Titanium (Ti)			<1.0		mg/kg		1	25-SEP-21
Tungsten (W)			<0.50		mg/kg		0.5	25-SEP-21
Uranium (U)			<0.050		mg/kg		0.05	25-SEP-21
Vanadium (V)			<0.20		mg/kg		0.2	25-SEP-21
Zinc (Zn)			<2.0		mg/kg		2	25-SEP-21
Zirconium (Zr)			<1.0		mg/kg		1	25-SEP-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-CL	**Soil**							
Batch R5594498								
WG3622721-3 DUP		**L2641071-12**						
Moisture		65.0	65.4		%	0.7	20	23-SEP-21
WG3622721-2 LCS								
Moisture			96.4		%		90-110	23-SEP-21
WG3622721-1 MB								
Moisture			<0.25		%		0.25	23-SEP-21
Batch R5595519								
WG3622448-2 LCS								
Moisture			97.7		%		90-110	23-SEP-21
WG3622448-1 MB								
Moisture			<0.25		%		0.25	23-SEP-21
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5598316								
WG3624657-2 DUP		**L2641071-12**						
Acenaphthene		<0.0075	<0.0075	RPD-NA	mg/kg	N/A	50	24-SEP-21
Acenaphthylene		0.0153	0.0169		mg/kg	9.4	50	24-SEP-21
Anthracene		<0.0060	<0.0060	RPD-NA	mg/kg	N/A	50	24-SEP-21
Acridine		<0.015	<0.015	RPD-NA	mg/kg	N/A	50	24-SEP-21
Benz(a)anthracene		0.034	0.042		mg/kg	21	50	24-SEP-21
Benzo(a)pyrene		<0.015	<0.015	RPD-NA	mg/kg	N/A	50	24-SEP-21
Benzo(b&j)fluoranthene		0.033	0.033		mg/kg	2.3	50	24-SEP-21
Benzo(e)pyrene		0.031	0.034		mg/kg	9.3	50	24-SEP-21
Benzo(g,h,i)perylene		<0.015	<0.015	RPD-NA	mg/kg	N/A	50	24-SEP-21
Benzo(k)fluoranthene		<0.015	<0.015	RPD-NA	mg/kg	N/A	50	24-SEP-21
Chrysene		0.039	0.046		mg/kg	18	50	24-SEP-21
Dibenz(a,h)anthracene		<0.0075	<0.0075	RPD-NA	mg/kg	N/A	50	24-SEP-21
Fluoranthene		<0.015	<0.015	RPD-NA	mg/kg	N/A	50	24-SEP-21
Fluorene		<0.015	<0.015	RPD-NA	mg/kg	N/A	50	24-SEP-21
Indeno(1,2,3-c,d)pyrene		<0.015	<0.015	RPD-NA	mg/kg	N/A	50	24-SEP-21
2-Methylnaphthalene		0.092	0.113		mg/kg	20	50	24-SEP-21
Naphthalene		0.038	0.041		mg/kg	8.8	50	24-SEP-21
Perylene		0.034	0.034		mg/kg	0.7	50	24-SEP-21
Phenanthrene		0.130	0.142		mg/kg	8.7	50	24-SEP-21
Pyrene		0.018	0.016		mg/kg	14	50	24-SEP-21
1-Methylnaphthalene		0.048	0.060		mg/kg	23	50	24-SEP-21
Quinoline		<0.015	<0.015	RPD-NA	mg/kg	N/A	50	24-SEP-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5598316								
WG3624657-4 IRM		**ALS PAH RM2**						
Acenaphthene			107.4		%		60-130	24-SEP-21
Acenaphthylene			115.2		%		60-130	24-SEP-21
Anthracene			121.4		%		60-130	24-SEP-21
Acridine			121.9		%		60-130	24-SEP-21
Benz(a)anthracene			107.7		%		60-130	24-SEP-21
Benzo(a)pyrene			113.9		%		60-130	24-SEP-21
Benzo(b&j)fluoranthene			102.5		%		60-130	24-SEP-21
Benzo(e)pyrene			111.7		%		60-130	24-SEP-21
Benzo(g,h,i)perylene			89.4		%		60-130	24-SEP-21
Benzo(k)fluoranthene			90.2		%		60-130	24-SEP-21
Chrysene			106.8		%		60-130	24-SEP-21
Dibenz(a,h)anthracene			93.4		%		60-130	24-SEP-21
Fluoranthene			101.3		%		60-130	24-SEP-21
Fluorene			107.0		%		60-130	24-SEP-21
Indeno(1,2,3-c,d)pyrene			123.5		%		60-130	24-SEP-21
2-Methylnaphthalene			104.7		%		60-130	24-SEP-21
Naphthalene			97.4		%		50-130	24-SEP-21
Perylene			118.8		%		60-130	24-SEP-21
Phenanthrene			102.7		%		60-130	24-SEP-21
Pyrene			103.1		%		60-130	24-SEP-21
1-Methylnaphthalene			104.0		%		60-130	24-SEP-21
WG3624657-3 LCS								
Acenaphthene			118.3		%		60-130	24-SEP-21
Acenaphthylene			107.3		%		60-130	24-SEP-21
Anthracene			111.9		%		60-130	24-SEP-21
Acridine			108.2		%		60-130	24-SEP-21
Benz(a)anthracene			116.8		%		60-130	24-SEP-21
Benzo(a)pyrene			110.6		%		60-130	24-SEP-21
Benzo(b&j)fluoranthene			124.5		%		60-130	24-SEP-21
Benzo(e)pyrene			112.8		%		60-130	24-SEP-21
Benzo(g,h,i)perylene			112.5		%		60-130	24-SEP-21
Benzo(k)fluoranthene			120.0		%		60-130	24-SEP-21
Chrysene			118.3		%		60-130	24-SEP-21
Dibenz(a,h)anthracene			111.1		%		60-130	24-SEP-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5598316								
WG3624657-3 LCS								
Fluoranthene			117.8		%		60-130	24-SEP-21
Fluorene			114.7		%		60-130	24-SEP-21
Indeno(1,2,3-c,d)pyrene			94.1		%		60-130	24-SEP-21
2-Methylnaphthalene			117.4		%		60-130	24-SEP-21
Naphthalene			109.6		%		50-130	24-SEP-21
Perylene			123.5		%		60-130	24-SEP-21
Phenanthrene			121.3		%		60-130	24-SEP-21
Pyrene			117.4		%		60-130	24-SEP-21
1-Methylnaphthalene			118.3		%		60-130	24-SEP-21
Quinoline			93.1		%		60-130	24-SEP-21
WG3624657-1 MB								
Acenaphthene			<0.0050		mg/kg		0.005	23-SEP-21
Acenaphthylene			<0.0050		mg/kg		0.005	23-SEP-21
Anthracene			<0.0040		mg/kg		0.004	23-SEP-21
Acridine			<0.010		mg/kg		0.01	23-SEP-21
Benz(a)anthracene			<0.010		mg/kg		0.01	23-SEP-21
Benzo(a)pyrene			<0.010		mg/kg		0.01	23-SEP-21
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	23-SEP-21
Benzo(e)pyrene			<0.010		mg/kg		0.01	23-SEP-21
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	23-SEP-21
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	23-SEP-21
Chrysene			<0.010		mg/kg		0.01	23-SEP-21
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	23-SEP-21
Fluoranthene			<0.010		mg/kg		0.01	23-SEP-21
Fluorene			<0.010		mg/kg		0.01	23-SEP-21
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	23-SEP-21
2-Methylnaphthalene			<0.010		mg/kg		0.01	23-SEP-21
Naphthalene			<0.010		mg/kg		0.01	23-SEP-21
Perylene			<0.010		mg/kg		0.01	23-SEP-21
Phenanthrene			<0.010		mg/kg		0.01	23-SEP-21
Pyrene			<0.010		mg/kg		0.01	23-SEP-21
1-Methylnaphthalene			<0.050		mg/kg		0.05	23-SEP-21
Quinoline			<0.050		mg/kg		0.05	23-SEP-21
Surrogate: d8-Naphthalene			76.4		%		50-130	23-SEP-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5598316								
WG3624657-1 MB								
Surrogate: d10-Acenaphthene			80.8		%		60-130	23-SEP-21
Surrogate: d10-Phenanthrene			86.8		%		60-130	23-SEP-21
Surrogate: d12-Chrysene			99.3		%		60-130	23-SEP-21
Batch R5599599								
WG3625117-12 IRM		**ALS PAH RM2**						
Acenaphthene			83.5		%		60-130	25-SEP-21
Acenaphthylene			95.1		%		60-130	25-SEP-21
Anthracene			98.6		%		60-130	25-SEP-21
Acridine			106.1		%		60-130	25-SEP-21
Benz(a)anthracene			94.2		%		60-130	25-SEP-21
Benzo(a)pyrene			92.4		%		60-130	25-SEP-21
Benzo(b&j)fluoranthene			87.2		%		60-130	25-SEP-21
Benzo(e)pyrene			94.7		%		60-130	25-SEP-21
Benzo(g,h,i)perylene			89.4		%		60-130	25-SEP-21
Benzo(k)fluoranthene			78.9		%		60-130	25-SEP-21
Chrysene			94.4		%		60-130	25-SEP-21
Dibenz(a,h)anthracene			78.7		%		60-130	25-SEP-21
Fluoranthene			84.6		%		60-130	25-SEP-21
Fluorene			85.7		%		60-130	25-SEP-21
Indeno(1,2,3-c,d)pyrene			103.7		%		60-130	25-SEP-21
2-Methylnaphthalene			83.4		%		60-130	25-SEP-21
Naphthalene			78.6		%		50-130	25-SEP-21
Perylene			100.5		%		60-130	25-SEP-21
Phenanthrene			85.2		%		60-130	25-SEP-21
Pyrene			87.6		%		60-130	25-SEP-21
1-Methylnaphthalene			81.6		%		60-130	25-SEP-21
WG3625117-20 IRM		**ALS PAH RM2**						
Acenaphthene			91.5		%		60-130	26-SEP-21
Acenaphthylene			97.2		%		60-130	26-SEP-21
Anthracene			105.0		%		60-130	26-SEP-21
Acridine			109.7		%		60-130	26-SEP-21
Benz(a)anthracene			97.1		%		60-130	26-SEP-21
Benzo(a)pyrene			98.7		%		60-130	26-SEP-21
Benzo(b&j)fluoranthene			91.2		%		60-130	26-SEP-21
Benzo(e)pyrene			104.3		%		60-130	26-SEP-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5599599								
WG3625117-20 IRM		**ALS PAH RM2**						
Benzo(g,h,i)perylene			89.9		%		60-130	26-SEP-21
Benzo(k)fluoranthene			91.2		%		60-130	26-SEP-21
Chrysene			97.0		%		60-130	26-SEP-21
Dibenz(a,h)anthracene			92.8		%		60-130	26-SEP-21
Fluoranthene			88.2		%		60-130	26-SEP-21
Fluorene			93.3		%		60-130	26-SEP-21
Indeno(1,2,3-c,d)pyrene			113.3		%		60-130	26-SEP-21
2-Methylnaphthalene			85.2		%		60-130	26-SEP-21
Naphthalene			80.2		%		50-130	26-SEP-21
Perylene			92.2		%		60-130	26-SEP-21
Phenanthrene			90.5		%		60-130	26-SEP-21
Pyrene			91.5		%		60-130	26-SEP-21
1-Methylnaphthalene			85.5		%		60-130	26-SEP-21
WG3625117-5 IRM		**ALS PAH RM2**						
Acenaphthene			82.8		%		60-130	25-SEP-21
Acenaphthylene			88.3		%		60-130	25-SEP-21
Anthracene			93.0		%		60-130	25-SEP-21
Acridine			96.0		%		60-130	25-SEP-21
Benz(a)anthracene			84.4		%		60-130	25-SEP-21
Benzo(a)pyrene			80.0		%		60-130	25-SEP-21
Benzo(b&j)fluoranthene			79.0		%		60-130	25-SEP-21
Benzo(e)pyrene			84.0		%		60-130	25-SEP-21
Benzo(g,h,i)perylene			73.8		%		60-130	25-SEP-21
Benzo(k)fluoranthene			69.4		%		60-130	25-SEP-21
Chrysene			84.4		%		60-130	25-SEP-21
Dibenz(a,h)anthracene			74.1		%		60-130	25-SEP-21
Fluoranthene			78.9		%		60-130	25-SEP-21
Fluorene			87.5		%		60-130	25-SEP-21
Indeno(1,2,3-c,d)pyrene			98.0		%		60-130	25-SEP-21
2-Methylnaphthalene			78.2		%		60-130	25-SEP-21
Naphthalene			69.6		%		50-130	25-SEP-21
Perylene			83.7		%		60-130	25-SEP-21
Phenanthrene			81.8		%		60-130	25-SEP-21
Pyrene			80.7		%		60-130	25-SEP-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5599599								
WG3625117-5 IRM		**ALS PAH RM2**						
1-Methylnaphthalene			78.0		%		60-130	25-SEP-21
WG3625117-8 IRM		**ALS PAH RM2**						
Acenaphthene			79.0		%		60-130	25-SEP-21
Acenaphthylene			82.6		%		60-130	25-SEP-21
Anthracene			88.8		%		60-130	25-SEP-21
Acridine			81.2		%		60-130	25-SEP-21
Benz(a)anthracene			81.4		%		60-130	25-SEP-21
Benzo(a)pyrene			76.9		%		60-130	25-SEP-21
Benzo(b&j)fluoranthene			74.2		%		60-130	25-SEP-21
Benzo(e)pyrene			81.5		%		60-130	25-SEP-21
Benzo(g,h,i)perylene			71.7		%		60-130	25-SEP-21
Benzo(k)fluoranthene			70.1		%		60-130	25-SEP-21
Chrysene			80.1		%		60-130	25-SEP-21
Dibenz(a,h)anthracene			76.0		%		60-130	25-SEP-21
Fluoranthene			74.6		%		60-130	25-SEP-21
Fluorene			78.0		%		60-130	25-SEP-21
Indeno(1,2,3-c,d)pyrene			89.0		%		60-130	25-SEP-21
2-Methylnaphthalene			75.5		%		60-130	25-SEP-21
Naphthalene			67.6		%		50-130	25-SEP-21
Perylene			80.3		%		60-130	25-SEP-21
Phenanthrene			77.0		%		60-130	25-SEP-21
Pyrene			76.4		%		60-130	25-SEP-21
1-Methylnaphthalene			74.7		%		60-130	25-SEP-21
WG3625117-1 LCS								
Acenaphthene			101.3		%		60-130	24-SEP-21
Acenaphthylene			92.7		%		60-130	24-SEP-21
Anthracene			93.8		%		60-130	24-SEP-21
Acridine			98.0		%		60-130	24-SEP-21
Benz(a)anthracene			99.7		%		60-130	24-SEP-21
Benzo(a)pyrene			78.9		%		60-130	24-SEP-21
Benzo(b&j)fluoranthene			91.1		%		60-130	24-SEP-21
Benzo(e)pyrene			100.0		%		60-130	24-SEP-21
Benzo(g,h,i)perylene			91.1		%		60-130	24-SEP-21
Benzo(k)fluoranthene			95.7		%		60-130	24-SEP-21
Chrysene			99.3		%		60-130	24-SEP-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5599599								
WG3625117-1 LCS								
Dibenz(a,h)anthracene			84.8		%		60-130	24-SEP-21
Fluoranthene			98.4		%		60-130	24-SEP-21
Fluorene			97.8		%		60-130	24-SEP-21
Indeno(1,2,3-c,d)pyrene			92.2		%		60-130	24-SEP-21
2-Methylnaphthalene			100.5		%		60-130	24-SEP-21
Naphthalene			96.6		%		50-130	24-SEP-21
Perylene			93.2		%		60-130	24-SEP-21
Phenanthrene			102.7		%		60-130	24-SEP-21
Pyrene			97.6		%		60-130	24-SEP-21
1-Methylnaphthalene			105.7		%		60-130	24-SEP-21
Quinoline			92.2		%		60-130	24-SEP-21
WG3625117-11 LCS								
Acenaphthene			96.9		%		60-130	25-SEP-21
Acenaphthylene			92.6		%		60-130	25-SEP-21
Anthracene			96.5		%		60-130	25-SEP-21
Acridine			92.5		%		60-130	25-SEP-21
Benz(a)anthracene			96.9		%		60-130	25-SEP-21
Benzo(a)pyrene			85.7		%		60-130	25-SEP-21
Benzo(b&j)fluoranthene			90.1		%		60-130	25-SEP-21
Benzo(e)pyrene			96.6		%		60-130	25-SEP-21
Benzo(g,h,i)perylene			89.7		%		60-130	25-SEP-21
Benzo(k)fluoranthene			92.3		%		60-130	25-SEP-21
Chrysene			94.3		%		60-130	25-SEP-21
Dibenz(a,h)anthracene			83.0		%		60-130	25-SEP-21
Fluoranthene			94.1		%		60-130	25-SEP-21
Fluorene			93.4		%		60-130	25-SEP-21
Indeno(1,2,3-c,d)pyrene			91.2		%		60-130	25-SEP-21
2-Methylnaphthalene			97.0		%		60-130	25-SEP-21
Naphthalene			94.0		%		50-130	25-SEP-21
Perylene			91.7		%		60-130	25-SEP-21
Phenanthrene			97.5		%		60-130	25-SEP-21
Pyrene			94.1		%		60-130	25-SEP-21
1-Methylnaphthalene			96.3		%		60-130	25-SEP-21
Quinoline			85.5		%		60-130	25-SEP-21
WG3625117-19 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5599599								
WG3625117-19 LCS								
Acenaphthene			100.6		%		60-130	26-SEP-21
Acenaphthylene			99.1		%		60-130	26-SEP-21
Anthracene			103.3		%		60-130	26-SEP-21
Acridine			98.8		%		60-130	26-SEP-21
Benz(a)anthracene			105.8		%		60-130	26-SEP-21
Benzo(a)pyrene			95.0		%		60-130	26-SEP-21
Benzo(b&j)fluoranthene			96.9		%		60-130	26-SEP-21
Benzo(e)pyrene			102.4		%		60-130	26-SEP-21
Benzo(g,h,i)perylene			98.5		%		60-130	26-SEP-21
Benzo(k)fluoranthene			98.6		%		60-130	26-SEP-21
Chrysene			100.4		%		60-130	26-SEP-21
Dibenz(a,h)anthracene			93.7		%		60-130	26-SEP-21
Fluoranthene			100.7		%		60-130	26-SEP-21
Fluorene			103.5		%		60-130	26-SEP-21
Indeno(1,2,3-c,d)pyrene			98.1		%		60-130	26-SEP-21
2-Methylnaphthalene			103.7		%		60-130	26-SEP-21
Naphthalene			101.5		%		50-130	26-SEP-21
Perylene			98.7		%		60-130	26-SEP-21
Phenanthrene			104.9		%		60-130	26-SEP-21
Pyrene			101.1		%		60-130	26-SEP-21
1-Methylnaphthalene			104.0		%		60-130	26-SEP-21
Quinoline			91.2		%		60-130	26-SEP-21
WG3625117-22 LCS								
Acenaphthene			100.6		%		60-130	26-SEP-21
Acenaphthylene			101.0		%		60-130	26-SEP-21
Anthracene			99.8		%		60-130	26-SEP-21
Acridine			95.0		%		60-130	26-SEP-21
Benz(a)anthracene			115.6		%		60-130	26-SEP-21
Benzo(a)pyrene			96.9		%		60-130	26-SEP-21
Benzo(b&j)fluoranthene			98.6		%		60-130	26-SEP-21
Benzo(e)pyrene			105.0		%		60-130	26-SEP-21
Benzo(g,h,i)perylene			96.1		%		60-130	26-SEP-21
Benzo(k)fluoranthene			103.6		%		60-130	26-SEP-21
Chrysene			116.2		%		60-130	26-SEP-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5599599								
WG3625117-22 LCS								
Dibenz(a,h)anthracene			90.2		%		60-130	26-SEP-21
Fluoranthene			100.4		%		60-130	26-SEP-21
Fluorene			99.5		%		60-130	26-SEP-21
Indeno(1,2,3-c,d)pyrene			94.1		%		60-130	26-SEP-21
2-Methylnaphthalene			100.6		%		60-130	26-SEP-21
Naphthalene			96.2		%		50-130	26-SEP-21
Perylene			102.2		%		60-130	26-SEP-21
Phenanthrene			100.5		%		60-130	26-SEP-21
Pyrene			101.6		%		60-130	26-SEP-21
1-Methylnaphthalene			104.5		%		60-130	26-SEP-21
Quinoline			92.4		%		60-130	26-SEP-21
WG3625117-4 LCS								
Acenaphthene			105.1		%		60-130	25-SEP-21
Acenaphthylene			94.1		%		60-130	25-SEP-21
Anthracene			100.2		%		60-130	25-SEP-21
Acridine			101.9		%		60-130	25-SEP-21
Benz(a)anthracene			111.0		%		60-130	25-SEP-21
Benzo(a)pyrene			91.6		%		60-130	25-SEP-21
Benzo(b&j)fluoranthene			103.2		%		60-130	25-SEP-21
Benzo(e)pyrene			111.1		%		60-130	25-SEP-21
Benzo(g,h,i)perylene			99.5		%		60-130	25-SEP-21
Benzo(k)fluoranthene			106.3		%		60-130	25-SEP-21
Chrysene			103.4		%		60-130	25-SEP-21
Dibenz(a,h)anthracene			96.8		%		60-130	25-SEP-21
Fluoranthene			103.8		%		60-130	25-SEP-21
Fluorene			103.7		%		60-130	25-SEP-21
Indeno(1,2,3-c,d)pyrene			104.5		%		60-130	25-SEP-21
2-Methylnaphthalene			106.9		%		60-130	25-SEP-21
Naphthalene			99.4		%		50-130	25-SEP-21
Perylene			103.1		%		60-130	25-SEP-21
Phenanthrene			106.9		%		60-130	25-SEP-21
Pyrene			105.1		%		60-130	25-SEP-21
1-Methylnaphthalene			108.2		%		60-130	25-SEP-21
Quinoline			94.2		%		60-130	25-SEP-21
WG3625117-7 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5599599								
WG3625117-7 LCS								
Acenaphthene			92.3		%		60-130	25-SEP-21
Acenaphthylene			87.8		%		60-130	25-SEP-21
Anthracene			92.5		%		60-130	25-SEP-21
Acridine			82.4		%		60-130	25-SEP-21
Benz(a)anthracene			96.9		%		60-130	25-SEP-21
Benzo(a)pyrene			89.6		%		60-130	25-SEP-21
Benzo(b&j)fluoranthene			92.6		%		60-130	25-SEP-21
Benzo(e)pyrene			95.4		%		60-130	25-SEP-21
Benzo(g,h,i)perylene			84.3		%		60-130	25-SEP-21
Benzo(k)fluoranthene			93.9		%		60-130	25-SEP-21
Chrysene			91.7		%		60-130	25-SEP-21
Dibenz(a,h)anthracene			84.4		%		60-130	25-SEP-21
Fluoranthene			90.8		%		60-130	25-SEP-21
Fluorene			90.3		%		60-130	25-SEP-21
Indeno(1,2,3-c,d)pyrene			92.0		%		60-130	25-SEP-21
2-Methylnaphthalene			95.3		%		60-130	25-SEP-21
Naphthalene			88.8		%		50-130	25-SEP-21
Perylene			90.8		%		60-130	25-SEP-21
Phenanthrene			94.1		%		60-130	25-SEP-21
Pyrene			90.5		%		60-130	25-SEP-21
1-Methylnaphthalene			95.1		%		60-130	25-SEP-21
Quinoline			74.7		%		60-130	25-SEP-21
WG3625117-13 MB								
Acenaphthene			<0.0050		mg/kg		0.005	26-SEP-21
Acenaphthylene			<0.0050		mg/kg		0.005	26-SEP-21
Anthracene			<0.0040		mg/kg		0.004	26-SEP-21
Acridine			<0.010		mg/kg		0.01	26-SEP-21
Benz(a)anthracene			<0.010		mg/kg		0.01	26-SEP-21
Benzo(a)pyrene			<0.010		mg/kg		0.01	26-SEP-21
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	26-SEP-21
Benzo(e)pyrene			<0.010		mg/kg		0.01	26-SEP-21
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	26-SEP-21
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	26-SEP-21
Chrysene			<0.010		mg/kg		0.01	26-SEP-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5599599								
WG3625117-13 MB								
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	26-SEP-21
Fluoranthene			<0.010		mg/kg		0.01	26-SEP-21
Fluorene			<0.010		mg/kg		0.01	26-SEP-21
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	26-SEP-21
2-Methylnaphthalene			<0.010		mg/kg		0.01	26-SEP-21
Naphthalene			<0.010		mg/kg		0.01	26-SEP-21
Perylene			<0.010		mg/kg		0.01	26-SEP-21
Phenanthrene			<0.010		mg/kg		0.01	26-SEP-21
Pyrene			<0.010		mg/kg		0.01	26-SEP-21
1-Methylnaphthalene			<0.050		mg/kg		0.05	26-SEP-21
Quinoline			<0.050		mg/kg		0.05	26-SEP-21
Surrogate: d8-Naphthalene			75.4		%		50-130	26-SEP-21
Surrogate: d10-Acenaphthene			82.3		%		60-130	26-SEP-21
Surrogate: d10-Phenanthrene			85.2		%		60-130	26-SEP-21
Surrogate: d12-Chrysene			88.5		%		60-130	26-SEP-21
WG3625117-15 MB								
Acenaphthene			<0.0050		mg/kg		0.005	26-SEP-21
Acenaphthylene			<0.0050		mg/kg		0.005	26-SEP-21
Anthracene			<0.0040		mg/kg		0.004	26-SEP-21
Acridine			<0.010		mg/kg		0.01	26-SEP-21
Benz(a)anthracene			<0.010		mg/kg		0.01	26-SEP-21
Benzo(a)pyrene			<0.010		mg/kg		0.01	26-SEP-21
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	26-SEP-21
Benzo(e)pyrene			<0.010		mg/kg		0.01	26-SEP-21
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	26-SEP-21
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	26-SEP-21
Chrysene			<0.010		mg/kg		0.01	26-SEP-21
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	26-SEP-21
Fluoranthene			<0.010		mg/kg		0.01	26-SEP-21
Fluorene			<0.010		mg/kg		0.01	26-SEP-21
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	26-SEP-21
2-Methylnaphthalene			<0.010		mg/kg		0.01	26-SEP-21
Naphthalene			<0.010		mg/kg		0.01	26-SEP-21
Perylene			<0.010		mg/kg		0.01	26-SEP-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5599599								
WG3625117-15 MB								
Phenanthrene			<0.010		mg/kg		0.01	26-SEP-21
Pyrene			<0.010		mg/kg		0.01	26-SEP-21
1-Methylnaphthalene			<0.050		mg/kg		0.05	26-SEP-21
Quinoline			<0.050		mg/kg		0.05	26-SEP-21
Surrogate: d8-Naphthalene			88.2		%		50-130	26-SEP-21
Surrogate: d10-Acenaphthene			103.5		%		60-130	26-SEP-21
Surrogate: d10-Phenanthrene			99.3		%		60-130	26-SEP-21
Surrogate: d12-Chrysene			122		%		60-130	26-SEP-21
WG3625117-17 MB								
Acenaphthene			<0.0050		mg/kg		0.005	26-SEP-21
Acenaphthylene			<0.0050		mg/kg		0.005	26-SEP-21
Anthracene			<0.0040		mg/kg		0.004	26-SEP-21
Acridine			<0.010		mg/kg		0.01	26-SEP-21
Benz(a)anthracene			<0.010		mg/kg		0.01	26-SEP-21
Benzo(a)pyrene			<0.010		mg/kg		0.01	26-SEP-21
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	26-SEP-21
Benzo(e)pyrene			<0.010		mg/kg		0.01	26-SEP-21
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	26-SEP-21
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	26-SEP-21
Chrysene			<0.010		mg/kg		0.01	26-SEP-21
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	26-SEP-21
Fluoranthene			<0.010		mg/kg		0.01	26-SEP-21
Fluorene			<0.010		mg/kg		0.01	26-SEP-21
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	26-SEP-21
2-Methylnaphthalene			<0.010		mg/kg		0.01	26-SEP-21
Naphthalene			<0.010		mg/kg		0.01	26-SEP-21
Perylene			<0.010		mg/kg		0.01	26-SEP-21
Phenanthrene			<0.010		mg/kg		0.01	26-SEP-21
Pyrene			<0.010		mg/kg		0.01	26-SEP-21
1-Methylnaphthalene			<0.050		mg/kg		0.05	26-SEP-21
Quinoline			<0.050		mg/kg		0.05	26-SEP-21
Surrogate: d8-Naphthalene			93.2		%		50-130	26-SEP-21
Surrogate: d10-Acenaphthene			97.7		%		60-130	26-SEP-21
Surrogate: d10-Phenanthrene			107.7		%		60-130	26-SEP-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5599599								
WG3625117-17 MB								
Surrogate: d12-Chrysene			109.9		%		60-130	26-SEP-21
WG3625117-2 MB								
Acenaphthene			<0.0050		mg/kg		0.005	24-SEP-21
Acenaphthylene			<0.0050		mg/kg		0.005	24-SEP-21
Anthracene			<0.0040		mg/kg		0.004	24-SEP-21
Acridine			<0.010		mg/kg		0.01	24-SEP-21
Benz(a)anthracene			<0.010		mg/kg		0.01	24-SEP-21
Benzo(a)pyrene			<0.010		mg/kg		0.01	24-SEP-21
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	24-SEP-21
Benzo(e)pyrene			<0.010		mg/kg		0.01	24-SEP-21
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	24-SEP-21
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	24-SEP-21
Chrysene			<0.010		mg/kg		0.01	24-SEP-21
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	24-SEP-21
Fluoranthene			<0.010		mg/kg		0.01	24-SEP-21
Fluorene			<0.010		mg/kg		0.01	24-SEP-21
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	24-SEP-21
2-Methylnaphthalene			<0.010		mg/kg		0.01	24-SEP-21
Naphthalene			<0.010		mg/kg		0.01	24-SEP-21
Perylene			<0.010		mg/kg		0.01	24-SEP-21
Phenanthrene			<0.010		mg/kg		0.01	24-SEP-21
Pyrene			<0.010		mg/kg		0.01	24-SEP-21
1-Methylnaphthalene			<0.050		mg/kg		0.05	24-SEP-21
Quinoline			<0.050		mg/kg		0.05	24-SEP-21
Surrogate: d8-Naphthalene			77.0		%		50-130	24-SEP-21
Surrogate: d10-Acenaphthene			72.7		%		60-130	24-SEP-21
Surrogate: d10-Phenanthrene			77.1		%		60-130	24-SEP-21
Surrogate: d12-Chrysene			79.3		%		60-130	24-SEP-21
WG3625117-6 MB								
Acenaphthene			<0.0050		mg/kg		0.005	25-SEP-21
Acenaphthylene			<0.0050		mg/kg		0.005	25-SEP-21
Anthracene			<0.0040		mg/kg		0.004	25-SEP-21
Acridine			<0.010		mg/kg		0.01	25-SEP-21
Benz(a)anthracene			<0.010		mg/kg		0.01	25-SEP-21
Benzo(a)pyrene			<0.010		mg/kg		0.01	25-SEP-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5599599								
WG3625117-6 MB								
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	25-SEP-21
Benzo(e)pyrene			<0.010		mg/kg		0.01	25-SEP-21
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	25-SEP-21
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	25-SEP-21
Chrysene			<0.010		mg/kg		0.01	25-SEP-21
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	25-SEP-21
Fluoranthene			<0.010		mg/kg		0.01	25-SEP-21
Fluorene			<0.010		mg/kg		0.01	25-SEP-21
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	25-SEP-21
2-Methylnaphthalene			<0.010		mg/kg		0.01	25-SEP-21
Naphthalene			<0.010		mg/kg		0.01	25-SEP-21
Perylene			<0.010		mg/kg		0.01	25-SEP-21
Phenanthrene			<0.010		mg/kg		0.01	25-SEP-21
Pyrene			<0.010		mg/kg		0.01	25-SEP-21
1-Methylnaphthalene			<0.050		mg/kg		0.05	25-SEP-21
Quinoline			<0.050		mg/kg		0.05	25-SEP-21
Surrogate: d8-Naphthalene			82.7		%		50-130	25-SEP-21
Surrogate: d10-Acenaphthene			76.0		%		60-130	25-SEP-21
Surrogate: d10-Phenanthrene			80.5		%		60-130	25-SEP-21
Surrogate: d12-Chrysene			86.8		%		60-130	25-SEP-21
WG3625117-9 MB								
Acenaphthene			<0.0050		mg/kg		0.005	25-SEP-21
Acenaphthylene			<0.0050		mg/kg		0.005	25-SEP-21
Anthracene			<0.0040		mg/kg		0.004	25-SEP-21
Acridine			<0.010		mg/kg		0.01	25-SEP-21
Benz(a)anthracene			<0.010		mg/kg		0.01	25-SEP-21
Benzo(a)pyrene			<0.010		mg/kg		0.01	25-SEP-21
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	25-SEP-21
Benzo(e)pyrene			<0.010		mg/kg		0.01	25-SEP-21
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	25-SEP-21
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	25-SEP-21
Chrysene			<0.010		mg/kg		0.01	25-SEP-21
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	25-SEP-21
Fluoranthene			<0.010		mg/kg		0.01	25-SEP-21

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5599599								
WG3625117-9 MB								
Fluorene			<0.010		mg/kg		0.01	25-SEP-21
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	25-SEP-21
2-Methylnaphthalene			<0.010		mg/kg		0.01	25-SEP-21
Naphthalene			<0.010		mg/kg		0.01	25-SEP-21
Perylene			<0.010		mg/kg		0.01	25-SEP-21
Phenanthrene			<0.010		mg/kg		0.01	25-SEP-21
Pyrene			<0.010		mg/kg		0.01	25-SEP-21
1-Methylnaphthalene			<0.050		mg/kg		0.05	25-SEP-21
Quinoline			<0.050		mg/kg		0.05	25-SEP-21
Surrogate: d8-Naphthalene			113.5		%		50-130	25-SEP-21
Surrogate: d10-Acenaphthene			86.1		%		60-130	25-SEP-21
Surrogate: d10-Phenanthrene			82.1		%		60-130	25-SEP-21
Surrogate: d12-Chrysene			79.5		%		60-130	25-SEP-21
PH-1:2-CL	**Soil**							
Batch R5601417								
WG3625868-2 IRM		**SAL-STD11**						
pH (1:2 soil:water)			7.89		pH		7.7-8.3	27-SEP-21
WG3625868-1 LCS								
pH (1:2 soil:water)			7.00		pH		6.8-7.2	27-SEP-21
PSA-PIPET-DETAIL-SK	**Soil**							
Batch R5599099								
WG3622179-1 DUP		**L2641071-1**						
% Gravel (>2mm)		15.2	15.2		%	0.0	25	24-SEP-21
% Sand (2.00mm - 1.00mm)		15.6	13.5	J	%	2.0	5	24-SEP-21
% Sand (1.00mm - 0.50mm)		15.2	15.7	J	%	0.6	5	24-SEP-21
% Sand (0.50mm - 0.25mm)		9.9	9.8	J	%	0.1	5	24-SEP-21
% Sand (0.25mm - 0.125mm)		7.6	7.7	J	%	0.1	5	24-SEP-21
% Sand (0.125mm - 0.063mm)		7.4	7.7	J	%	0.3	5	24-SEP-21
% Silt (0.063mm - 0.0312mm)		12.3	13.0	J	%	0.7	5	24-SEP-21
% Silt (0.0312mm - 0.004mm)		14.0	14.6	J	%	0.6	5	24-SEP-21
% Clay (<4um)		2.9	2.8	J	%	0.1	5	24-SEP-21
WG3622179-2 IRM		**2020-PSA_SOIL**						
% Sand (2.00mm - 1.00mm)			2.4		%		0-7.2	24-SEP-21
% Sand (1.00mm - 0.50mm)			3.5		%		0-8.7	24-SEP-21
% Sand (0.50mm - 0.25mm)			8.5		%		4-14	24-SEP-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PSA-PIPET-DETAIL-SK	**Soil**							
Batch R5599099								
WG3622179-2 IRM		**2020-PSA_SOIL**						
% Sand (0.25mm - 0.125mm)			16.3		%		11.7-21.7	24-SEP-21
% Sand (0.125mm - 0.063mm)			13.7		%		8.4-18.4	24-SEP-21
% Silt (0.063mm - 0.0312mm)			13.1		%		8.5-18.5	24-SEP-21
% Silt (0.0312mm - 0.004mm)			21.0		%		15.1-25.1	24-SEP-21
% Clay (<4um)			21.5		%		16.5-26.5	24-SEP-21

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.

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:	September EVO LAEMP 2021	TURNAROUND TIME:	

PROJECT/CLIENT INFO

Facility Name / Job#	REP
Project Manager	Allie Ferguson
Email	allie.ferguson@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

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SAMPLE DETAILS / **ANALYSIS REQUESTED**

L2641071-COFC

Sample ID	Sample Location	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
							Filtered	N	N	N	N	N
							Preservative	NONE	NONE	NONE	NONE	NONE
RG_MIDER_SE-1_2021-09-09_1130	RG_MIDER	SE	No	9/9/2021	1130	G	2	X	X	X	X	X
RG_MIDER_SE-2_2021-09-09_1540	RG_MIDER	SE	No	9/9/2021	1540	G	2	X	X	X	X	X
RG_MIDER_SE-3_2021-09-09_1600	RG_MIDER	SE	No	9/9/2021	1600	G	2	X	X	X	X	X
RG_MIDER_SE-4_2021-09-09_1600	RG_MIDER	SE	No	9/9/2021	1600	G	2	X	X	X	X	X
RG_MIDER_SE-5_2021-09-09_1615	RG_MIDER	SE	No	9/9/2021	1615	G	2	X	X	X	X	X
RG_ERCK_1_SE-1_2021_09-10-1000	RG_ERCK	SE	No	9/10/2021	1000	G	2	X	X	X	X	X
RG_ERCK_1_SE-2_2021_09-10-1010	RG_ERCK	SE	No	9/10/2021	1010	G	2	X	X	X	X	X
RG_ERCK_1_SE-3_2021_09-10-1020	RG_ERCK	SE	No	9/10/2021	1020	G	2	X	X	X	X	X
RG_ERCK_1_SE-4_2021_09-10-1030	RG_ERCK	SE	No	9/10/2021	1030	G	2	X	X	X	X	X
RG_ERCK_1_SE-5_2021_09-10-1040	RG_ERCK	SE	No	9/10/2021	1040	G	2	X	X	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	
ALS PO 750546	Jennifer Ings/Minnow	################		9/14 1030

NB OF BOTTLES RETURNED/DESCRIPTION

Regular (default)	x	Sampler's Name	Jennifer Ings	Mobile #	519-500-3444
Priority (2-3 business days) - 50% surcharge					
Emergency (1 Business Day) - 100% surcharge		Sampler's Signature		Date/Time	September 13, 2021
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

4

Teck

COC ID: September EVO LAEMP 2021

TURNAROUND TIME:

L2641071-COFC

PROJECT/CLIENT INFO				LABORATORY			
Facility Name / Job#	REP			Lab Name	ALS Calgary		
Project Manager	Allie Ferguson			Lab Contact	Lyudmyla Shvets		
Email	[illegible]			Email	lyudmyla.shvets@alsglobal.com		
Address	421 Pine Avenue			Address	2559 29 Street NE		
City	Sparwood	Province	BC	City	Calgary	Province	AB
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada
Phone Number	250-425-8202			Phone Number	1 403 407 1794		

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Sample ID	Sample Location	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
								N	N	N	N	N
								NONE	NONE	NONE	NONE	NONE
RG_ALUSM_SE-1_2021-09-12_1000	RG_ALUSM	SE	No	9/12/2021	1000	G	2	X	X	X	X	X
RG_ALUSM_SE-2_2021-09-12_1110	RG_ALUSM	SE	No	9/12/2021	1110	G	2	X	X	X	X	X
RG_ALUSM_SE-3_2021-09-12_1300	RG_ALUSM	SE	No	9/12/2021	1300	G	2	X	X	X	X	X
RG_MI3_SE-1_2021-09-10_1500	RG_MI3	SE	No	9/10/2021	1500	G	2	X	X	X	X	X
RG_MI3_SE-2_2021-09-12_1430	RG_MI3	SE	No	9/12/2021	1430	G	2	X	X	X	X	X
RG_MI3_SE-3_2021-09-12_1440	RG_MI3	SE	No	9/12/2021	1440	G	2	X	X	X	X	X
RG_RIVER_SE-4_2021-09-12_1440	RG_RIVER	SE	No	9/12/2021	1440	G	2	X	X	X	X	X
		SE	No			G	2	X	X	X	X	X
		SE	No			G	2	X	X	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION
ALS PO 750546	Jennifer Ings/Minnow	################	

NB OF BOTTLES RETURNED/DESCRIPTION					
Regular (default) x	Sampler's Name	Jennifer Ings	Mobile #	519-500-3444
Priority (2-3 business days) - 50% surcharge				
Emergency (1 Business Day) - 100% surcharge	Sampler's Signature		Date/Time	September 13, 2021
For Emergency <1 Day, ASAP or Weekend - Contact ALS				

SEDIMENT CHEMISTRY

ALS Laboratory Report L2641329
(Finalized October 13, 2021)

Teck Coal Ltd.
ATTN: Allie Ferguson
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 17-SEP-21
Report Date: 13-OCT-21 17:32 (MT)
Version: FINAL REV. 4

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2641329

Project P.O. #:	VPO00750546
Job Reference:	REGIONAL EFFECTS PROGRAM
C of C Numbers:	September EVO LAEMP
Legal Site Desc:	

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2641329-1	L2641329-2	L2641329-3	L2641329-4	L2641329-5
	Description	SE	SE	SE	SE	SE
	Sampled Date	14-SEP-21	14-SEP-21	14-SEP-21	14-SEP-21	15-SEP-21
	Sampled Time	11:00	11:00	12:40	13:30	08:55
	Client ID	RG_ERCKDT_SE-1_2021-09-14_1100	RG_RIVER_SE_2021-09-14_1100	RG_ERCKDT_SE-2_2021-09-14_1240	RG_ERCKDT_SE-3_2021-09-14_1330	RG_ERCKDT_SE-4_2021-09-15_0855
SOIL						
Physical Tests	Moisture (%)	86.4	85.8	78.9	83.9	80.3
	pH (1:2 soil:water) (pH)	8.01	8.03	7.91	8.05	7.82
Particle Size	% Gravel (>2mm) (%)	<1.0 PSAL	<1.0 PSAL	2.1 PSAL	2.2 PSAL	<1.0
	% Sand (2.00mm - 1.00mm) (%)	<1.0 PSAL	<1.0 PSAL	1.6 PSAL	6.4 PSAL	<1.0
	% Sand (1.00mm - 0.50mm) (%)	<1.0 PSAL	<1.0 PSAL	3.1 PSAL	5.9 PSAL	<1.0
	% Sand (0.50mm - 0.25mm) (%)	<1.0 PSAL	<1.0 PSAL	7.7 PSAL	4.3 PSAL	1.3
	% Sand (0.25mm - 0.125mm) (%)	3.2 PSAL	2.8 PSAL	10.5 PSAL	4.1 PSAL	4.3
	% Sand (0.125mm - 0.063mm) (%)	4.7 PSAL	5.0 PSAL	7.8 PSAL	5.0 PSAL	7.1
	% Silt (0.063mm - 0.0312mm) (%)	24.7 PSAL	27.7 PSAL	18.3 PSAL	21.5 PSAL	24.5
	% Silt (0.0312mm - 0.004mm) (%)	50.8 PSAL	50.4 PSAL	35.0 PSAL	39.2 PSAL	48.9
	% Clay (<4um) (%)	15.5 PSAL	13.6 PSAL	13.9 PSAL	11.5 PSAL	13.2
	Texture	Silt	Silt	Silt loam	Silt loam	Silt loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	11.8	11.1	8.97	7.66	10.0
Metals	Aluminum (Al) (mg/kg)	3610	4110	3700	3950	3660
	Antimony (Sb) (mg/kg)	0.95	1.08	0.80	0.66	0.82
	Arsenic (As) (mg/kg)	14.5	14.6	21.1	20.2	9.80
	Barium (Ba) (mg/kg)	178	173	197	199	193
	Beryllium (Be) (mg/kg)	0.46	0.48	0.56	0.59	0.47
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	8.5	10.4	<5.0	<5.0	6.1
	Cadmium (Cd) (mg/kg)	3.85	3.60	4.65	5.15	3.13
	Calcium (Ca) (mg/kg)	67400	64000	75800	71900	79500
	Chromium (Cr) (mg/kg)	8.58	9.97	8.76	8.46	8.51
	Cobalt (Co) (mg/kg)	63.6	57.7	123	121	45.7
	Copper (Cu) (mg/kg)	15.4	14.5	14.0	15.1	14.9
	Iron (Fe) (mg/kg)	25700	24300	41100	40400	20300
	Lead (Pb) (mg/kg)	7.56	7.04	9.52	11.0	6.97
	Lithium (Li) (mg/kg)	5.5	5.7	6.2	6.5	5.9
	Magnesium (Mg) (mg/kg)	8620	8020	9890	8830	9720
	Manganese (Mn) (mg/kg)	1290	1140	2710	2680	808
	Mercury (Hg) (mg/kg)	0.0366	0.0314	0.0340	0.0345	0.0282
	Molybdenum (Mo) (mg/kg)	1.72	1.83	2.49	2.31	1.65
	Nickel (Ni) (mg/kg)	98.0	91.9	122	127	82.4
	Phosphorus (P) (mg/kg)	1170	1160	1200	1160	1270
	Potassium (K) (mg/kg)	1100	1290	1160	1280	1150
	Selenium (Se) (mg/kg)	32.1	32.9	20.1	23.9	20.9
	Silver (Ag) (mg/kg)	0.19	0.18	0.20	0.24	0.20

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2641329-6	L2641329-7	L2641329-8	L2641329-9	L2641329-10
	Description	SE	SE	SE	SE	SE
	Sampled Date	15-SEP-21	15-SEP-21	15-SEP-21	15-SEP-21	15-SEP-21
	Sampled Time	09:05	15:20	14:05	13:50	12:15
	Client ID	RG_ERCKDT_SE-5_2021-09-15_0905	RG_ERCKUT_SE-1_2021-09-15_1520	RG_ERCKUT_SE-2_2021-09-15_1405	RG_ERCKUT_SE-3_2021-09-15_1350	RG_ERCKUT_SE-4_2021-09-15_1215
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	73.8	56.4	58.1	58.5	56.5
	pH (1:2 soil:water) (pH)	8.04	8.13	7.72	7.51	7.53
Particle Size	% Gravel (>2mm) (%)	<1.0	8.3	6.0	<1.0	4.1
	% Sand (2.00mm - 1.00mm) (%)	<1.0	2.2	2.8	1.5	3.5
	% Sand (1.00mm - 0.50mm) (%)	<1.0	4.1	5.4	5.5	8.0
	% Sand (0.50mm - 0.25mm) (%)	2.0	9.3	18.7	16.7	14.9
	% Sand (0.25mm - 0.125mm) (%)	6.5	14.9	23.3	27.3	18.8
	% Sand (0.125mm - 0.063mm) (%)	8.0	13.8	11.4	14.8	13.1
	% Silt (0.063mm - 0.0312mm) (%)	23.1	21.5	14.2	15.9	15.1
	% Silt (0.0312mm - 0.004mm) (%)	45.9	22.1	15.3	15.5	17.3
	% Clay (<4um) (%)	12.9	3.7	2.9	2.8	5.3
	Texture	Silt loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	8.67	7.99	7.90	10.2	10.4
Metals	Aluminum (Al) (mg/kg)	4180	4580	5000	4560	4980
	Antimony (Sb) (mg/kg)	0.73	0.34	0.93	0.90	0.61
	Arsenic (As) (mg/kg)	16.4	4.04	4.90	5.37	4.64
	Barium (Ba) (mg/kg)	207	133	174	167	179
	Beryllium (Be) (mg/kg)	0.52	0.51	0.58	0.55	0.61
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	6.0	<5.0	5.4	<5.0	<5.0
	Cadmium (Cd) (mg/kg)	4.06	0.992	1.23	1.26	1.27
	Calcium (Ca) (mg/kg)	81300	22400	42800	22700	18800
	Chromium (Cr) (mg/kg)	9.42	8.87	9.73	9.25	9.18
	Cobalt (Co) (mg/kg)	55.3	4.48	4.98	6.25	5.70
	Copper (Cu) (mg/kg)	14.5	12.0	13.4	15.2	15.0
	Iron (Fe) (mg/kg)	30100	9560	12000	12200	10900
	Lead (Pb) (mg/kg)	8.79	6.88	8.60	8.75	8.44
	Lithium (Li) (mg/kg)	6.1	5.7	6.4	5.8	6.3
	Magnesium (Mg) (mg/kg)	9360	3720	3560	3380	2840
	Manganese (Mn) (mg/kg)	936	113	186	263	174
	Mercury (Hg) (mg/kg)	0.0298	0.0333	0.0298	0.0255	0.0258
	Molybdenum (Mo) (mg/kg)	1.97	0.85	1.16	1.17	0.98
	Nickel (Ni) (mg/kg)	88.9	17.7	20.5	21.7	19.7
	Phosphorus (P) (mg/kg)	1340	865	1040	1090	971
	Potassium (K) (mg/kg)	1330	1170	1360	1200	1250
	Selenium (Se) (mg/kg)	19.0	5.14	5.93	5.96	5.02
	Silver (Ag) (mg/kg)	0.21	0.19	0.19	0.21	0.22

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2641329-11
	Sample ID	L2641329-11
	Description	SE
	Sampled Date	15-SEP-21
	Sampled Time	11:55
	Client ID	RG_ERCKUT_SE-5_2021-09-15_1155
SOIL		
Physical Tests	Moisture (%)	48.9
	pH (1:2 soil:water) (pH)	7.63
Particle Size	% Gravel (>2mm) (%)	<1.0
	% Sand (2.00mm - 1.00mm) (%)	2.1
	% Sand (1.00mm - 0.50mm) (%)	5.5
	% Sand (0.50mm - 0.25mm) (%)	17.8
	% Sand (0.25mm - 0.125mm) (%)	28.3
	% Sand (0.125mm - 0.063mm) (%)	15.0
	% Silt (0.063mm - 0.0312mm) (%)	14.9
	% Silt (0.0312mm - 0.004mm) (%)	13.9
	% Clay (<4um) (%)	2.5
	Texture	Sandy loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	6.34
Metals	Aluminum (Al) (mg/kg)	4630
	Antimony (Sb) (mg/kg)	0.86
	Arsenic (As) (mg/kg)	5.34
	Barium (Ba) (mg/kg)	154
	Beryllium (Be) (mg/kg)	0.56
	Bismuth (Bi) (mg/kg)	<0.20
	Boron (B) (mg/kg)	<5.0
	Cadmium (Cd) (mg/kg)	1.17
	Calcium (Ca) (mg/kg)	30400
	Chromium (Cr) (mg/kg)	9.16
	Cobalt (Co) (mg/kg)	5.55
	Copper (Cu) (mg/kg)	13.2
	Iron (Fe) (mg/kg)	13600
	Lead (Pb) (mg/kg)	8.89
	Lithium (Li) (mg/kg)	6.0
	Magnesium (Mg) (mg/kg)	3480
	Manganese (Mn) (mg/kg)	229
	Mercury (Hg) (mg/kg)	0.0313
	Molybdenum (Mo) (mg/kg)	1.09
	Nickel (Ni) (mg/kg)	21.1
	Phosphorus (P) (mg/kg)	1050
	Potassium (K) (mg/kg)	1250
	Selenium (Se) (mg/kg)	4.02
	Silver (Ag) (mg/kg)	0.17

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2641329-1	L2641329-2	L2641329-3	L2641329-4	L2641329-5
	Description	SE	SE	SE	SE	SE
	Sampled Date	14-SEP-21	14-SEP-21	14-SEP-21	14-SEP-21	15-SEP-21
	Sampled Time	11:00	11:00	12:40	13:30	08:55
	Client ID	RG_ERCKDT_SE-1_2021-09-14_1100	RG_RIVER_SE_2021-09-14_1100	RG_ERCKDT_SE-2_2021-09-14_1240	RG_ERCKDT_SE-3_2021-09-14_1330	RG_ERCKDT_SE-4_2021-09-15_0855
Grouping	**Analyte**					
SOIL						
Metals	Sodium (Na) (mg/kg)	84	75	82	89	82
	Strontium (Sr) (mg/kg)	71.4	68.9	89.5	88.3	80.4
	Sulfur (S) (mg/kg)	2100	1800	1200	1800	1700
	Thallium (Tl) (mg/kg)	0.355	0.394	0.297	0.302	0.249
	Tin (Sn) (mg/kg)	<2.0	15.8	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	5.6	9.7	4.6	3.7	6.1
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	1.55	1.55	2.06	2.10	1.57
	Vanadium (V) (mg/kg)	18.9	21.3	19.2	20.2	18.6
	Zinc (Zn) (mg/kg)	243	227	334	350	180
	Zirconium (Zr) (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	DLCI <0.085	DLCI <0.085	DLCI <0.070	DLCI <0.090	DLCI <0.095
	Acenaphthylene (mg/kg)	DLHM <0.018	DLHM <0.018	DLHM 0.013	DLHM 0.011	DLHM 0.013
	Acridine (mg/kg)	DLCI <0.22	DLCI <0.22	DLCI <0.19	DLCI <0.20	DLCI <0.20
	Anthracene (mg/kg)	DLCI <0.020	DLHM <0.014	DLHM <0.0080	DLHM <0.0080	DLHM 0.0127
	Benz(a)anthracene (mg/kg)	DLHM 0.102	DLHM 0.272	DLHM 0.063	DLCI <0.090	DLCI <0.070
	Benzo(a)pyrene (mg/kg)	DLHM 0.064	DLHM <0.035	DLHM 0.033	DLHM 0.053	DLHM 0.025
	Benzo(b&j)fluoranthene (mg/kg)	DLHM 0.162	DLHM 0.152	DLHM 0.112	DLHM 0.160	DLHM 0.125
	Benzo(b+j+k)fluoranthene (mg/kg)	0.162	0.152	0.112	0.160	0.125
	Benzo(e)pyrene (mg/kg)	DLHM 0.156	DLHM 0.147	DLHM 0.123	DLHM 0.163	DLHM 0.130
	Benzo(g,h,i)perylene (mg/kg)	DLHM 0.073	DLHM 0.056	DLHM 0.048	DLHM 0.067	DLHM 0.049
	Benzo(k)fluoranthene (mg/kg)	DLHM <0.035	DLHM <0.035	DLHM <0.020	DLHM <0.020	DLHM <0.020
	Chrysene (mg/kg)	DLCI <0.39	DLHM 0.212	DLHM 0.285	DLCI <0.38	DLHM 0.311
	Dibenz(a,h)anthracene (mg/kg)	DLHM 0.019	DLHM <0.018	DLHM 0.011	DLHM 0.027	DLHM <0.010
	Fluoranthene (mg/kg)	DLHM 0.081	DLHM 0.060	DLHM 0.062	DLHM 0.068	DLHM 0.055
	Fluorene (mg/kg)	DLHM 0.274	DLHM 0.302	DLHM 0.248	DLHM 0.326	DLHM 0.238
	Indeno(1,2,3-c,d)pyrene (mg/kg)	DLHM <0.035	DLHM <0.035	DLHM <0.020	DLHM <0.020	DLHM <0.020
	1-Methylnaphthalene (mg/kg)	DLHM 0.751	DLHM 0.836	DLHM 0.655	DLHM 0.873	DLHM 0.718
	2-Methylnaphthalene (mg/kg)	DLHM 1.48	DLHM 1.55	DLHM 1.30	DLHM 1.70	DLHM 1.32
	Naphthalene (mg/kg)	DLHM 0.374	DLHM 0.380	DLHM 0.325	DLHM 0.433	DLHM 0.335
	Perylene (mg/kg)	DLHM <0.035	DLHM <0.035	DLHM <0.020	DLHM <0.020	DLHM <0.020
	Phenanthrene (mg/kg)	DLHM 1.06	DLHM 1.12	DLHM 0.898	DLHM 1.24	DLHM 0.944
	Pyrene (mg/kg)	DLHM 0.101	DLHM 0.112	DLHM 0.085	DLHM 0.109	DLHM 0.089
	Quinoline (mg/kg)	DLHM <0.035	DLHM <0.035	DLHM <0.020	DLHM <0.020	DLHM <0.020
	Surrogate: d10-Acenaphthene (%)	123.1	122.4	97.0	114.3	123.5
	Surrogate: d12-Chrysene (%)	119.1	SMI N/A	117.1	SMI N/A	126.4

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2641329-6	L2641329-7	L2641329-8	L2641329-9	L2641329-10
	Description	SE	SE	SE	SE	SE
	Sampled Date	15-SEP-21	15-SEP-21	15-SEP-21	15-SEP-21	15-SEP-21
	Sampled Time	09:05	15:20	14:05	13:50	12:15
	Client ID	RG_ERCKDT_SE-5_2021-09-15_0905	RG_ERCKUT_SE-1_2021-09-15_1520	RG_ERCKUT_SE-2_2021-09-15_1405	RG_ERCKUT_SE-3_2021-09-15_1350	RG_ERCKUT_SE-4_2021-09-15_1215
Grouping	**Analyte**					
SOIL						
Metals	Sodium (Na) (mg/kg)	90	<50	54	55	53
	Strontium (Sr) (mg/kg)	86.2	37.4	51.0	46.1	39.0
	Sulfur (S) (mg/kg)	1500	<1000	<1000	<1000	<1000
	Thallium (Tl) (mg/kg)	0.281	0.151	0.183	0.174	0.160
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	5.3	2.5	9.4	3.9	2.8
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	1.73	1.26	1.49	1.43	1.24
	Vanadium (V) (mg/kg)	21.6	20.5	25.3	24.1	23.2
	Zinc (Zn) (mg/kg)	248	70.5	82.5	86.8	81.0
	Zirconium (Zr) (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	DLCI <0.080	DLCI <0.025	DLCI <0.015	DLCI <0.020	DLCI <0.045
	Acenaphthylene (mg/kg)	0.0074	<0.0050	<0.0050	<0.0050	0.0052
	Acridine (mg/kg)	DLCI <0.18	DLCI <0.020	DLCI <0.040	DLCI <0.030	DLCI <0.050
	Anthracene (mg/kg)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Benz(a)anthracene (mg/kg)	0.067	0.073	0.045	0.022	0.109
	Benzo(a)pyrene (mg/kg)	0.029	<0.010	<0.010	<0.010	<0.010
	Benzo(b&j)fluoranthene (mg/kg)	0.125	0.081	0.037	0.064	0.112
	Benzo(b+j+k)fluoranthene (mg/kg)	0.125	0.081	0.037	0.064	0.112
	Benzo(e)pyrene (mg/kg)	0.127	0.069	0.033	0.059	0.099
	Benzo(g,h,i)perylene (mg/kg)	0.051	0.014	<0.010	0.018	0.024
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Chrysene (mg/kg)	0.332	0.130	0.045	0.140	0.143
	Dibenz(a,h)anthracene (mg/kg)	0.0134	0.0083	<0.0050	0.0060	0.0117
	Fluoranthene (mg/kg)	0.057	0.035	0.014	DLCI <0.030	0.040
	Fluorene (mg/kg)	0.265	0.016	0.027	0.038	0.044
	Indeno(1,2,3-c,d)pyrene (mg/kg)	0.010	<0.010	<0.010	<0.010	<0.010
	1-Methylnaphthalene (mg/kg)	0.698	0.177	0.156	0.190	0.329
	2-Methylnaphthalene (mg/kg)	1.40	0.259	0.248	0.294	0.544
	Naphthalene (mg/kg)	0.349	0.174	0.071	0.113	0.272
	Perylene (mg/kg)	<0.010	0.022	<0.010	<0.010	0.050
	Phenanthrene (mg/kg)	0.992	0.583	0.258	0.409	0.873
	Pyrene (mg/kg)	0.084	0.043	0.021	0.037	0.065
	Quinoline (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Surrogate: d10-Acenaphthene (%)	100.2	92.2	83.5	86.9	84.0
	Surrogate: d12-Chrysene (%)	122.0	116.2	102.0	107.9	102.5

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2641329-11				
	Description	SE				
	Sampled Date	15-SEP-21				
	Sampled Time	11:55				
	Client ID	RG_ERCKUT_SE-5_2021-09-15_1155				
Grouping	**Analyte**					
SOIL						
Metals	Sodium (Na) (mg/kg)	51				
	Strontium (Sr) (mg/kg)	45.7				
	Sulfur (S) (mg/kg)	<1000				
	Thallium (Tl) (mg/kg)	0.171				
	Tin (Sn) (mg/kg)	<2.0				
	Titanium (Ti) (mg/kg)	3.9				
	Tungsten (W) (mg/kg)	<0.50				
	Uranium (U) (mg/kg)	1.13				
	Vanadium (V) (mg/kg)	23.8				
	Zinc (Zn) (mg/kg)	90.9				
	Zirconium (Zr) (mg/kg)	<1.0				
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	DLCI <0.025				
	Acenaphthylene (mg/kg)	<0.0050				
	Acridine (mg/kg)	DLCI <0.030				
	Anthracene (mg/kg)	<0.0040				
	Benz(a)anthracene (mg/kg)	0.123				
	Benzo(a)pyrene (mg/kg)	<0.010				
	Benzo(b&j)fluoranthene (mg/kg)	0.096				
	Benzo(b+j+k)fluoranthene (mg/kg)	0.096				
	Benzo(e)pyrene (mg/kg)	0.081				
	Benzo(g,h,i)perylene (mg/kg)	0.019				
	Benzo(k)fluoranthene (mg/kg)	<0.010				
	Chrysene (mg/kg)	0.132				
	Dibenz(a,h)anthracene (mg/kg)	0.0068				
	Fluoranthene (mg/kg)	0.037				
	Fluorene (mg/kg)	0.022				
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010				
	1-Methylnaphthalene (mg/kg)	0.250				
	2-Methylnaphthalene (mg/kg)	0.388				
	Naphthalene (mg/kg)	0.226				
	Perylene (mg/kg)	<0.010				
	Phenanthrene (mg/kg)	0.719				
	Pyrene (mg/kg)	0.053				
	Quinoline (mg/kg)	<0.050				
	Surrogate: d10-Acenaphthene (%)	89.5				
	Surrogate: d12-Chrysene (%)	107.4				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2641329-1	L2641329-2	L2641329-3	L2641329-4	L2641329-5
	Description	SE	SE	SE	SE	SE
	Sampled Date	14-SEP-21	14-SEP-21	14-SEP-21	14-SEP-21	15-SEP-21
	Sampled Time	11:00	11:00	12:40	13:30	08:55
	Client ID	RG_ERCKDT_SE-1_2021-09-14_1100	RG_RIVER_SE_2021-09-14_1100	RG_ERCKDT_SE-2_2021-09-14_1240	RG_ERCKDT_SE-3_2021-09-14_1330	RG_ERCKDT_SE-4_2021-09-15_0855
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d8-Naphthalene (%)	115.0	114.9	95.1	110.8	118.7
	Surrogate: d10-Phenanthrene (%)	110.0	N/A SMI	108.9	129.2	88.6
	IACR:Coarse	0.061	0.069	<0.050	<0.050	<0.050
	IACR:Fine	0.117	0.131	0.078	0.095	0.076
	B(a)P Total Potency Equivalent (mg/kg)	0.116	0.075	0.067	0.104	0.051
	IACR (CCME)	1.80	2.09	1.24	1.56	1.20

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2641329-6	L2641329-7	L2641329-8	L2641329-9	L2641329-10
	Description	SE	SE	SE	SE	SE
	Sampled Date	15-SEP-21	15-SEP-21	15-SEP-21	15-SEP-21	15-SEP-21
	Sampled Time	09:05	15:20	14:05	13:50	12:15
	Client ID	RG_ERCKDT_SE-5_2021-09-15_0905	RG_ERCKUT_SE-1_2021-09-15_1520	RG_ERCKUT_SE-2_2021-09-15_1405	RG_ERCKUT_SE-3_2021-09-15_1350	RG_ERCKUT_SE-4_2021-09-15_1215
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d8-Naphthalene (%)	95.7	90.1	83.3	86.6	87.0
	Surrogate: d10-Phenanthrene (%)	113.3	107.1	96.2	100.6	96.9
	IACR:Coarse	<0.050	<0.050	<0.050	<0.050	<0.050
	IACR:Fine	0.076	0.052	<0.050	<0.050	0.069
	B(a)P Total Potency Equivalent (mg/kg)	0.067	0.031	<0.020	0.022	0.041
	IACR (CCME)	1.32	0.87	0.44	0.61	1.20

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2641329-11				
	Description	SE				
	Sampled Date	15-SEP-21				
	Sampled Time	11:55				
	Client ID	RG_ERCKUT_SE-5_2021-09-15_1155				
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d8-Naphthalene (%)	87.4				
	Surrogate: d10-Phenanthrene (%)	99.5				
	IACR:Coarse	<0.050				
	IACR:Fine	0.065				
	B(a)P Total Potency Equivalent (mg/kg)	0.036				
	IACR (CCME)	1.11				

* 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 Particle Size Analysis (100g minimum is standard). Measurement Uncertainty for PSA results may be higher than usual.
SMI	Surrogate recovery could not be measured due to sample matrix interference.

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.

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:

September EVO LAEMP

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

Workorder: L2641329 Report Date: 13-OCT-21

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Allie Ferguson

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TIC-PCT-SK	**Soil**							
Batch R5606512								
WG3628485-1 DUP		**L2641329-4**						
Inorganic Carbon		2.21	2.20		%	0.6	20	01-OCT-21
WG3628485-4 IRM		**08-109_SOIL**						
Inorganic Carbon			97.4		%		80-120	01-OCT-21
WG3628485-2 LCS		**0.5**						
Inorganic Carbon			97.0		%		90-110	01-OCT-21
WG3628485-3 MB								
Inorganic Carbon			<0.050		%		0.05	01-OCT-21
C-TOT-LECO-SK	**Soil**							
Batch R5606047								
WG3622206-2 IRM		**08-109_SOIL**						
Total Carbon by Combustion			101.6		%		80-120	24-SEP-21
WG3622206-4 LCS		**SULFADIAZINE**						
Total Carbon by Combustion			102.2		%		90-110	24-SEP-21
WG3622206-3 MB								
Total Carbon by Combustion			<0.05		%		0.05	24-SEP-21
HG-200.2-CVAA-CL	**Soil**							
Batch R5605501								
WG3627462-14 CRM		**TILL-2**						
Mercury (Hg)			83.4		%		70-130	30-SEP-21
WG3627462-13 LCS								
Mercury (Hg)			98.4		%		80-120	30-SEP-21
WG3627462-11 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	30-SEP-21
MET-200.2-CCMS-CL	**Soil**							
Batch R5605699								
WG3627462-14 CRM		**TILL-2**						
Aluminum (Al)			79.0		%		70-130	01-OCT-21
Antimony (Sb)			93.8		%		70-130	01-OCT-21
Arsenic (As)			91.4		%		70-130	01-OCT-21
Barium (Ba)			89.2		%		70-130	01-OCT-21
Beryllium (Be)			84.9		%		70-130	01-OCT-21
Bismuth (Bi)			91.5		%		70-130	01-OCT-21
Cadmium (Cd)			93.9		%		70-130	01-OCT-21
Calcium (Ca)			85.1		%		70-130	01-OCT-21
Chromium (Cr)			86.7		%		70-130	01-OCT-21
Cobalt (Co)			90.7		%		70-130	01-OCT-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5605699								
WG3627462-14 CRM		**TILL-2**						
Copper (Cu)			92.4		%		70-130	01-OCT-21
Iron (Fe)			90.6		%		70-130	01-OCT-21
Lead (Pb)			92.3		%		70-130	01-OCT-21
Lithium (Li)			88.5		%		70-130	01-OCT-21
Magnesium (Mg)			82.5		%		70-130	01-OCT-21
Manganese (Mn)			85.1		%		70-130	01-OCT-21
Molybdenum (Mo)			86.4		%		70-130	01-OCT-21
Nickel (Ni)			93.2		%		70-130	01-OCT-21
Phosphorus (P)			84.8		%		70-130	01-OCT-21
Potassium (K)			83.0		%		70-130	01-OCT-21
Selenium (Se)			0.38		mg/kg		0.15-0.55	01-OCT-21
Silver (Ag)			0.24		mg/kg		0.16-0.36	01-OCT-21
Sodium (Na)			78.6		%		70-130	01-OCT-21
Strontium (Sr)			88.4		%		70-130	01-OCT-21
Thallium (Tl)			93.3		%		70-130	01-OCT-21
Tin (Sn)			2.0		mg/kg		0.2-4.2	01-OCT-21
Titanium (Ti)			77.2		%		70-130	01-OCT-21
Tungsten (W)			1.11		mg/kg		1-2	01-OCT-21
Uranium (U)			91.8		%		70-130	01-OCT-21
Vanadium (V)			86.1		%		70-130	01-OCT-21
Zinc (Zn)			88.5		%		70-130	01-OCT-21
Zirconium (Zr)			93.9		%		70-130	01-OCT-21
WG3627462-13 LCS								
Aluminum (Al)			85.0		%		80-120	01-OCT-21
Antimony (Sb)			91.4		%		80-120	01-OCT-21
Arsenic (As)			90.5		%		80-120	01-OCT-21
Barium (Ba)			91.8		%		80-120	01-OCT-21
Beryllium (Be)			90.2		%		80-120	01-OCT-21
Bismuth (Bi)			86.5		%		80-120	01-OCT-21
Boron (B)			83.7		%		80-120	01-OCT-21
Cadmium (Cd)			92.4		%		80-120	01-OCT-21
Calcium (Ca)			84.8		%		80-120	01-OCT-21
Chromium (Cr)			88.8		%		80-120	01-OCT-21
Cobalt (Co)			92.7		%		80-120	01-OCT-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5605699								
WG3627462-13 LCS								
Copper (Cu)			90.1		%		80-120	01-OCT-21
Iron (Fe)			95.1		%		80-120	01-OCT-21
Lead (Pb)			86.9		%		80-120	01-OCT-21
Lithium (Li)			93.8		%		80-120	01-OCT-21
Magnesium (Mg)			85.8		%		80-120	01-OCT-21
Manganese (Mn)			93.5		%		80-120	01-OCT-21
Molybdenum (Mo)			87.3		%		80-120	01-OCT-21
Nickel (Ni)			93.4		%		80-120	01-OCT-21
Phosphorus (P)			90.9		%		80-120	01-OCT-21
Potassium (K)			88.3		%		80-120	01-OCT-21
Selenium (Se)			91.5		%		80-120	01-OCT-21
Silver (Ag)			89.9		%		80-120	01-OCT-21
Sodium (Na)			89.8		%		80-120	01-OCT-21
Strontium (Sr)			88.4		%		80-120	01-OCT-21
Sulfur (S)			83.4		%		80-120	01-OCT-21
Thallium (Tl)			85.4		%		80-120	01-OCT-21
Tin (Sn)			86.8		%		80-120	01-OCT-21
Titanium (Ti)			81.1		%		80-120	01-OCT-21
Tungsten (W)			89.8		%		80-120	01-OCT-21
Uranium (U)			88.2		%		80-120	01-OCT-21
Vanadium (V)			90.8		%		80-120	01-OCT-21
Zinc (Zn)			87.7		%		80-120	01-OCT-21
Zirconium (Zr)			89.8		%		80-120	01-OCT-21
WG3627462-11 MB								
Aluminum (Al)			<50		mg/kg		50	01-OCT-21
Antimony (Sb)			<0.10		mg/kg		0.1	01-OCT-21
Arsenic (As)			<0.10		mg/kg		0.1	01-OCT-21
Barium (Ba)			<0.50		mg/kg		0.5	01-OCT-21
Beryllium (Be)			<0.10		mg/kg		0.1	01-OCT-21
Bismuth (Bi)			<0.20		mg/kg		0.2	01-OCT-21
Boron (B)			<5.0		mg/kg		5	01-OCT-21
Cadmium (Cd)			<0.020		mg/kg		0.02	01-OCT-21
Calcium (Ca)			<50		mg/kg		50	01-OCT-21
Chromium (Cr)			<0.50		mg/kg		0.5	01-OCT-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5605699								
WG3627462-11 MB								
Cobalt (Co)			<0.10		mg/kg		0.1	01-OCT-21
Copper (Cu)			<0.50		mg/kg		0.5	01-OCT-21
Iron (Fe)			<50		mg/kg		50	01-OCT-21
Lead (Pb)			<0.50		mg/kg		0.5	01-OCT-21
Lithium (Li)			<2.0		mg/kg		2	01-OCT-21
Magnesium (Mg)			<20		mg/kg		20	01-OCT-21
Manganese (Mn)			<1.0		mg/kg		1	01-OCT-21
Molybdenum (Mo)			<0.10		mg/kg		0.1	01-OCT-21
Nickel (Ni)			<0.50		mg/kg		0.5	01-OCT-21
Phosphorus (P)			<50		mg/kg		50	01-OCT-21
Potassium (K)			<100		mg/kg		100	01-OCT-21
Selenium (Se)			<0.20		mg/kg		0.2	01-OCT-21
Silver (Ag)			<0.10		mg/kg		0.1	01-OCT-21
Sodium (Na)			<50		mg/kg		50	01-OCT-21
Strontium (Sr)			<0.50		mg/kg		0.5	01-OCT-21
Sulfur (S)			<1000		mg/kg		1000	01-OCT-21
Thallium (Tl)			<0.050		mg/kg		0.05	01-OCT-21
Tin (Sn)			<2.0		mg/kg		2	01-OCT-21
Titanium (Ti)			<1.0		mg/kg		1	01-OCT-21
Tungsten (W)			<0.50		mg/kg		0.5	01-OCT-21
Uranium (U)			<0.050		mg/kg		0.05	01-OCT-21
Vanadium (V)			<0.20		mg/kg		0.2	01-OCT-21
Zinc (Zn)			<2.0		mg/kg		2	01-OCT-21
Zirconium (Zr)			<1.0		mg/kg		1	01-OCT-21
MOISTURE-CL	**Soil**							
Batch R5602397								
WG3625482-3 DUP		**L2641329-1**						
Moisture		86.4	86.2		%	0.2	20	28-SEP-21
WG3625482-2 LCS								
Moisture			96.4		%		90-110	28-SEP-21
WG3625482-1 MB								
Moisture			<0.25		%		0.25	28-SEP-21
PAH-TMB-H/A-MS-CL	**Soil**							

Quality Control Report

Workorder: L2641329 Report Date: 13-OCT-21

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5604623								
WG3627661-5 DUP		**L2641329-1**						
Acenaphthene		<0.085	<0.085	RPD-NA	mg/kg	N/A	50	29-SEP-21
Acenaphthylene		<0.018	<0.018	RPD-NA	mg/kg	N/A	50	29-SEP-21
Anthracene		<0.020	<0.020	RPD-NA	mg/kg	N/A	50	29-SEP-21
Acridine		<0.22	<0.22	RPD-NA	mg/kg	N/A	50	29-SEP-21
Benz(a)anthracene		0.102	0.069		mg/kg	39	50	29-SEP-21
Benzo(a)pyrene		0.064	<0.035	RPD-NA	mg/kg	N/A	50	29-SEP-21
Benzo(b&j)fluoranthene		0.162	0.130		mg/kg	22	50	29-SEP-21
Benzo(e)pyrene		0.156	0.137		mg/kg	13	50	29-SEP-21
Benzo(g,h,i)perylene		0.073	0.051		mg/kg	35	50	29-SEP-21
Benzo(k)fluoranthene		<0.035	<0.035	RPD-NA	mg/kg	N/A	50	29-SEP-21
Chrysene		<0.39	<0.39	RPD-NA	mg/kg	N/A	50	29-SEP-21
Dibenz(a,h)anthracene		0.019	0.026		mg/kg	31	50	29-SEP-21
Fluoranthene		0.081	0.045	J	mg/kg	0.037	0.07	29-SEP-21
Fluorene		0.274	0.184		mg/kg	39	50	29-SEP-21
Indeno(1,2,3-c,d)pyrene		<0.035	<0.035	RPD-NA	mg/kg	N/A	50	29-SEP-21
2-Methylnaphthalene		1.48	1.28		mg/kg	15	50	29-SEP-21
Naphthalene		0.374	0.333		mg/kg	12	50	29-SEP-21
Perylene		<0.035	<0.035	RPD-NA	mg/kg	N/A	50	29-SEP-21
Phenanthrene		1.06	0.958		mg/kg	10	50	29-SEP-21
Pyrene		0.101	0.087		mg/kg	16	50	29-SEP-21
1-Methylnaphthalene		0.751	0.693		mg/kg	8.0	50	29-SEP-21
Quinoline		<0.035	<0.035	RPD-NA	mg/kg	N/A	50	29-SEP-21
WG3627661-3 IRM		**ALS PAH RM2**						
Acenaphthene			93.4		%		60-130	29-SEP-21
Acenaphthylene			104.9		%		60-130	29-SEP-21
Anthracene			113.6		%		60-130	29-SEP-21
Acridine			117.1		%		60-130	29-SEP-21
Benz(a)anthracene			110.3		%		60-130	29-SEP-21
Benzo(a)pyrene			109.5		%		60-130	29-SEP-21
Benzo(b&j)fluoranthene			103.6		%		60-130	29-SEP-21
Benzo(e)pyrene			110.4		%		60-130	29-SEP-21
Benzo(g,h,i)perylene			95.7		%		60-130	29-SEP-21
Benzo(k)fluoranthene			93.2		%		60-130	29-SEP-21
Chrysene			105.7		%		60-130	29-SEP-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5604623								
WG3627661-3 IRM		**ALS PAH RM2**						
Dibenz(a,h)anthracene			92.9		%		60-130	29-SEP-21
Fluoranthene			93.7		%		60-130	29-SEP-21
Fluorene			95.6		%		60-130	29-SEP-21
Indeno(1,2,3-c,d)pyrene			124.7		%		60-130	29-SEP-21
2-Methylnaphthalene			92.2		%		60-130	29-SEP-21
Naphthalene			86.7		%		50-130	29-SEP-21
Perylene			110.2		%		60-130	29-SEP-21
Phenanthrene			96.0		%		60-130	29-SEP-21
Pyrene			97.0		%		60-130	29-SEP-21
1-Methylnaphthalene			91.3		%		60-130	29-SEP-21
WG3627661-7 IRM		**ALS PAH RM2**						
Acenaphthene			96.1		%		60-130	29-SEP-21
Acenaphthylene			102.2		%		60-130	29-SEP-21
Anthracene			116.7		%		60-130	29-SEP-21
Acridine			108.0		%		60-130	29-SEP-21
Benz(a)anthracene			102.2		%		60-130	29-SEP-21
Benzo(a)pyrene			98.4		%		60-130	29-SEP-21
Benzo(b&j)fluoranthene			97.4		%		60-130	29-SEP-21
Benzo(e)pyrene			98.9		%		60-130	29-SEP-21
Benzo(g,h,i)perylene			89.7		%		60-130	29-SEP-21
Benzo(k)fluoranthene			82.5		%		60-130	29-SEP-21
Chrysene			98.9		%		60-130	29-SEP-21
Dibenz(a,h)anthracene			87.5		%		60-130	29-SEP-21
Fluoranthene			92.2		%		60-130	29-SEP-21
Fluorene			100.9		%		60-130	29-SEP-21
Indeno(1,2,3-c,d)pyrene			118.9		%		60-130	29-SEP-21
2-Methylnaphthalene			95.9		%		60-130	29-SEP-21
Naphthalene			92.0		%		50-130	29-SEP-21
Perylene			104.2		%		60-130	29-SEP-21
Phenanthrene			97.6		%		60-130	29-SEP-21
Pyrene			95.2		%		60-130	29-SEP-21
1-Methylnaphthalene			94.7		%		60-130	29-SEP-21
WG3627661-2 LCS								
Acenaphthene			104.6		%		60-130	29-SEP-21
Acenaphthylene			101.7		%		60-130	29-SEP-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5604623								
WG3627661-2 LCS								
Anthracene			111.1		%		60-130	29-SEP-21
Acridine			120.0		%		60-130	29-SEP-21
Benz(a)anthracene			118.0		%		60-130	29-SEP-21
Benzo(a)pyrene			113.5		%		60-130	29-SEP-21
Benzo(b&j)fluoranthene			115.3		%		60-130	29-SEP-21
Benzo(e)pyrene			118.5		%		60-130	29-SEP-21
Benzo(g,h,i)perylene			103.0		%		60-130	29-SEP-21
Benzo(k)fluoranthene			108.5		%		60-130	29-SEP-21
Chrysene			110.9		%		60-130	29-SEP-21
Dibenz(a,h)anthracene			101.5		%		60-130	29-SEP-21
Fluoranthene			106.1		%		60-130	29-SEP-21
Fluorene			108.0		%		60-130	29-SEP-21
Indeno(1,2,3-c,d)pyrene			112.4		%		60-130	29-SEP-21
2-Methylnaphthalene			111.0		%		60-130	29-SEP-21
Naphthalene			104.6		%		50-130	29-SEP-21
Perylene			106.4		%		60-130	29-SEP-21
Phenanthrene			111.5		%		60-130	29-SEP-21
Pyrene			110.4		%		60-130	29-SEP-21
1-Methylnaphthalene			108.1		%		60-130	29-SEP-21
Quinoline			89.5		%		60-130	29-SEP-21
WG3627661-6 LCS								
Acenaphthene			100.5		%		60-130	29-SEP-21
Acenaphthylene			99.9		%		60-130	29-SEP-21
Anthracene			106.6		%		60-130	29-SEP-21
Acridine			104.5		%		60-130	29-SEP-21
Benz(a)anthracene			111.3		%		60-130	29-SEP-21
Benzo(a)pyrene			110.0		%		60-130	29-SEP-21
Benzo(b&j)fluoranthene			106.9		%		60-130	29-SEP-21
Benzo(e)pyrene			110.3		%		60-130	29-SEP-21
Benzo(g,h,i)perylene			98.4		%		60-130	29-SEP-21
Benzo(k)fluoranthene			103.1		%		60-130	29-SEP-21
Chrysene			103.7		%		60-130	29-SEP-21
Dibenz(a,h)anthracene			97.4		%		60-130	29-SEP-21
Fluoranthene			102.1		%		60-130	29-SEP-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5604623								
WG3627661-6 LCS								
Fluorene			102.6		%		60-130	29-SEP-21
Indeno(1,2,3-c,d)pyrene			102.7		%		60-130	29-SEP-21
2-Methylnaphthalene			104.4		%		60-130	29-SEP-21
Naphthalene			101.2		%		50-130	29-SEP-21
Perylene			105.1		%		60-130	29-SEP-21
Phenanthrene			106.7		%		60-130	29-SEP-21
Pyrene			103.4		%		60-130	29-SEP-21
1-Methylnaphthalene			103.3		%		60-130	29-SEP-21
Quinoline			98.3		%		60-130	29-SEP-21
WG3627661-1 MB								
Acenaphthene			<0.0050		mg/kg		0.005	28-SEP-21
Acenaphthylene			<0.0050		mg/kg		0.005	28-SEP-21
Anthracene			<0.0040		mg/kg		0.004	28-SEP-21
Acridine			<0.010		mg/kg		0.01	28-SEP-21
Benz(a)anthracene			<0.010		mg/kg		0.01	28-SEP-21
Benzo(a)pyrene			<0.010		mg/kg		0.01	28-SEP-21
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	28-SEP-21
Benzo(e)pyrene			<0.010		mg/kg		0.01	28-SEP-21
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	28-SEP-21
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	28-SEP-21
Chrysene			<0.010		mg/kg		0.01	28-SEP-21
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	28-SEP-21
Fluoranthene			<0.010		mg/kg		0.01	28-SEP-21
Fluorene			<0.010		mg/kg		0.01	28-SEP-21
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	28-SEP-21
2-Methylnaphthalene			<0.010		mg/kg		0.01	28-SEP-21
Naphthalene			<0.010		mg/kg		0.01	28-SEP-21
Perylene			<0.010		mg/kg		0.01	28-SEP-21
Phenanthrene			<0.010		mg/kg		0.01	28-SEP-21
Pyrene			<0.010		mg/kg		0.01	28-SEP-21
1-Methylnaphthalene			<0.050		mg/kg		0.05	28-SEP-21
Quinoline			<0.050		mg/kg		0.05	28-SEP-21
Surrogate: d8-Naphthalene			91.9		%		50-130	28-SEP-21
Surrogate: d10-Acenaphthene			100.4		%		60-130	28-SEP-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5604623								
WG3627661-1 MB								
Surrogate: d10-Phenanthrene			102.5		%		60-130	28-SEP-21
Surrogate: d12-Chrysene			107.9		%		60-130	28-SEP-21
WG3627661-4 MB								
Acenaphthene			<0.0050		mg/kg		0.005	29-SEP-21
Acenaphthylene			<0.0050		mg/kg		0.005	29-SEP-21
Anthracene			<0.0040		mg/kg		0.004	29-SEP-21
Acridine			<0.010		mg/kg		0.01	29-SEP-21
Benz(a)anthracene			<0.010		mg/kg		0.01	29-SEP-21
Benzo(a)pyrene			<0.010		mg/kg		0.01	29-SEP-21
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	29-SEP-21
Benzo(e)pyrene			<0.010		mg/kg		0.01	29-SEP-21
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	29-SEP-21
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	29-SEP-21
Chrysene			<0.010		mg/kg		0.01	29-SEP-21
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	29-SEP-21
Fluoranthene			<0.010		mg/kg		0.01	29-SEP-21
Fluorene			<0.010		mg/kg		0.01	29-SEP-21
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	29-SEP-21
2-Methylnaphthalene			<0.010		mg/kg		0.01	29-SEP-21
Naphthalene			<0.010		mg/kg		0.01	29-SEP-21
Perylene			<0.010		mg/kg		0.01	29-SEP-21
Phenanthrene			<0.010		mg/kg		0.01	29-SEP-21
Pyrene			<0.010		mg/kg		0.01	29-SEP-21
1-Methylnaphthalene			<0.050		mg/kg		0.05	29-SEP-21
Quinoline			<0.050		mg/kg		0.05	29-SEP-21
Surrogate: d8-Naphthalene			90.9		%		50-130	29-SEP-21
Surrogate: d10-Acenaphthene			93.3		%		60-130	29-SEP-21
Surrogate: d10-Phenanthrene			100.0		%		60-130	29-SEP-21
Surrogate: d12-Chrysene			108.0		%		60-130	29-SEP-21
PH-1:2-CL	**Soil**							
Batch R5604712								
WG3627849-9 DUP		**L2641329-1**						
pH (1:2 soil:water)		8.01	8.00	J	pH	0.01	0.2	29-SEP-21
WG3627849-8 IRM		**SAL-STD11**						
pH (1:2 soil:water)			7.96		pH		7.7-8.3	29-SEP-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-1:2-CL	**Soil**							
Batch R5604712								
WG3627849-7 LCS								
pH (1:2 soil:water)			7.00		pH		6.8-7.2	29-SEP-21
PSA-PIPET-DETAIL-SK	**Soil**							
Batch R5604764								
WG3622197-2 IRM		**2020-PSA_SOIL**						
% Sand (2.00mm - 1.00mm)			2.2		%		0-7.2	28-SEP-21
% Sand (1.00mm - 0.50mm)			3.9		%		0-8.7	28-SEP-21
% Sand (0.50mm - 0.25mm)			9.2		%		4-14	28-SEP-21
% Sand (0.25mm - 0.125mm)			16.8		%		11.7-21.7	28-SEP-21
% Sand (0.125mm - 0.063mm)			14.2		%		8.4-18.4	28-SEP-21
% Silt (0.063mm - 0.0312mm)			11.6		%		8.5-18.5	28-SEP-21
% Silt (0.0312mm - 0.004mm)			20.2		%		15.1-25.1	28-SEP-21
% Clay (<4um)			21.9		%		16.5-26.5	28-SEP-21
Batch R5606465								
WG3625839-2 IRM		**2020-PSA_SOIL**						
% Sand (2.00mm - 1.00mm)			2.9		%		0-7.2	01-OCT-21
% Sand (1.00mm - 0.50mm)			3.7		%		0-8.7	01-OCT-21
% Sand (0.50mm - 0.25mm)			9.0		%		4-14	01-OCT-21
% Sand (0.25mm - 0.125mm)			16.9		%		11.7-21.7	01-OCT-21
% Sand (0.125mm - 0.063mm)			13.8		%		8.4-18.4	01-OCT-21
% Silt (0.063mm - 0.0312mm)			11.5		%		8.5-18.5	01-OCT-21
% Silt (0.0312mm - 0.004mm)			20.4		%		15.1-25.1	01-OCT-21
% Clay (<4um)			21.9		%		16.5-26.5	01-OCT-21

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.

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:	September EVO LAEMP 2021	TURNAROUND TIME:	

PROJECT/CLIENT INFO

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SAMPLE DETAILS

L2641329-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.	C-TOC-SK	MET-CCME+FULL-CL	MOISTURE-CL - % Moisture	PSA-PIPET-DETAIL-SK Particle Size	PAH-TMB-D/A-MS-CL-PAHs
								Filtered	N	N	N	N	N
								Preservative	NONE	NONE	NONE	NONE	NONE
1	RG_ERCKDT_SE-1_2021-09-14_1100	RG_ERCKDT	SE	No	9/14/2021	1100	G	2	X	X	X	X	X
2	RG_RIVER_SE_2021-09-14_1100	RG_RIVER	SE	No	9/14/2021	1100	G	2	X	X	X	X	X
3	RG_ERCKDT_SE-2_2021-09-14_1240	RG_ERCKDT	SE	No	9/14/2021	1240	G	2	X	X	X	X	X
4	RG_ERCKDT_SE-3_2021-09-14_1330	RG_ERCKDT	SE	No	9/14/2021	1330	G	2	X	X	X	X	X
5	RG_ERCKDT_SE-4_2021-09-14_0855	RG_ERCKDT	SE	No	9/15/2021	855	G	2	X	X	X	X	X
6	RG_ERCKDT_SE-5_2021-09-14_0905	RG_ERCKDT	SE	No	9/15/2021	905	G	2	X	X	X	X	X
7	RG_ERCKUT_SE-1_2021-09-15_1520	RG_ERCKUT	SE	No	9/15/2021	1520	G	2	X	X	X	X	X
8	RG_ERCKUT_SE-2_2021-09-15_1405	RG_ERCKUT	SE	No	9/15/2021	1405	G	2	X	X	X	X	X
9	RG_ERCKUT_SE-3_2021-09-15_1350	RG_ERCKUT	SE	No	9/15/2021	1350	G	2	X	X	X	X	X
10	RG_ERCKUT_SE-4_2021-09-15_1215	RG_ERCKUT	SE	No	9/15/2021	1215	G	2	X	X	X	X	X
11	RG_ERCKUT_SE-5_2021-09-15_1155	RG_ERCKUT	SE	No	9/15/2021	1155	G	2	X	X	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

ALS PO 750546

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Jennifer Ings/Minnow	###############		9/17 [illegible]

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	Jennifer Ings	Mobile #	519-500-3444
Sampler's Signature	[signature]	Date/Time	September 16, 2021

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BENTHIC COMMUNITY

Cordillera Methods and QC Report 21-09

(Finalized May 11, 2022)

Methods and QC Report 2022

Project ID: EVO LAEMP (21-09)

Client: Minnow Environmental

Prepared by:
Cordillera Consulting Inc.
Summerland, BC

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Sample Reception

On September 28, 2021, Cordillera Consulting received 27 benthic samples from Minnow Environmental. When samples arrived to Cordillera Consulting, exterior packaging was initially inspected for damage or wet spots that would have indicated damage to the interior containers.

Samples were logged into a proprietary software database (INSTAR1) where the clients assigned sample name was recorded along with a Cordillera Consulting (CC) number for cross-reference. Each sample was checked to ensure that all sites and replicates recorded on field sheets or packing lists were delivered intact and with adequate preservative. Any missing, mislabelled or extra samples were reported to the client immediately to confirm the total numbers and correct names on the sample jars. The client representative was notified of the arrival of the shipment and provided a sample inventory once intake was completed.
See table below for sample inventory:

Table 1: Summary of sample information including Cordillera Consulting (CC) number

Sample	CC#	Date	Size	# of Jars
RG_ERCKUT_BIC-1_2021-09-15	CC221287	9/15/2021	400µM	3
RG_ERCKUT_BIC-2_2021-09-15	CC221288	9/15/2021	400µM	5
RG_ERCKUT_BIC-3_2021-09-15	CC221289	9/15/2021	400µM	3
RG_MIDBO_BIC-1_2021-09-11	CC221290	9/11/2021	400µM	1
RG_MIDBO_BIC-2_2021-09-11	CC221291	9/11/2021	400µM	1
RG_MIDBO_BIC-3_2021-09-11	CC221292	9/11/2021	400µM	1
RG_ERCKDT_BIC-1_2021-09-15	CC221293	9/15/2021	400µM	2
RG_ERCKDT_BIC-2_2021-09-15	CC221294	9/15/2021	400µM	3
RG_ERCKDT_BIC-3_2021-09-15	CC221295	9/15/2021	400µM	4
RG_MIDER_BIC-1_2021-09-09	CC221296	9/9/2021	400µM	1
RG_MIDER_BIC-2_2021-09-09	CC221297	9/9/2021	400µM	1
RG_MIDER_BIC-3_2021-09-09	CC221298	9/9/2021	400µM	1
RG_ERCK_BIC-1_2021-09-10	CC221299	9/10/2021	400µM	2
RG_ALUSM_BIC-1_2021-09-12	CC221300	9/12/2021	400µM	1
RG_ALUSM_BIC-2_2021-09-12	CC221301	9/12/2021	400µM	1
RG_ALUSM_BIC-3_2021-09-12	CC221302	9/12/2021	400µM	1
RG_MIDGA_BIC-1_2021-09-11	CC221303	9/11/2021	400µM	1
RG_MIDGA_BIC-2_2021-09-11	CC221304	9/11/2021	400µM	1
RG_MIDGA_BIC-3_2021-09-11	CC221305	9/11/2021	400µM	1
RG_MI3_BIC-1_2021-09-11	CC221306	9/11/2021	400µM	1
RG_MI3_BIC-2_2021-09-11	CC221307	9/11/2021	400µM	1
RG_MI3_BIC-3_2021-09-11	CC221308	9/11/2021	400µM	1
RG_MICOMP_BIC-1_2021-09-13	CC221309	9/13/2021	400µM	1
RG_MICOMP_BIC-2_2021-09-13	CC221310	9/13/2021	400µM	1
RG_MICOMP_BIC-3_2021-09-13	CC221311	9/13/2021	400µM	1
RG_MICOMP_BIC-4_2021-09-13	CC221312	9/13/2021	400µM	1

RG_MICOMP_BIC-5_2021-09-13	CC221313	9/13/2021	400µM	1

Sample Sorting

- Using a gridded Petri dish, fine forceps and a low power stereo-microscope (Olympus, Nikon, Leica) the sorting technicians removed the invertebrates and sorted them into family/orders.
- The sorting technician kept a running tally of total numbers excluding organisms from Porifera, Nemata, Platyhelminthes, Ostracoda, Copepoda, Cladocera and terrestrial drop-ins such as aphids. These organisms were marked for their presence (given a value of 1) only and left in the sample. They were not included towards the 300-organism subsample count.
- Where specimens are broken or damaged, only heads were counted.
- Subsampling was conducted with the use of a Marchant Box.
- When using the Marchant box, cells were extracted at the same time in the order indicated by a random number table. If the 300th organism was found part way into sorting a cell then the balance of that cell was sorted. If the organism count had not reached 300 by the 50th cell then the entire sample was sorted.
- The total number of cells sorted and the number of organisms removed were recorded manually on a bench sheet and then recorded into INSTAR1
- Organisms were stored in vials containing 80% ethanol and an interior label indicating the site names, date of sampling, site code numbers and portion subsampled. This information was also recorded on the laboratory bench sheet and on INSTAR1.
- The sorted portion of the debris was preserved and labeled separately from the unsorted portion and was tested for sorting efficiency (Sorting Quality Control – Sorting Efficiency). The unsorted portion was also labeled and preserved in separate jars.

Percent sub-sampled and total countable invertebrates pulled from the samples were summarized in the table below.

Table 2: Percent sub-sample and invertebrate count for each sample

Sample	Date	CC#	400 micron fraction	
			% Sampled	# Invertebrates
RG_ERCKUT_BIC-1_2021-09-15	15-Sep-21	CC221287	5%	556
RG_ERCKUT_BIC-2_2021-09-15	15-Sep-21	CC221288	5%	722
RG_ERCKUT_BIC-3_2021-09-15	15-Sep-21	CC221289	5%	373
RG_MIDBO_BIC-1_2021-09-11	11-Sep-21	CC221290	5%	524
RG_MIDBO_BIC-2_2021-09-11	11-Sep-21	CC221291	5%	404
RG_MIDBO_BIC-3_2021-09-11	11-Sep-21	CC221292	5%	400
RG_ERCKDT_BIC-1_2021-09-15	15-Sep-21	CC221293	5%	942

RG_ERCKDT_BIC-2_2021-09-15	15-Sep-21	CC221294	5%	599
RG_ERCKDT_BIC-3_2021-09-15	15-Sep-21	CC221295	5%	782
RG_MIDER_BIC-1_2021-09-09	09-Sep-21	CC221296	12%	417
RG_MIDER_BIC-2_2021-09-09	09-Sep-21	CC221297	8%	324
RG_MIDER_BIC-3_2021-09-09	09-Sep-21	CC221298	5%	340
RG_ERCK_BIC-1_2021-09-10	10-Sep-21	CC221299	5%	868
RG_ALUSM_BIC-1_2021-09-12	12-Sep-21	CC221300	5%	475
RG_ALUSM_BIC-2_2021-09-12	12-Sep-21	CC221301	5%	427
RG_ALUSM_BIC-3_2021-09-12	12-Sep-21	CC221302	5%	362
RG_MIDGA_BIC-1_2021-09-11	11-Sep-21	CC221303	5%	647
RG_MIDGA_BIC-2_2021-09-11	11-Sep-21	CC221304	5%	391
RG_MIDGA_BIC-3_2021-09-11	11-Sep-21	CC221305	5%	400
RG_MI3_BIC-1_2021-09-11	11-Sep-21	CC221306	5%	356
RG_MI3_BIC-2_2021-09-11	11-Sep-21	CC221307	5%	633
RG_MI3_BIC-3_2021-09-11	11-Sep-21	CC221308	5%	474
RG_MICOMP_BIC-1_2021-09-13	13-Sep-21	CC221309	5%	800
RG_MICOMP_BIC-2_2021-09-13	13-Sep-21	CC221310	5%	399
RG_MICOMP_BIC-3_2021-09-13	13-Sep-21	CC221311	5%	561
RG_MICOMP_BIC-4_2021-09-13	13-Sep-21	CC221312	5%	671
RG_MICOMP_BIC-5_2021-09-13	13-Sep-21	CC221313	5%	784

Sorting Quality Control - Sorting Efficiency

As a part of Cordillera's laboratory policy, all projects undergo sorting efficiency checks.

- As sorting progresses, 10% of samples were randomly chosen by senior members of the sorting team for resorting.
- All sorters working on a project had at least 1 sample resorted by another sorter.
- An efficiency of 90 % was expected (95% for CABIN samples).
- If 90/95% efficiency was not met, samples from that sorter were resorted.
- To calculated sorting efficiency the following formula was used:

$$\frac{\#OrganismsMissed}{TotalOrganismsFound} * 100 = \%OM$$

Table 3 Summary of sorting efficiency

Total from Sample	Percent Efficiency

Site - QC, Sample - QC 1, CC# - CC221300, Percent sampled = 5%, Sieve size = 400			
Diptera	1		
Chironomidae	1		
Ephemeroptera	8		
Plecoptera	3		
Trichoptera	1		
Trombidiformes	1		
Oligochaeta	3		
Total:	**18**	**475**	**96%**

Site - QC, Sample - QC 2, CC# - CC221303, Percent sampled = 5%, Sieve size = 400			
Gastropoda	2		
Collembola	1		
Trombidiformes	7		
Trichoptera	7		
Plecoptera	4		
Ephemerellidae	1		
Chironomidae	6		
Diptera	2		
Total:	**30**	**647**	**95%**

Site - QC, Sample - QC 3, CC# - CC221306, Percent sampled = 5%, Sieve size = 400			
Diptera	1		
Trichoptera	1		
Trombidiformes	3		
Total:	**5**	**356**	**99%**

Sorting Quality Control - Sub-Sampling QC

Certain Provincial and Mining projects require additional sorting checks in the form of sub-sampling QC, (Environmental Effects Monitoring (EEM) protocol). This ensured that any fraction of the total sample that was examined was actually an accurate representation of the number of total organisms. Organisms from the additional sub-samples were not identified; rather total organism count only was compared.

Sub-Sampling efficiency was measured on 10% of the number of sub-sampled samples in the project. Ex. In a project where 50 of 100 total samples were processed through subsampling using a Marchant box, then 10% of 50; or 5 samples were used for sub sampling efficiency.

Sub-Sampling efficiency was performed by fractioning the entire sample into sub-sample percentages. On each sub-sampled portion, a total organism count was recorded and compared to the rest of the sub-samples. In order to pass, all fractions were required to be within 20% of total organism count.

Example: If 300 organisms are found in 10% of the sample, the sorter will continue to sample in 10% fractions until the entire sample is separated. They will then count the total number of organisms in each of the 10 fractions of 10% and compare the organism count.

When divergence is >20% the sorting manager examines for the source of the problem and takes steps to correct it. With the Marchant box, the problem typically rested with how the box is flipped back to the upright position. For this reason, subsampling was performed by experienced employees only. Another common source of error would be the type of debris in the sample. Samples with algae or heavy with periphyton have a higher incident of failure due to clumping than clear samples.

Table 4 Summary of Sub Sample efficiency

Station ID		Organisms in Subsample																				Sorter		Actual Total	Precision		Accuracy	
CC#	Sample Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	By	Time		Percent Range		Min	Max
221291	RG_MIDBO_BIC-2	384	369	370	413	369																CM	120	1905	0.00	10.65	0.79	8.40
221308	RG_MI3_BIC-3	437	447	446	435	433																CM	240	2198	0.22	3.13	0.59	1.68
221301	RG_ALUSM_BIC-2	414	410	392	380	415	408	418	425	426	373	378	377	414	400	440	364	409	384	385	410	CM	950	8022	0.00	17.27	0.27	9.70

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 - 2021, Sample - RG_ERCKUT_BIC-2_2021-09-15, CC# - CC221288, Percent sampled = 5%, Sieve size = 400	723	0.00	0.06920415	0.41493776	0.00346021
Site - 2021, Sample - RG_ERCKDT_BIC-2_2021-09-15, CC# - CC221294, Percent sampled = 5%, Sieve size = 400	599	0.00	0	0.50083472	0.00500835
Site - 2021, Sample - RG_MIDGA_BIC-2_2021-09-11, CC# - CC221304, Percent sampled = 5%, Sieve size = 400	392	0.00	0.12771392	1.02040816	0.00893997

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 - 2021, Sample - RG_ERCKUT_BIC-2_2021-09-15, CC# - CC221288, Percent sampled = 5%, Sieve size = 400	Laboratory Count	QC Audit Count	Agreement	Misidentification	Questionable Taxonomic Resolution	Enumeration	Insufficient Taxonomic Resolution	Comments
Capniidae	2	2						
Chironomidae	168	167	No			X		
Chloroperlidae	8	8						

Diamesa	5	5						
Dicranota	1	1						
Empididae	1	1						
Eukiefferiella	87	88	No			X		
Heptageniidae	1	1						
Hydrobaenus	7	7						
Limnephilidae	7	7						
Malenka	2	2						
Micropsectra	11	11						
Neoplasta	1	1						
Oribatida	1	1						
Orthocladius complex	2	2						
Pagastia	1	1						
Peltoperlidae	55	55						
Pericoma/Telmatoscopus	2	2						
Perlodidae	35	35						
Rhyacophila brunnea/vemna group	1	1						
Sperchon	4	4						
Sweltsa	5	5						
Tvetenia	110	111	No			X		
Yoraperla	121	121						
Zapada	41	42	No			X		
Zapada cinctipes	16	16						
Zapada columbiana	26	25	No			X		
Zapada oregonensis group	1	1						
Total:	**722**	**723**						
					0	**5**	**0**	
% Total Misidentification Rate =	misidentifications / total number	x100 =	0.00	**Pass**				
Site - 2021, Sample - RG_ERCKDT_BIC-2_2021-09-15, CC# - CC221294, Percent sampled = 5%, Sieve size = 400	**Laboratory Count**	**QC Audit Count**	**Agreement**	**Misidentification**	**Questionable Taxonomic Resolution**	**Enumeration**	**Insufficient Taxonomic Resolution**	**Comments**
Albertathyas	2	2						
Arctopsyche	1	1						
Chironomidae	40	40						
Corynoneura	2	2						

Diamesa	16	16						
Ecclisomyia	2	2						
Ephemerellidae	14	14						
Eukiefferiella	25	25						
Hydrobaenus	7	7						
Lebertia	5	4	No			X		
Lepidostoma	2	2						
Micropsectra	76	77	No			X		
Nais	39	39						
Orthocladius complex	3	3						
Pagastia	3	3						
Parapsyche	3	3						
Peltoperlidae	44	44						
Pericoma/Telmatoscopus	1	1						
Pseudodiamesa	2	2						
Rhyacophila brunnea/vemna group	1	1						
Sperchon	2	2						
Sweltsa	2	2						
Tipula	1	1						
Trichoptera	12	12						
Tubificinae with hair chaetae	5	5						
Tubificinae without hair chaetae	1	1						
Tvetenia	90	90						
Yoraperla	60	60						
Zapada	128	126	No			X		
Zapada columbiana	8	10	No			X		
Zapada oregonensis group	2	2						
Total:	**599**	**599**						
					0	**4**	**0**	
% Total Misidentification Rate =	misidentifications / total number	x100 =	0.00	**Pass**				
Site - 2021, Sample - RG_MIDGA_BIC-2_2021-09-11, CC# - CC221304, Percent sampled = 5%, Sieve size = 400	**Laboratory Count**	**QC Audit Count**	**Agreement**	**Misidentification**	**Questionable Taxonomic Resolution**	**Enumeration**	**Insufficient Taxonomic Resolution**	**Comments**
Apatania	73	73						

Arctopsyche	4	4						
Baetidae	1	1						
Baetis	63	66	No			X		
Baetis rhodani group	67	64	No			X		
Brachycentrus	1	1						
Capniidae	1	1						
Chironomidae	7	7						
Drunella doddsii	12	12						
Drunella spinifera	1	1						
Ephemerella	3	3						
Ephemerellidae	4	4						
Glossosoma	2	2						
Glossosomatidae	12	12						
Heptageniidae	49	49						
Hesperoperla	1	1						
Heterlimnius	3	3						
Hexatoma	4	4						
Lebertia	4	4						
Lepidostoma	2	2						
Micropsectra	1	1						
Neoplasta	2	2						
Orthocladius complex	2	2						
Pagastia	2	2						
Pericoma/Telmatoscopus	2	2						
Polypedilum	1	1						
Rheocricotopus	3	3						
Rhithrogena	4	4						
Rhyacophila	3	3						
Simuliidae	2	2						
Sperchon	1	1						
Sweltsa	1	1						
Taeniopterygidae	5	5						
Torrenticola	13	14	No			X		
Trichoptera	2	2						
Tubificinae without hair chaetae	2	2						
Tvetenia	6	6						
Zapada	1	1						
Zapada cinctipes	24	24						
Total:	**391**	**392**						
					0	**3**	**0**	

% Total Misidentification Rate =	misidentifications	x100 =	0.00	**Pass**		
	total number					

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[3] Pacific Northwest Aquatic Monitoring Partnership (Accessed 2015). www.pnamp.org

Taxonomic Keys

Below is a reference list of taxonomic keys utilized by taxonomists at Cordillera Consulting. Cordillera taxonomists routinely seek out new literature to ensure the most accurate identification keys are being utilized. This is not reflective of the exhaustive list of resources that we use for identification. A more complete list of taxonomic resources can be found at Southwest Association of Freshwater Invertebrate Taxonomists. (2015).
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Raw Benthic Invertebrate Density Results (# organisms/sample), EVO LAEMP 2021

Project: EVO LAEMP (21-09)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2021	2021	2021	2021	2021	2021	2021
Sample:	RG_ERCKUT_BIC-1_2021-09-15	RG_ERCKUT_BIC-2_2021-09-15	RG_ERCKUT_BIC-3_2021-09-15	RG_MIDBO_BIC-1_2021-09-11	RG_MIDBO_BIC-2_2021-09-11	RG_MIDBO_BIC-3_2021-09-11	RG_ERCKDT_BIC-1_2021-09-15
Sample Collection Date:	15-Sep-21	15-Sep-21	15-Sep-21	11-Sep-21	11-Sep-21	11-Sep-21	15-Sep-21
CC#:	CC221287	CC221288	CC221289	CC221290	CC221291	CC221292	CC221293
Phylum: Arthropoda	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0
Ameletus	0	0	0	0	0	0	0
| Family: Baetidae	0	0	0	40	0	160	40
Acentrella	0	0	0	0	0	0	0
Baetis	0	0	0	1,960	1,220	2400	0
Baetis rhodani group	0	0	0	760	540	580	0
| Family: Ephemerellidae	40	0	0	180	240	180	320
Caudatella	0	0	0	0	0	0	0
Drunella	0	0	0	0	0	0	0
Drunella coloradensis	0	0	0	0	0	0	0
Drunella doddsii	0	0	0	200	220	200	0
Drunella spinifera	0	0	0	20	0	0	0
Ephemerella	0	0	0	160	0	40	0
Ephemerella excrucians complex	0	0	0	0	0	0	0
| Family: Heptageniidae	20	20	0	1,020	1,360	1,040	20
Cinygmula	0	0	0	0	0	0	0
Epeorus	0	0	0	20	0	20	0
Rhithrogena	0	0	0	40	40	20	0
| Family: Leptophlebiidae	0	0	0	0	0	0	0
| Order: Plecoptera	40	0	60	0	20	0	0
| Family: Capniidae	40	40	0	0	20	0	20
Utacapnia	60	0	60	0	0	0	0
| Family: Chloroperlidae	80	160	160	0	40	0	20
Sweltsa	80	100	80	60	160	100	0
| Family: Leuctridae	0	0	0	0	20	0	0
Paraleuctra	0	0	0	20	20	0	0

Note: A value of zero reported at a less specific level of taxonomy does not indicate an absence of organisms at a more specific level of taxonomy.

Raw Benthic Invertebrate Density Results (# organisms/sample), EVO LAEMP 2021

Project: EVO LAEMP (21-09)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2021	2021	2021	2021	2021	2021	2021
Sample:	RG_ERCKUT_BIC-1_2021-09-15	RG_ERCKUT_BIC-2_2021-09-15	RG_ERCKUT_BIC-3_2021-09-15	RG_MIDBO_BIC-1_2021-09-11	RG_MIDBO_BIC-2_2021-09-11	RG_MIDBO_BIC-3_2021-09-11	RG_ERCKDT_BIC-1_2021-09-15
Sample Collection Date:	15-Sep-21	15-Sep-21	15-Sep-21	11-Sep-21	11-Sep-21	11-Sep-21	15-Sep-21
CC#:	CC221287	CC221288	CC221289	CC221290	CC221291	CC221292	CC221293
| Family: Nemouridae	0	0	0	0	0	40	120
Malenka	0	40	40	0	0	0	0
Zapada	1,320	820	660	20	0	60	6280
Zapada oregonensis group	80	20	0	0	20	40	80
Zapada cinctipes	320	320	180	720	820	800	0
Zapada columbiana	620	520	360	0	0	0	300
| Family: Peltoperlidae	2,020	1,100	780	0	0	0	560
Yoraperla	1,480	2420	1,840	0	0	0	1,320
| Family: Perlidae	0	0	0	0	0	0	0
Doroneuria	0	0	0	0	0	0	0
Hesperoperla	0	0	0	0	20	20	0
| Family: Perlodidae	300	700	360	0	0	0	0
Cultus	0	0	0	0	0	0	0
Kogotus	0	0	0	20	0	0	0
Megarcys	20	0	20	0	0	0	0
Skwala	0	0	0	0	20	0	0
| Family: Pteronarcyidae	0	0	0	0	0	0	0
Pteronarcella	0	0	0	0	0	0	0
| Family: Taeniopterygidae	0	0	0	100	20	200	20
| Order: Trichoptera	20	0	20	1,660	0	0	580
| Family: Apataniidae	0	0	0	0	0	0	0
Apatania	0	0	20	280	80	240	0
| Family: Brachycentridae	0	0	0	0	20	40	0
Brachycentrus	0	0	0	0	0	0	0
Brachycentrus americanus	0	0	0	0	0	0	0
Micrasema	0	0	0	0	0	0	0
| Family: Glossosomatidae	0	0	0	420	600	320	0
Glossosoma	0	0	0	340	360	120	0
| Family: Hydropsychidae	0	0	0	60	220	80	0
Arctopsyche	0	0	0	260	220	120	0
Parapsyche	0	0	0	0	0	0	0
Parapsyche elsis	0	0	0	0	0	0	0
| Family: Hydroptilidae	0	0	0	0	0	0	0
Hydroptila	0	0	0	0	0	0	0
| Family: Lepidostomatidae	0	0	0	0	0	0	0
Lepidostoma	0	0	0	0	60	20	40

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Raw Benthic Invertebrate Density Results (# organisms/sample), EVO LAEMP 2021

Project: EVO LAEMP (21-09)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2021	2021	2021	2021	2021	2021	2021
Sample:	RG_ERCKUT_BIC-1_2021-09-15	RG_ERCKUT_BIC-2_2021-09-15	RG_ERCKUT_BIC-3_2021-09-15	RG_MIDBO_BIC-1_2021-09-11	RG_MIDBO_BIC-2_2021-09-11	RG_MIDBO_BIC-3_2021-09-11	RG_ERCKDT_BIC-1_2021-09-15
Sample Collection Date:	15-Sep-21	15-Sep-21	15-Sep-21	11-Sep-21	11-Sep-21	11-Sep-21	15-Sep-21
CC#:	CC221287	CC221288	CC221289	CC221290	CC221291	CC221292	CC221293
| Family: Limnephilidae	100	140	60	0	0	0	20
Ecclisomyia	0	0	0	0	0	0	40
| Family: Rhyacophilidae	0	0	0	0	0	0	0
Rhyacophila	140	0	20	100	60	0	0
Rhyacophila angelita group	0	0	0	0	0	0	0
Rhyacophila betteni group	0	0	0	0	0	0	0
Rhyacophila brunnea/vemna group	20	20	100	0	0	0	0
Rhyacophila hyalinata group	0	0	0	0	0	0	0
Rhyacophila narvae	0	0	0	0	0	0	0
| Family: Thremmatidae	0	0	0	0	0	0	0
Oligophlebodes	0	0	0	0	0	20	0
| Family: Uenoidae	0	0	0	0	0	0	0
Neothremma	0	0	0	40	0	0	0
| Order: Coleoptera	0	0	0	0	0	0	0
| Family: Dytiscidae	0	0	0	0	0	0	0
Desmopachria	0	0	0	0	0	0	0
| Family: Elmidae	0	0	0	20	0	0	0
Heterlimnius	0	0	0	0	0	40	0
Narpus	0	0	0	0	20	0	0
Zaitzevia	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0
| Family: Athericidae	0	0	0	0	0	0	0
Atherix	0	0	0	0	0	0	0
| Family: Ceratopogonidae	0	0	0	0	0	0	0
Bezzia/ Palpomyia	0	0	0	0	0	0	0
Mallochohelea	0	0	0	0	0	0	0
| Family: Chironomidae	1,120	3360	800	340	660	120	600
| Subfamily: Chironominae	0	0	0	0	0	0	0
| Tribe: Chironomini	0	0	0	0	0	0	0
Polypedilum	0	0	0	20	40	0	0
| Tribe: Tanytarsini	0	0	0	0	0	0	1,420
Micropsectra	60	220	100	60	20	20	2060
Rheotanytarsus	0	0	0	0	20	0	0
Stempellina	0	0	0	0	0	0	0
Sublettea	0	0	0	0	0	0	0
| Subfamily: Diamesinae	0	0	0	0	0	0	0

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Minnow Environmental (BC)
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250-494-7553

Site:	2021	2021	2021	2021	2021	2021	2021
Sample:	RG_ERCKUT_BIC-1_2021-09-15	RG_ERCKUT_BIC-2_2021-09-15	RG_ERCKUT_BIC-3_2021-09-15	RG_MIDBO_BIC-1_2021-09-11	RG_MIDBO_BIC-2_2021-09-11	RG_MIDBO_BIC-3_2021-09-11	RG_ERCKDT_BIC-1_2021-09-15
Sample Collection Date:	15-Sep-21	15-Sep-21	15-Sep-21	11-Sep-21	11-Sep-21	11-Sep-21	15-Sep-21
CC#:	CC221287	CC221288	CC221289	CC221290	CC221291	CC221292	CC221293
| **Tribe: Diamesini**	0	0	0	0	0	0	0
Diamesa	140	100	40	0	0	0	260
Pagastia	0	20	0	60	0	0	120
Potthastia gaedii group	0	0	0	0	0	0	0
Pseudodiamesa	0	0	0	0	0	0	60
| **Subfamily: Orthocladiinae**	0	0	0	0	0	0	0
Brillia	0	0	0	0	0	0	0
Corynoneura	0	0	0	0	0	0	20
Eukiefferiella	1,880	1,740	820	20	40	60	460
Hydrobaenus	0	140	0	0	0	0	140
Limnophyes	0	0	0	0	0	0	20
Orthocladius complex	0	40	80	520	0	120	420
Orthocladius lignicola	0	0	0	0	0	0	0
Psectrocladius	0	0	0	0	0	0	0
Rheocricotopus	0	0	0	60	80	20	0
Thienemanniella	0	0	0	0	0	0	0
Tvetenia	460	2200	660	180	100	100	1,700
| **Subfamily: Tanypodinae**	20	0	0	0	0	0	0
| **Tribe: Pentaneurini**	0	0	0	0	0	0	0
Thienemannimyia group	0	0	0	20	0	0	0
| **Tribe: Procladiini**	0	0	0	0	0	0	0
Procladius	0	0	0	0	0	0	20
| **Family: Empididae**	100	20	0	0	20	0	20
Clinocera	0	0	0	0	0	0	0
Neoplasta	340	20	60	60	120	80	0
Wiedemannia	0	0	0	0	0	0	0
| **Family: Muscidae**	0	0	0	0	0	0	0
Limnophora	0	0	0	0	0	0	0
| **Family: Pelecorhynchidae**	0	0	0	0	0	0	0
Glutops	40	0	0	0	0	0	20
| **Family: Psychodidae**	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	20	40	0	100	20	120	0
| **Family: Simuliidae**	0	0	0	20	0	80	0
Simulium	0	0	0	20	20	20	0

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Minnow Environmental (BC)
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250-494-7553

Site:	2021	2021	2021	2021	2021	2021	2021
Sample:	RG_ERCKUT_BIC-1_2021-09-15	RG_ERCKUT_BIC-2_2021-09-15	RG_ERCKUT_BIC-3_2021-09-15	RG_MIDBO_BIC-1_2021-09-11	RG_MIDBO_BIC-2_2021-09-11	RG_MIDBO_BIC-3_2021-09-11	RG_ERCKDT_BIC-1_2021-09-15
Sample Collection Date:	15-Sep-21	15-Sep-21	15-Sep-21	11-Sep-21	11-Sep-21	11-Sep-21	15-Sep-21
CC#:	CC221287	CC221288	CC221289	CC221290	CC221291	CC221292	CC221293
| Family: Tipulidae	0	0	0	0	0	0	0
Antocha	0	0	0	20	0	20	0
Dicranota	0	20	0	0	0	0	0
Hexatoma	0	0	0	20	60	20	0
Tipula	0	0	0	0	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0
| Order: Trombidiformes	20	0	40	0	0	0	0
| Family: Aturidae	0	0	0	0	0	0	0
Aturus	0	0	0	0	0	0	0
| Family: Feltriidae	0	0	0	0	0	0	0
Feltria	0	0	0	0	0	0	0
| Family: Hydryphantidae	0	0	0	0	0	0	0
Albertathyas	0	0	0	0	0	0	0
Protzia	0	0	0	0	20	0	0
| Family: Lebertiidae	0	0	0	0	0	0	0
Lebertia	0	0	0	60	20	0	80
| Family: Sperchontidae	0	0	0	0	0	0	0
Sperchon	40	80	20	60	20	60	40
| Family: Torrenticolidae	0	0	0	0	0	0	0
Testudacarus	0	0	0	0	0	0	0
Torrenticola	0	0	0	240	340	220	0
Suborder: Prostigmata	0	0	0	0	0	0	0
| Family: Stygothrombidiidae	0	0	0	0	0	0	0
Stygothrombium	0	0	0	0	0	0	0
| Order: Sarcoptiformes	0	0	0	0	0	0	0
| Order: Oribatida	0	20	0	0	0	0	0
| Family: Hydrozetidae	0	0	0	0	0	0	40
Phylum: Annelida	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0
| Order: Lumbriculida	0	0	0	0	0	0	0
| Family: Lumbriculidae	0	0	0	0	0	0	0
Lumbriculus	0	0	0	20	20	0	0
Rhynchelmis	0	0	0	0	0	0	0

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250-494-7553

Site:	2021	2021	2021	2021	2021	2021	2021
Sample:	RG_ERCKUT_BIC-1_2021-09-15	RG_ERCKUT_BIC-2_2021-09-15	RG_ERCKUT_BIC-3_2021-09-15	RG_MIDBO_BIC-1_2021-09-11	RG_MIDBO_BIC-2_2021-09-11	RG_MIDBO_BIC-3_2021-09-11	RG_ERCKDT_BIC-1_2021-09-15
Sample Collection Date:	15-Sep-21	15-Sep-21	15-Sep-21	11-Sep-21	11-Sep-21	11-Sep-21	15-Sep-21
CC#:	CC221287	CC221288	CC221289	CC221290	CC221291	CC221292	CC221293
| Order: Tubificida	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0	0	0
Enchytraeus	60	0	0	0	0	0	0
| Family: Naididae	0	0	20	0	0	0	0
Nais	0	0	0	60	20	40	1,120
| Subfamily: Tubificinae with hair chaetae	0	0	0	0	0	0	440
| Subfamily: Tubificinae without hair chaetae	20	0	0	0	0	0	0
Totals:	**11,120**	**14,440**	**7,460**	**10,480**	**8,080**	**8,000**	**18,840**
Taxa present but not included:							
Phylum: Arthropoda	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0
| Order: Homoptera	0	0	0	0	0	0	0
| Family: Cicadellidae	0	0	20	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0
| Class: Ostracoda	20	20	20	20	20	0	20
Phylum: Nemata	20	0	20	20	20	0	20
Phylum: Platyhelminthes	0	0	0	0	0	0	0
| Class: Turbellaria	20	20	20	20	20	20	20
Totals:	**60**	**40**	**80**	**60**	**60**	**20**	**60**

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Minnow Environmental (BC)
Taxonomist: Scott Finlayson
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250-494-7553

Site:	2021	2021	2021	2021	2021	2021	2021
Sample:	RG_ERCKDT_BIC-2_2021-09-15	RG_ERCKDT_BIC-3_2021-09-15	RG_MIDER_BIC-1_2021-09-09	RG_MIDER_BIC-2_2021-09-09	RG_MIDER_BIC-3_2021-09-09	RG_ERCK_BIC-1_2021-09-10	RG_ALUSM_BIC-1_2021-09-12
Sample Collection Date:	15-Sep-21	15-Sep-21	09-Sep-21	09-Sep-21	09-Sep-21	10-Sep-21	12-Sep-21
CC#:	CC221294	CC221295	CC221296	CC221297	CC221298	CC221299	CC221300
Phylum: Arthropoda	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0
Ameletus	0	0	17	0	0	0	0
| Family: Baetidae	0	0	408	775	380	0	120
Acentrella	0	0	8	0	0	0	0
Baetis	0	0	383	400	1,380	0	660
Baetis rhodani group	0	0	42	212	380	0	40
| Family: Ephemerellidae	280	160	275	438	480	140	1,780
Caudatella	0	0	0	0	20	0	320
Drunella	0	0	0	0	0	20	20
Drunella coloradensis	0	0	0	0	20	0	0
Drunella doddsii	0	0	25	38	180	0	140
Drunella spinifera	0	0	33	12	0	0	20
Ephemerella	0	0	0	0	0	0	0
Ephemerella excrucians complex	0	0	0	0	0	0	0
| Family: Heptageniidae	0	0	242	412	520	20	1,060
Cinygmula	0	0	0	0	0	0	20
Epeorus	0	0	0	12	0	0	200
Rhithrogena	0	0	0	0	20	0	40
| Family: Leptophlebiidae	0	0	0	0	0	0	0
| Order: Plecoptera	0	0	0	0	0	0	20
| Family: Capniidae	0	20	0	0	0	40	0
Utacapnia	0	0	0	0	0	0	0
| Family: Chloroperlidae	0	0	0	12	0	0	20
Sweltsa	40	60	67	25	20	0	0
| Family: Leuctridae	0	0	0	12	0	0	40
Paraleuctra	0	0	0	0	0	0	0

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Minnow Environmental (BC)
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250-494-7553

Site:	2021	2021	2021	2021	2021	2021	2021
Sample:	RG_ERCKDT_BIC-2_2021-09-15	RG_ERCKDT_BIC-3_2021-09-15	RG_MIDER_BIC-1_2021-09-09	RG_MIDER_BIC-2_2021-09-09	RG_MIDER_BIC-3_2021-09-09	RG_ERCK_BIC-1_2021-09-10	RG_ALUSM_BIC-1_2021-09-12
Sample Collection Date:	15-Sep-21	15-Sep-21	09-Sep-21	09-Sep-21	09-Sep-21	10-Sep-21	12-Sep-21
CC#:	CC221294	CC221295	CC221296	CC221297	CC221298	CC221299	CC221300
| **Family: Nemouridae**	0	0	0	0	80	0	40
Malenka	0	0	0	0	0	0	0
Zapada	2560	1,740	42	25	0	220	340
Zapada oregonensis group	40	80	0	0	20	0	220
Zapada cinctipes	0	160	58	162	620	1,420	1,040
Zapada columbiana	160	300	0	0	0	460	60
| **Family: Peltoperlidae**	880	800	0	0	0	0	0
Yoraperla	1,200	1,740	0	0	0	20	0
| **Family: Perlidae**	0	0	8	12	20	0	0
Doroneuria	0	0	8	0	0	0	0
Hesperoperla	0	0	0	0	40	0	0
| **Family: Perlodidae**	0	0	8	0	20	20	40
Cultus	0	0	0	0	0	0	0
Kogotus	0	0	0	0	0	0	60
Megarcys	0	0	0	0	0	40	0
Skwala	0	0	0	0	0	0	0
| **Family: Pteronarcyidae**	0	0	0	0	0	0	0
Pteronarcella	0	0	0	0	0	0	0
| **Family: Taeniopterygidae**	0	0	0	0	40	40	120
| **Order: Trichoptera**	240	20	25	0	20	140	0
| **Family: Apataniidae**	0	0	0	0	0	0	0
Apatania	0	0	792	225	320	20	20
| **Family: Brachycentridae**	0	0	0	0	0	100	0
Brachycentrus	0	0	0	0	40	0	0
Brachycentrus americanus	0	0	0	0	0	0	0
Micrasema	0	0	0	12	0	540	140
| **Family: Glossosomatidae**	0	0	192	138	20	0	80
Glossosoma	0	0	0	25	120	0	0
| **Family: Hydropsychidae**	0	40	0	0	180	40	20
Arctopsyche	20	0	58	38	180	0	0
Parapsyche	60	0	0	0	0	0	0
Parapsyche elsis	0	0	0	0	0	0	0
| **Family: Hydroptilidae**	0	0	0	0	0	0	0
Hydroptila	0	20	0	0	0	60	0
| **Family: Lepidostomatidae**	0	0	0	0	0	0	0
Lepidostoma	40	0	0	0	0	0	0

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250-494-7553

Site:	2021	2021	2021	2021	2021	2021	2021
Sample:	RG_ERCKDT_BIC-2_2021-09-15	RG_ERCKDT_BIC-3_2021-09-15	RG_MIDER_BIC-1_2021-09-09	RG_MIDER_BIC-2_2021-09-09	RG_MIDER_BIC-3_2021-09-09	RG_ERCK_BIC-1_2021-09-10	RG_ALUSM_BIC-1_2021-09-12
Sample Collection Date:	15-Sep-21	15-Sep-21	09-Sep-21	09-Sep-21	09-Sep-21	10-Sep-21	12-Sep-21
CC#:	CC221294	CC221295	CC221296	CC221297	CC221298	CC221299	CC221300
| Family: Limnephilidae	0	0	0	0	0	0	0
Ecclisomyia	40	0	0	0	0	0	0
| Family: Rhyacophilidae	0	0	0	0	0	0	0
Rhyacophila	0	0	42	100	200	100	300
Rhyacophila angelita group	0	0	0	0	0	0	0
Rhyacophila betteni group	0	0	0	0	0	0	0
Rhyacophila brunnea/vemna group	20	0	0	12	20	0	140
Rhyacophila hyalinata group	0	0	0	0	0	0	0
Rhyacophila narvae	0	0	0	0	0	0	60
| Family: Thremmatidae	0	0	0	0	0	0	0
Oligophlebodes	0	0	8	0	20	40	0
| Family: Uenoidae	0	0	0	0	0	0	0
Neothremma	0	0	0	0	0	0	0
| Order: Coleoptera	0	0	0	0	0	0	0
| Family: Dytiscidae	0	0	0	0	0	0	0
Desmopachria	0	0	0	0	0	0	0
| Family: Elmidae	0	0	0	0	20	0	120
Heterlimnius	0	0	8	0	20	20	180
Narpus	0	0	0	0	0	0	0
Zaitzevia	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0
| Family: Athericidae	0	0	0	0	0	0	0
Atherix	0	0	0	0	0	0	0
| Family: Ceratopogonidae	0	0	0	0	0	0	0
Bezzia/ Palpomyia	0	0	0	0	0	0	0
Mallochohelea	0	0	0	0	20	0	120
| Family: Chironomidae	800	1,100	8	25	0	740	80
| Subfamily: Chironominae	0	0	0	0	0	0	0
| Tribe: Chironomini	0	0	0	0	0	0	0
Polypedilum	0	0	0	0	0	0	0
| Tribe: Tanytarsini	0	0	0	0	0	0	0
Micropsectra	1,520	1,000	0	25	20	40	0
Rheotanytarsus	0	0	0	0	0	0	0
Stempellina	0	0	0	0	0	0	0
Sublettea	0	0	0	12	0	0	0
| Subfamily: Diamesinae	0	0	0	0	0	0	0

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Raw Benthic Invertebrate Density Results (# organisms/sample), EVO LAEMP 2021

Project: EVO LAEMP (21-09)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2021	2021	2021	2021	2021	2021	2021
Sample:	RG_ERCKDT_BIC-2_2021-09-15	RG_ERCKDT_BIC-3_2021-09-15	RG_MIDER_BIC-1_2021-09-09	RG_MIDER_BIC-2_2021-09-09	RG_MIDER_BIC-3_2021-09-09	RG_ERCK_BIC-1_2021-09-10	RG_ALUSM_BIC-1_2021-09-12
Sample Collection Date:	15-Sep-21	15-Sep-21	09-Sep-21	09-Sep-21	09-Sep-21	10-Sep-21	12-Sep-21
CC#:	CC221294	CC221295	CC221296	CC221297	CC221298	CC221299	CC221300
| Tribe: Diamesini	0	0	0	0	0	0	0
Diamesa	320	680	0	0	0	0	20
Pagastia	60	580	25	50	20	460	20
Potthastia gaedii group	0	0	0	0	0	0	0
Pseudodiamesa	40	300	0	0	0	0	0
| Subfamily: Orthocladiinae	0	0	0	0	0	0	0
Brillia	0	0	0	0	0	0	20
Corynoneura	40	60	0	0	0	0	0
Eukiefferiella	500	760	50	25	120	7540	200
Hydrobaenus	140	540	0	0	0	0	0
Limnophyes	0	20	0	0	0	0	0
Orthocladius complex	60	800	125	200	200	1,500	100
Orthocladius lignicola	0	0	0	0	0	0	0
Psectrocladius	0	0	0	0	0	0	0
Rheocricotopus	0	0	17	50	40	20	120
Thienemanniella	0	0	0	0	0	380	0
Tvetenia	1,800	1,540	0	12	20	400	60
| Subfamily: Tanypodinae	0	0	0	0	0	0	0
| Tribe: Pentaneurini	0	0	0	0	0	0	0
Thienemannimyia group	0	0	0	0	20	0	20
| Tribe: Procladiini	0	0	0	0	0	0	0
Procladius	0	0	0	0	0	0	0
| Family: Empididae	0	0	0	0	0	340	0
Clinocera	0	0	0	0	0	360	0
Neoplasta	0	0	17	12	60	160	140
Wiedemannia	0	0	0	0	0	0	0
| Family: Muscidae	0	0	0	0	0	0	0
Limnophora	0	0	0	0	0	40	0
| Family: Pelecorhynchidae	0	0	0	0	0	0	0
Glutops	0	0	0	0	0	0	0
| Family: Psychodidae	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	20	20	250	312	260	140	900
| Family: Simuliidae	0	0	0	38	260	0	0
Simulium	0	0	8	38	220	0	40

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250-494-7553

Site:	2021	2021	2021	2021	2021	2021	2021
Sample:	RG_ERCKDT_BIC-2_2021-09-15	RG_ERCKDT_BIC-3_2021-09-15	RG_MIDER_BIC-1_2021-09-09	RG_MIDER_BIC-2_2021-09-09	RG_MIDER_BIC-3_2021-09-09	RG_ERCK_BIC-1_2021-09-10	RG_ALUSM_BIC-1_2021-09-12
Sample Collection Date:	15-Sep-21	15-Sep-21	09-Sep-21	09-Sep-21	09-Sep-21	10-Sep-21	12-Sep-21
CC#:	CC221294	CC221295	CC221296	CC221297	CC221298	CC221299	CC221300
| Family: Tipulidae	0	0	0	0	0	0	0
Antocha	0	0	0	0	0	200	0
Dicranota	0	40	0	0	0	20	0
Hexatoma	0	0	42	0	0	0	0
Tipula	20	0	0	0	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0
| Order: Trombidiformes	0	0	0	0	0	0	0
| Family: Aturidae	0	0	0	0	0	0	0
Aturus	0	0	0	0	0	0	0
| Family: Feltriidae	0	0	0	0	0	0	0
Feltria	0	0	0	0	0	20	20
| Family: Hydryphantidae	0	0	0	0	0	0	0
Albertathyas	40	0	0	0	0	0	0
Protzia	0	0	17	12	0	0	0
| Family: Lebertiidae	0	0	0	0	0	0	0
Lebertia	100	0	92	62	80	260	20
| Family: Sperchontidae	0	0	0	0	0	0	0
Sperchon	40	80	17	12	40	40	0
| Family: Torrenticolidae	0	0	0	0	0	0	0
Testudacarus	0	0	0	0	0	0	120
Torrenticola	0	0	58	50	20	0	20
Suborder: Prostigmata	0	0	0	0	0	0	0
| Family: Stygothrombidiidae	0	0	0	0	0	0	0
Stygothrombium	0	0	0	0	0	0	0
| Order: Sarcoptiformes	0	0	0	0	0	0	0
| Order: Oribatida	0	0	0	0	0	0	0
| Family: Hydrozetidae	0	20	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0
| Order: Lumbriculida	0	0	0	0	0	0	0
| Family: Lumbriculidae	0	0	0	0	0	0	0
Lumbriculus	0	0	0	0	0	0	0
Rhynchelmis	0	0	0	0	0	0	0

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250-494-7553

Site:	2021	2021	2021	2021	2021	2021	2021
Sample:	RG_ERCKDT_BIC-2_2021-09-15	RG_ERCKDT_BIC-3_2021-09-15	RG_MIDER_BIC-1_2021-09-09	RG_MIDER_BIC-2_2021-09-09	RG_MIDER_BIC-3_2021-09-09	RG_ERCK_BIC-1_2021-09-10	RG_ALUSM_BIC-1_2021-09-12
Sample Collection Date:	15-Sep-21	15-Sep-21	09-Sep-21	09-Sep-21	09-Sep-21	10-Sep-21	12-Sep-21
CC#:	CC221294	CC221295	CC221296	CC221297	CC221298	CC221299	CC221300
| Order: Tubificida	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0	0	0
Enchytraeus	0	0	0	0	0	0	0
| Family: Naididae	0	0	0	0	0	0	0
Nais	780	2720	0	12	0	780	0
| Subfamily: Tubificinae with hair chaetae	100	80	0	0	0	0	0
| Subfamily: Tubificinae without hair chaetae	20	160	0	0	0	420	0
Totals:	**11,980**	**15,640**	**3,475**	**4,044**	**6,800**	**17,360**	**9,500**
Taxa present but not included:							
Phylum: Arthropoda	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0
| Order: Homoptera	0	0	0	0	0	0	0
| Family: Cicadellidae	0	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0
| Class: Ostracoda	20	20	8	12	0	20	20
Phylum: Nemata	0	20	0	12	20	0	20
Phylum: Platyhelminthes	0	0	0	0	0	0	0
| Class: Turbellaria	20	20	0	0	20	20	20
Totals:	**40**	**60**	**8**	**24**	**40**	**40**	**60**

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Site:	2021	2021	2021	2021	2021	2021	2021
Sample:	RG_ALUSM_BIC-2_2021-09-12	RG_ALUSM_BIC-3_2021-09-12	RG_MIDGA_BIC-1_2021-09-11	RG_MIDGA_BIC-2_2021-09-11	RG_MIDGA_BIC-3_2021-09-11	RG_MI3_BIC-1_2021-09-11	RG_MI3_BIC-2_2021-09-11
Sample Collection Date:	12-Sep-21	12-Sep-21	11-Sep-21	11-Sep-21	11-Sep-21	11-Sep-21	11-Sep-21
CC#:	CC221301	CC221302	CC221303	CC221304	CC221305	CC221306	CC221307
Phylum: Arthropoda	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0
Ameletus	0	0	0	0	20	40	0
| Family: Baetidae	160	20	420	20	200	100	400
Acentrella	0	0	0	0	0	0	0
Baetis	440	300	3500	1,260	760	720	1,620
Baetis rhodani group	40	20	520	1,340	1,620	940	2580
| Family: Ephemerellidae	1,100	1,120	280	80	380	1,380	1,240
Caudatella	40	20	0	0	0	20	0
Drunella	0	20	20	0	0	0	0
Drunella coloradensis	140	100	0	0	20	0	40
Drunella doddsii	180	180	260	240	60	60	100
Drunella spinifera	20	20	0	20	0	60	0
Ephemerella	0	0	420	60	0	0	0
Ephemerella excrucians complex	0	0	0	0	0	0	0
| Family: Heptageniidae	1,780	1,200	1,340	980	840	620	540
Cinygmula	80	100	0	0	0	0	0
Epeorus	240	20	20	0	20	0	0
Rhithrogena	20	0	0	80	20	0	40
| Family: Leptophlebiidae	0	0	0	0	0	0	0
| Order: Plecoptera	0	0	60	0	20	0	0
| Family: Capniidae	0	0	60	20	0	0	20
Utacapnia	0	0	0	0	0	0	0
| Family: Chloroperlidae	20	40	0	0	0	0	0
Sweltsa	100	40	80	20	80	60	60
| Family: Leuctridae	40	60	0	0	0	0	0
Paraleuctra	20	60	0	0	0	0	0

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Site:	2021	2021	2021	2021	2021	2021	2021
Sample:	RG_ALUSM_BIC-2_2021-09-12	RG_ALUSM_BIC-3_2021-09-12	RG_MIDGA_BIC-1_2021-09-11	RG_MIDGA_BIC-2_2021-09-11	RG_MIDGA_BIC-3_2021-09-11	RG_MI3_BIC-1_2021-09-11	RG_MI3_BIC-2_2021-09-11
Sample Collection Date:	12-Sep-21	12-Sep-21	11-Sep-21	11-Sep-21	11-Sep-21	11-Sep-21	11-Sep-21
CC#:	CC221301	CC221302	CC221303	CC221304	CC221305	CC221306	CC221307
Family: Nemouridae	60	0	0	0	0	0	0
Malenka	0	0	0	0	0	0	0
Zapada	540	160	60	20	20	0	160
Zapada oregonensis group	20	160	40	0	0	0	20
Zapada cinctipes	200	420	1,560	480	780	180	740
Zapada columbiana	320	120	20	0	0	0	40
Family: Peltoperlidae	0	0	0	0	0	0	0
Yoraperla	0	0	0	0	0	0	0
Family: Perlidae	0	0	40	0	20	0	0
Doroneuria	0	0	0	0	0	0	20
Hesperoperla	0	0	40	20	20	0	20
Family: Perlodidae	0	0	0	0	0	0	20
Cultus	0	0	0	0	0	0	0
Kogotus	20	40	20	0	20	0	40
Megarcys	20	0	0	0	0	0	20
Skwala	0	0	0	0	0	0	0
Family: Pteronarcyidae	0	0	0	0	0	0	0
Pteronarcella	0	0	0	0	0	0	0
Family: Taeniopterygidae	360	200	120	100	60	0	40
Order: Trichoptera	20	0	0	40	0	0	100
Family: Apataniidae	0	0	0	0	0	0	0
Apatania	60	160	920	1,460	1,000	140	360
Family: Brachycentridae	0	0	0	0	0	0	0
Brachycentrus	20	20	20	20	0	100	40
Brachycentrus americanus	0	0	0	0	0	0	0
Micrasema	0	0	0	0	20	0	40
Family: Glossosomatidae	20	40	320	240	320	60	100
Glossosoma	20	0	60	40	220	60	0
Family: Hydropsychidae	20	100	180	0	20	20	60
Arctopsyche	0	0	500	80	140	40	160
Parapsyche	0	0	0	0	0	0	0
Parapsyche elsis	0	0	0	0	0	0	20
Family: Hydroptilidae	0	0	0	0	0	0	0
Hydroptila	0	0	0	0	0	0	0
Family: Lepidostomatidae	0	0	0	0	0	0	0
Lepidostoma	0	0	120	40	0	0	0

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Site:	2021	2021	2021	2021	2021	2021	2021
Sample:	RG_ALUSM_BIC-2_2021-09-12	RG_ALUSM_BIC-3_2021-09-12	RG_MIDGA_BIC-1_2021-09-11	RG_MIDGA_BIC-2_2021-09-11	RG_MIDGA_BIC-3_2021-09-11	RG_MI3_BIC-1_2021-09-11	RG_MI3_BIC-2_2021-09-11
Sample Collection Date:	12-Sep-21	12-Sep-21	11-Sep-21	11-Sep-21	11-Sep-21	11-Sep-21	11-Sep-21
CC#:	CC221301	CC221302	CC221303	CC221304	CC221305	CC221306	CC221307
| Family: Limnephilidae	0	0	0	0	0	0	0
Ecclisomyia	0	0	0	0	0	0	0
| Family: Rhyacophilidae	0	0	0	0	0	0	0
Rhyacophila	80	40	0	60	0	40	180
Rhyacophila angelita group	80	140	0	0	0	0	0
Rhyacophila betteni group	220	60	0	0	0	0	0
Rhyacophila brunnea/vemna group	60	80	0	0	0	0	60
Rhyacophila hyalinata group	0	20	0	0	0	0	20
Rhyacophila narvae	360	80	0	0	0	0	0
| Family: Thremmatidae	0	0	0	0	0	0	0
Oligophlebodes	0	0	60	0	0	0	0
| Family: Uenoidae	0	0	0	0	0	0	0
Neothremma	0	0	0	0	0	0	0
| Order: Coleoptera	0	0	0	0	0	0	0
| Family: Dytiscidae	0	0	0	0	0	0	0
Desmopachria	0	0	0	0	20	0	0
| Family: Elmidae	20	80	20	0	20	20	20
Heterlimnius	300	220	20	60	0	100	140
Narpus	0	0	0	0	20	0	0
Zaitzevia	0	0	20	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0
| Family: Athericidae	0	0	0	0	0	0	0
Atherix	0	0	0	0	0	0	0
| Family: Ceratopogonidae	0	0	20	0	0	0	0
Bezzia/ Palpomyia	0	0	0	0	0	0	20
Mallochohelea	20	40	0	0	0	100	20
| Family: Chironomidae	120	20	280	140	140	200	660
| Subfamily: Chironominae	0	0	0	0	0	0	0
| Tribe: Chironomini	0	0	0	0	0	0	0
Polypedilum	0	0	0	20	20	0	40
| Tribe: Tanytarsini	0	0	0	0	0	0	0
Micropsectra	40	0	40	20	20	20	80
Rheotanytarsus	0	0	0	0	0	0	0
Stempellina	0	0	0	0	0	0	0
Sublettea	0	0	0	0	0	0	0
| Subfamily: Diamesinae	0	0	0	0	0	0	0

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Site:	2021	2021	2021	2021	2021	2021	2021
Sample:	RG_ALUSM_BIC-2_2021-09-12	RG_ALUSM_BIC-3_2021-09-12	RG_MIDGA_BIC-1_2021-09-11	RG_MIDGA_BIC-2_2021-09-11	RG_MIDGA_BIC-3_2021-09-11	RG_MI3_BIC-1_2021-09-11	RG_MI3_BIC-2_2021-09-11
Sample Collection Date:	12-Sep-21	12-Sep-21	11-Sep-21	11-Sep-21	11-Sep-21	11-Sep-21	11-Sep-21
CC#:	CC221301	CC221302	CC221303	CC221304	CC221305	CC221306	CC221307
| Tribe: Diamesini	0	0	0	0	0	0	0
Diamesa	0	0	0	0	0	0	20
Pagastia	20	40	0	40	20	20	240
Potthastia gaedii group	0	0	0	0	0	20	20
Pseudodiamesa	0	0	0	0	0	0	0
| Subfamily: Orthocladiinae	0	0	0	0	0	0	0
Brillia	20	20	0	0	0	0	0
Corynoneura	0	0	0	0	0	0	0
Eukiefferiella	0	20	40	0	0	60	0
Hydrobaenus	0	0	0	0	0	0	0
Limnophyes	0	0	0	0	0	0	0
Orthocladius complex	0	40	220	40	140	580	1,240
Orthocladius lignicola	0	20	0	0	0	0	0
Psectrocladius	0	0	0	0	20	0	0
Rheocricotopus	0	40	120	60	20	40	160
Thienemanniella	0	0	0	0	0	0	0
Tvetenia	20	0	200	120	40	0	40
| Subfamily: Tanypodinae	0	0	0	0	0	0	0
| Tribe: Pentaneurini	0	0	0	0	0	0	0
Thienemannimyia group	20	0	0	0	0	0	0
| Tribe: Procladiini	0	0	0	0	0	0	0
Procladius	0	0	0	0	0	0	0
| Family: Empididae	0	0	20	0	0	0	100
Clinocera	0	0	0	0	0	0	0
Neoplasta	60	80	60	40	0	0	0
Wiedemannia	0	0	0	0	0	0	0
| Family: Muscidae	0	0	0	0	0	0	0
Limnophora	0	0	0	0	0	0	0
| Family: Pelecorhynchidae	0	0	0	0	0	0	0
Glutops	0	40	0	0	0	0	0
| Family: Psychodidae	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	840	1,260	240	40	160	560	280
| Family: Simuliidae	0	0	20	40	20	0	20
Simulium	60	40	20	0	0	0	40

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250-494-7553

Site:	2021	2021	2021	2021	2021	2021	2021
Sample:	RG_ALUSM_BIC-2_2021-09-12	RG_ALUSM_BIC-3_2021-09-12	RG_MIDGA_BIC-1_2021-09-11	RG_MIDGA_BIC-2_2021-09-11	RG_MIDGA_BIC-3_2021-09-11	RG_MI3_BIC-1_2021-09-11	RG_MI3_BIC-2_2021-09-11
Sample Collection Date:	12-Sep-21	12-Sep-21	11-Sep-21	11-Sep-21	11-Sep-21	11-Sep-21	11-Sep-21
CC#:	CC221301	CC221302	CC221303	CC221304	CC221305	CC221306	CC221307
| Family: Tipulidae	0	0	0	0	0	0	0
Antocha	0	0	20	0	0	0	0
Dicranota	0	0	0	0	0	0	0
Hexatoma	0	0	40	80	20	0	20
Tipula	0	0	0	0	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0
| Order: Trombidiformes	40	0	0	0	0	0	0
| Family: Aturidae	0	0	0	0	0	0	0
Aturus	0	0	0	0	0	0	0
| Family: Feltriidae	0	0	0	0	0	0	0
Feltria	0	0	0	0	0	0	0
| Family: Hydryphantidae	0	0	0	0	0	0	0
Albertathyas	0	0	0	0	0	0	0
Protzia	0	0	20	0	0	0	20
| Family: Lebertiidae	0	0	0	0	0	0	0
Lebertia	0	60	220	80	80	340	260
| Family: Sperchontidae	0	0	0	0	0	0	0
Sperchon	0	0	0	20	40	80	140
| Family: Torrenticolidae	0	0	0	0	0	0	0
Testudacarus	0	20	0	0	0	0	0
Torrenticola	0	0	140	260	400	240	160
Suborder: Prostigmata	0	0	0	0	0	0	0
| Family: Stygothrombidiidae	0	0	0	0	0	0	0
Stygothrombium	0	0	0	0	0	0	0
| Order: Sarcoptiformes	0	0	0	0	0	0	0
| Order: Oribatida	0	0	0	0	0	0	0
| Family: Hydrozetidae	20	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0
| Order: Lumbriculida	0	0	0	0	0	0	0
| Family: Lumbriculidae	20	40	0	0	40	0	0
Lumbriculus	0	0	0	0	0	0	0
Rhynchelmis	0	0	0	0	0	40	0

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Raw Benthic Invertebrate Density Results (# organisms/sample), EVO LAEMP 2021

Project: EVO LAEMP (21-09)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2021	2021	2021	2021	2021	2021	2021
Sample:	RG_ALUSM_BIC-2_2021-09-12	RG_ALUSM_BIC-3_2021-09-12	RG_MIDGA_BIC-1_2021-09-11	RG_MIDGA_BIC-2_2021-09-11	RG_MIDGA_BIC-3_2021-09-11	RG_MI3_BIC-1_2021-09-11	RG_MI3_BIC-2_2021-09-11
Sample Collection Date:	12-Sep-21	12-Sep-21	11-Sep-21	11-Sep-21	11-Sep-21	11-Sep-21	11-Sep-21
CC#:	CC221301	CC221302	CC221303	CC221304	CC221305	CC221306	CC221307
| Order: Tubificida	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0	0	0
Enchytraeus	0	0	20	0	0	0	0
| Family: Naididae	0	0	0	0	0	0	0
Nais	0	0	80	0	80	60	20
| Subfamily: Tubificinae with hair chaetae	0	0	0	0	0	0	0
| Subfamily: Tubificinae without hair chaetae	0	0	0	40	0	0	0
Totals:	**8,540**	**7,240**	**12,940**	**7,820**	**8,000**	**7,120**	**12,660**
Taxa present but not included:							
Phylum: Arthropoda	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0
| Order: Homoptera	0	0	0	0	0	0	0
| Family: Cicadellidae	0	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0
| Class: Ostracoda	20	20	0	20	20	20	20
Phylum: Nemata	20	20	0	20	0	0	20
Phylum: Platyhelminthes	0	0	0	0	0	0	0
| Class: Turbellaria	20	20	0	20	20	20	20
Totals:	**60**	**60**	0	**60**	**40**	**40**	**60**

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Raw Benthic Invertebrate Density Results (# organisms/sample), EVO LAEMP 2021

Project: EVO LAEMP (21-09)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2021	2021	2021	2021	2021	2021
Sample:	RG_MI3_BIC-3_2021-09-11	RG_MICOMP_BIC-1_2021-09-13	RG_MICOMP_BIC-2_2021-09-13	RG_MICOMP_BIC-3_2021-09-13	RG_MICOMP_BIC-4_2021-09-13	RG_MICOMP_BIC-5_2021-09-13
Sample Collection Date:	11-Sep-21	13-Sep-21	13-Sep-21	13-Sep-21	13-Sep-21	13-Sep-21
CC#:	CC221308	CC221309	CC221310	CC221311	CC221312	CC221313
Phylum: Arthropoda	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0
Ameletus	60	0	0	0	40	0
| Family: Baetidae	320	220	80	160	40	260
Acentrella	0	0	0	60	0	0
Baetis	900	2220	700	1,360	1,440	1,140
Baetis rhodani group	1,240	1,900	580	680	1,300	1,820
| Family: Ephemerellidae	1,080	640	360	80	600	380
Caudatella	0	0	20	0	20	0
Drunella	60	20	0	20	0	0
Drunella coloradensis	20	0	0	0	0	0
Drunella doddsii	80	260	60	240	160	180
Drunella spinifera	20	0	20	0	40	0
Ephemerella	0	100	0	0	180	280
Ephemerella excrucians complex	20	0	20	0	0	0
| Family: Heptageniidae	2380	1,580	1,660	1,440	1,080	2040
Cinygmula	0	0	0	0	0	0
Epeorus	40	0	0	20	0	0
Rhithrogena	0	0	0	40	60	100
| Family: Leptophlebiidae	0	0	20	0	0	0
| Order: Plecoptera	0	0	20	100	0	0
| Family: Capniidae	0	60	60	0	20	20
Utacapnia	0	0	0	0	0	0
| Family: Chloroperlidae	0	0	20	0	0	0
Sweltsa	0	40	220	0	40	20
| Family: Leuctridae	20	0	20	20	0	40
Paraleuctra	0	0	0	0	0	0

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Raw Benthic Invertebrate Density Results (# organisms/sample), EVO LAEMP 2021

Project: EVO LAEMP (21-09)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2021	2021	2021	2021	2021	2021
Sample:	RG_MI3_BIC-3_2021-09-11	RG_MICOMP_BIC-1_2021-09-13	RG_MICOMP_BIC-2_2021-09-13	RG_MICOMP_BIC-3_2021-09-13	RG_MICOMP_BIC-4_2021-09-13	RG_MICOMP_BIC-5_2021-09-13
Sample Collection Date:	11-Sep-21	13-Sep-21	13-Sep-21	13-Sep-21	13-Sep-21	13-Sep-21
CC#:	CC221308	CC221309	CC221310	CC221311	CC221312	CC221313
| **Family: Nemouridae**	0	0	0	0	20	20
Malenka	0	0	0	0	0	0
Zapada	140	80	40	180	240	380
Zapada oregonensis group	20	20	40	0	0	0
Zapada cinctipes	640	1,520	460	1,300	980	1,240
Zapada columbiana	0	20	0	0	200	180
| **Family: Peltoperlidae**	0	0	0	0	0	0
Yoraperla	0	0	0	0	0	0
| **Family: Perlidae**	40	20	0	0	0	40
Doroneuria	20	20	0	0	0	0
Hesperoperla	0	40	0	40	20	20
| **Family: Perlodidae**	0	0	0	0	0	0
Cultus	0	20	0	0	0	0
Kogotus	40	20	0	0	20	0
Megarcys	0	0	0	0	0	0
Skwala	0	0	20	0	0	0
| **Family: Pteronarcyidae**	0	0	0	0	0	0
Pteronarcella	0	0	0	20	0	0
| **Family: Taeniopterygidae**	60	340	180	280	20	280
| **Order: Trichoptera**	0	80	140	100	100	220
| **Family: Apataniidae**	0	0	0	0	0	0
Apatania	380	1,380	680	80	120	960
| **Family: Brachycentridae**	0	0	0	0	0	0
Brachycentrus	20	20	0	20	0	80
Brachycentrus americanus	0	20	0	0	40	20
Micrasema	0	40	0	0	20	0
| **Family: Glossosomatidae**	80	180	20	0	80	800
Glossosoma	0	140	80	0	20	680
| **Family: Hydropsychidae**	20	60	40	140	40	200
Arctopsyche	20	300	20	460	160	440
Parapsyche	0	0	0	0	0	0
Parapsyche elsis	0	0	0	0	0	0
| **Family: Hydroptilidae**	0	0	0	0	0	0
Hydroptila	0	0	0	0	20	0
| **Family: Lepidostomatidae**	0	0	0	0	0	0
Lepidostoma	0	100	160	60	380	60

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Raw Benthic Invertebrate Density Results (# organisms/sample), EVO LAEMP 2021

Project: EVO LAEMP (21-09)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2021	2021	2021	2021	2021	2021
Sample:	RG_MI3_BIC-3_2021-09-11	RG_MICOMP_BIC-1_2021-09-13	RG_MICOMP_BIC-2_2021-09-13	RG_MICOMP_BIC-3_2021-09-13	RG_MICOMP_BIC-4_2021-09-13	RG_MICOMP_BIC-5_2021-09-13
Sample Collection Date:	11-Sep-21	13-Sep-21	13-Sep-21	13-Sep-21	13-Sep-21	13-Sep-21
CC#:	CC221308	CC221309	CC221310	CC221311	CC221312	CC221313
| Family: Limnephilidae	0	0	0	0	0	0
Ecclisomyia	0	0	0	0	0	0
| Family: Rhyacophilidae	0	0	0	0	0	0
Rhyacophila	120	40	60	40	120	200
Rhyacophila angelita group	0	0	0	0	0	0
Rhyacophila betteni group	20	0	0	0	0	0
Rhyacophila brunnea/vemna group	40	0	0	0	20	0
Rhyacophila hyalinata group	0	0	0	0	0	20
Rhyacophila narvae	0	0	0	20	0	0
| Family: Thremmatidae	0	0	0	0	0	0
Oligophlebodes	20	0	0	0	0	0
| Family: Uenoidae	0	0	0	0	0	0
Neothremma	0	0	0	0	0	0
| Order: Coleoptera	0	0	0	0	0	0
| Family: Dytiscidae	0	0	0	0	0	0
Desmopachria	0	0	0	0	0	0
| Family: Elmidae	20	0	0	20	0	0
Heterlimnius	80	0	20	0	0	0
Narpus	0	0	20	0	0	0
Zaitzevia	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0
| Family: Athericidae	0	0	0	0	0	0
Atherix	0	60	40	20	60	40
| Family: Ceratopogonidae	0	0	0	20	0	0
Bezzia/ Palpomyia	0	0	0	0	0	0
Mallochohelea	40	0	20	20	0	0
| Family: Chironomidae	100	1,240	360	700	1,080	760
| Subfamily: Chironominae	0	0	0	0	0	0
| Tribe: Chironomini	0	0	0	0	0	0
Polypedilum	0	240	160	140	540	120
| Tribe: Tanytarsini	0	0	0	0	0	0
Micropsectra	20	100	100	20	20	120
Rheotanytarsus	0	0	0	0	0	0
Stempellina	0	20	0	0	0	0
Sublettea	0	0	0	0	0	0
| Subfamily: Diamesinae	0	0	0	0	0	0

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Raw Benthic Invertebrate Density Results (# organisms/sample), EVO LAEMP 2021

Project: EVO LAEMP (21-09)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2021	2021	2021	2021	2021	2021
Sample:	RG_MI3_BIC-3_2021-09-11	RG_MICOMP_BIC-1_2021-09-13	RG_MICOMP_BIC-2_2021-09-13	RG_MICOMP_BIC-3_2021-09-13	RG_MICOMP_BIC-4_2021-09-13	RG_MICOMP_BIC-5_2021-09-13
Sample Collection Date:	11-Sep-21	13-Sep-21	13-Sep-21	13-Sep-21	13-Sep-21	13-Sep-21
CC#:	CC221308	CC221309	CC221310	CC221311	CC221312	CC221313
| Tribe: Diamesini	0	0	0	0	0	0
Diamesa	0	0	0	20	80	0
Pagastia	0	60	0	0	0	20
Potthastia gaedii group	0	80	40	40	20	40
Pseudodiamesa	0	0	0	0	0	0
| Subfamily: Orthocladiinae	0	0	0	0	0	0
Brillia	0	0	0	0	0	0
Corynoneura	0	0	0	0	0	0
Eukiefferiella	140	100	40	180	140	140
Hydrobaenus	0	0	60	0	0	40
Limnophyes	0	0	0	0	0	0
Orthocladius complex	140	1,500	420	1,360	2300	640
Orthocladius lignicola	0	0	0	0	0	0
Psectrocladius	0	0	0	0	0	0
Rheocricotopus	140	20	40	0	100	40
Thienemanniella	0	0	0	0	0	0
Tvetenia	0	300	40	180	240	500
| Subfamily: Tanypodinae	0	20	0	0	0	0
| Tribe: Pentaneurini	0	0	0	0	0	0
Thienemannimyia group	20	0	0	0	20	0
| Tribe: Procladiini	0	0	0	0	0	0
Procladius	0	0	0	0	0	0
| Family: Empididae	0	0	0	0	20	20
Clinocera	0	0	0	0	0	0
Neoplasta	0	0	20	40	20	40
Wiedemannia	0	20	0	0	20	0
| Family: Muscidae	0	0	0	0	0	0
Limnophora	0	0	0	0	0	0
| Family: Pelecorhynchidae	0	0	0	0	0	0
Glutops	0	0	0	0	0	0
| Family: Psychodidae	0	0	0	0	0	0
Pericoma/Telmatoscopus	520	240	180	60	180	220
| Family: Simuliidae	0	20	20	960	80	140
Simulium	0	0	0	300	20	100

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Raw Benthic Invertebrate Density Results (# organisms/sample), EVO LAEMP 2021

Project: EVO LAEMP (21-09)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2021	2021	2021	2021	2021	2021
Sample:	RG_MI3_BIC-3_2021-09-11	RG_MICOMP_BIC-1_2021-09-13	RG_MICOMP_BIC-2_2021-09-13	RG_MICOMP_BIC-3_2021-09-13	RG_MICOMP_BIC-4_2021-09-13	RG_MICOMP_BIC-5_2021-09-13
Sample Collection Date:	11-Sep-21	13-Sep-21	13-Sep-21	13-Sep-21	13-Sep-21	13-Sep-21
CC#:	CC221308	CC221309	CC221310	CC221311	CC221312	CC221313
| Family: Tipulidae	0	0	0	0	20	0
Antocha	0	40	0	0	0	40
Dicranota	0	0	0	0	0	0
Hexatoma	0	40	20	20	20	40
Tipula	0	0	0	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0
| Order: Trombidiformes	0	0	0	0	0	0
| Family: Aturidae	0	0	0	0	0	0
Aturus	0	20	0	0	0	0
| Family: Feltriidae	0	0	0	0	0	0
Feltria	0	0	0	0	0	0
| Family: Hydryphantidae	0	0	0	0	0	0
Albertathyas	0	0	0	0	0	0
Protzia	20	0	20	0	0	0
| Family: Lebertiidae	0	0	0	0	0	0
Lebertia	60	180	220	20	120	180
| Family: Sperchontidae	0	0	0	0	0	0
Sperchon	100	60	20	0	40	60
| Family: Torrenticolidae	0	0	0	0	0	0
Testudacarus	40	20	20	0	0	0
Torrenticola	100	60	180	80	80	100
Suborder: Prostigmata	0	0	0	0	0	0
| Family: Stygothrombidiidae	0	0	0	0	0	0
Stygothrombium	0	0	0	0	20	0
| Order: Sarcoptiformes	0	0	0	0	0	0
| Order: Oribatida	0	0	0	0	0	0
| Family: Hydrozetidae	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0
| Order: Lumbriculida	0	0	0	0	0	0
| Family: Lumbriculidae	0	0	0	0	0	0
Lumbriculus	0	0	0	0	0	0
Rhynchelmis	0	0	0	0	0	0

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Raw Benthic Invertebrate Density Results (# organisms/sample), EVO LAEMP 2021

Project: EVO LAEMP (21-09)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2021	2021	2021	2021	2021	2021
Sample:	RG_MI3_BIC-3_2021-09-11	RG_MICOMP_BIC-1_2021-09-13	RG_MICOMP_BIC-2_2021-09-13	RG_MICOMP_BIC-3_2021-09-13	RG_MICOMP_BIC-4_2021-09-13	RG_MICOMP_BIC-5_2021-09-13
Sample Collection Date:	11-Sep-21	13-Sep-21	13-Sep-21	13-Sep-21	13-Sep-21	13-Sep-21
CC#:	CC221308	CC221309	CC221310	CC221311	CC221312	CC221313
| Order: Tubificida	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0	0
Enchytraeus	0	0	0	20	0	0
| Family: Naididae	0	0	0	0	0	0
Nais	20	60	120	40	540	160
| Subfamily: Tubificinae with hair chaetae	0	0	0	0	0	0
| Subfamily: Tubificinae without hair chaetae	0	0	0	0	0	0
Totals:	**9,480**	**16,000**	**7,980**	**11,220**	**13,420**	**15,680**
Taxa present but not included:						
Phylum: Arthropoda	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0
| Order: Homoptera	0	0	0	0	0	0
| Family: Cicadellidae	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0
| Class: Ostracoda	20	20	20	0	0	20
Phylum: Nemata	20	20	0	20	0	0
Phylum: Platyhelminthes	0	0	0	0	0	0
| Class: Turbellaria	20	20	20	20	0	20
Totals:	**60**	**60**	**40**	**40**	0	**40**

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BENTHIC BIOMASS

ZEAS 21-09 Raw Data

(September 15, 2021)

Raw Benthic Invertebrate Biomass and Taxa Composition from Hess Samples, EVO LAEMP, September 2021

Area	Date	Sample ID	Taxa	Count	Total Biomass
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-1_2021-09-14	Planariidae	19	0.66032
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-1_2021-09-14	Naididae	34	0.13968
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-1_2021-09-14	Sperchonidae	3	0.02857
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-1_2021-09-14	Ostracoda	1	0.00317
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-1_2021-09-14	Ephemerellidae	3	0.00317
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-1_2021-09-14	Nemouridae	23	0.40952
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-1_2021-09-14	Peltoperlidae	17	2.26032
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-1_2021-09-14	Chironomidae	123	0.71746
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-1_2021-09-14	Empididae	1	0.00635
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-1_2021-09-14	Tipulidae	1	0.00317
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-2_2021-09-14	Nemata	5	0.00952
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-2_2021-09-14	Planariidae	18	0.41587
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-2_2021-09-14	Enchytraeidae	4	0.0254
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-2_2021-09-14	Naididae	39	0.07937
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-2_2021-09-14	Ostracoda	9	0.06032
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-2_2021-09-14	Ephemerellidae	3	0.00635
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-2_2021-09-14	Nemouridae	57	0.75556
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-2_2021-09-14	Peltoperlidae	17	2.96825
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-2_2021-09-14	Hydropsychidae	2	0.05079
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-2_2021-09-14	Lepidostomatidae	5	0.02222
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-2_2021-09-14	Limnephilidae	1	0.0254
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-2_2021-09-14	Chironomidae	234	0.87937
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-2_2021-09-14	Empididae	2	0.05079
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-2_2021-09-14	Pelecorhyncidae	4	0.46349
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-2_2021-09-14	Tipulidae	6	0.04762
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-3_2021-09-14	Nemata	2	0.0016
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-3_2021-09-14	Planariidae	14	0.344
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-3_2021-09-14	Naididae	42	0.0448
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-3_2021-09-14	Lebertiidae	3	0.0176
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-3_2021-09-14	Sperchonidae	7	0.0352
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-3_2021-09-14	Ostracoda	24	0.0688
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-3_2021-09-14	Ephemerellidae	3	0.0064
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-3_2021-09-14	Chloroperlidae	1	0.0384
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-3_2021-09-14	Nemouridae	52	0.3808
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-3_2021-09-14	Peltoperlidae	42	1.872
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-3_2021-09-14	Apataniidae	2	0.032
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-3_2021-09-14	Lepidostomatidae	5	0.0016
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-3_2021-09-14	Uenoidae	2	0.0336
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-3_2021-09-14	Ceratopogonidae	1	0.0032
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-3_2021-09-14	Chironomidae	88	0.408
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-3_2021-09-14	Empididae	3	0.0464
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-3_2021-09-14	Pelecorhyncidae	2	0.048
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-3_2021-09-14	Tipulidae	1	0.0032
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-4_2021-09-14	Nemata	3	0.0016
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-4_2021-09-14	Planariidae	5	0.009
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-4_2021-09-14	Planariidae	25	0.456
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-4_2021-09-14	Enchytraeidae	1	0.008
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-4_2021-09-14	Naididae	159	0.216
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-4_2021-09-14	Sperchonidae	1	0.0048
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-4_2021-09-14	Ostracoda	9	0.0304
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-4_2021-09-14	Ephemerellidae	4	0.0048
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-4_2021-09-14	Nemouridae	11	0.0161
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-4_2021-09-14	Nemouridae	154	0.7872
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-4_2021-09-14	Peltoperlidae	12	0.3872
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-4_2021-09-14	Hydropsychidae	1	0.0929
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-4_2021-09-14	Hydropsychidae	2	0.048
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-4_2021-09-14	Lepidostomatidae	42	0.0896
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-4_2021-09-14	Limnephilidae	1	0.0064
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-4_2021-09-14	Chironomidae	381	1.8128
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-4_2021-09-14	Empididae	1	0.0256
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-4_2021-09-14	Muscidae	2	0.0714
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-4_2021-09-14	Tipulidae	1	0.0016
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-5_2021-09-14	Nemata	8	0.0064
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-5_2021-09-14	Planariidae	2	0.0023
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-5_2021-09-14	Planariidae	20	0.7264
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-5_2021-09-14	Naididae	307	0.7488
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-5_2021-09-14	Ostracoda	6	0.0384
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-5_2021-09-14	Ephemerellidae	2	0.0064
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-5_2021-09-14	Nemouridae	2	0.0055
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-5_2021-09-14	Nemouridae	97	1.6992
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-5_2021-09-14	Peltoperlidae	1	0.0069
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-5_2021-09-14	Peltoperlidae	11	1.1552
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-5_2021-09-14	Hydropsychidae	1	0.0729
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-5_2021-09-14	Hydropsychidae	3	0.0864
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-5_2021-09-14	Lepidostomatidae	4	0.016
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-5_2021-09-14	Chironomidae	211	1.6544
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-5_2021-09-14	Muscidae	11	0.3698
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-5_2021-09-14	Pelecorhyncidae	9	0.1248
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-6_2021-09-14	Planariidae	20	0.544
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-6_2021-09-14	Naididae	308	0.6048
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-6_2021-09-14	Ostracoda	1	0.0032
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-6_2021-09-14	Ephemerellidae	3	0.0032
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-6_2021-09-14	Chloroperlidae	2	0.032
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-6_2021-09-14	Nemouridae	86	0.9312
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-6_2021-09-14	Peltoperlidae	31	3.2448
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-6_2021-09-14	Hydropsychidae	1	0.0448

Raw Benthic Invertebrate Biomass and Taxa Composition from Hess Samples, EVO LAEMP, September 2021

Area	Date	Sample ID	Taxa	Count	Total Biomass
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-6_2021-09-14	Lepidostomatidae	6	0.0224
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-6_2021-09-14	Chironomidae	177	1.2416
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-6_2021-09-14	Empididae	1	0.0064
RG_ERCKDT	9/14/2021	RG_ERCKDT_HESS-6_2021-09-14	Tipulidae	1	0.0064
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-7_2021-09-15	Nemata	20	0.0052
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-7_2021-09-15	Planariidae	3	0.0108
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-7_2021-09-15	Enchytraeidae	25	0.0164
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-7_2021-09-15	Naididae	19	0.008
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-7_2021-09-15	Lebertiidae	1	4.00E-04
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-7_2021-09-15	Sperchonidae	1	4.00E-04
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-7_2021-09-15	Heptageniidae	1	0.0012
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-7_2021-09-15	Chloroperlidae	2	0.0108
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-7_2021-09-15	Nemouridae	31	0.052
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-7_2021-09-15	Peltoperlidae	13	0.2656
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-7_2021-09-15	Hydropsychidae	1	0.0012
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-7_2021-09-15	Rhyacophilidae	2	0.2112
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-7_2021-09-15	Chironomidae	165	0.6532
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-7_2021-09-15	Pelecorhyncidae	2	0.0232
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-7_2021-09-15	Tipulidae	1	0.0456
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-8_2021-09-15	Nemata	15	0.002
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-8_2021-09-15	Planariidae	11	0.0884
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-8_2021-09-15	Enchytraeidae	9	0.0044
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-8_2021-09-15	Naididae	210	0.0752
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-8_2021-09-15	Sperchonidae	1	6.00E-04
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-8_2021-09-15	Sperchonidae	1	8.00E-04
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-8_2021-09-15	Ostracoda	4	0.0048
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-8_2021-09-15	Ephemerellidae	3	0.0036
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-8_2021-09-15	Chloroperlidae	1	0.004
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-8_2021-09-15	Nemouridae	86	0.3212
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-8_2021-09-15	Peltoperlidae	2	0.0199
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-8_2021-09-15	Peltoperlidae	41	0.4664
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-8_2021-09-15	Limnephilidae	1	0.002
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-8_2021-09-15	Rhyacophilidae	1	0.0357
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-8_2021-09-15	Rhyacophilidae	1	0.2876
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-8_2021-09-15	Ceratopogonidae	2	0.0036
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-8_2021-09-15	Chironomidae	557	1.86
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-8_2021-09-15	Empididae	2	0.0092
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-8_2021-09-15	Muscidae	1	0.0353
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-8_2021-09-15	Muscidae	2	0.0092
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-8_2021-09-15	Pelecorhyncidae	2	0.0502
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-8_2021-09-15	Pelecorhyncidae	1	0.0176
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-9_2021-09-15	Nemata	3	0.0224
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-9_2021-09-15	Planariidae	37	1.936
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-9_2021-09-15	Enchytraeidae	7	0.1152
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-9_2021-09-15	Naididae	302	1.3312
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-9_2021-09-15	Ostracoda	32	0.2688
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-9_2021-09-15	Ephemerellidae	3	0.0224
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-9_2021-09-15	Chloroperlidae	3	0.1056
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-9_2021-09-15	Nemouridae	24	0.7296
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-9_2021-09-15	Peltoperlidae	23	3.3248
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-9_2021-09-15	Perlodidae	1	0.1536
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-9_2021-09-15	Chironomidae	238	6.4768
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-9_2021-09-15	Empididae	1	0.0416
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-9_2021-09-15	Muscidae	1	0.2176
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-10_2021-09-15	Nemata	17	0.0224
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-10_2021-09-15	Planariidae	16	0.7144
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-10_2021-09-15	Enchytraeidae	7	0.008
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-10_2021-09-15	Naididae	58	0.04
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-10_2021-09-15	Lebertiidae	2	0.0032
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-10_2021-09-15	Sperchonidae	15	0.0672
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-10_2021-09-15	Ostracoda	29	0.0576
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-10_2021-09-15	Capniidae	1	0.048
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-10_2021-09-15	Chloroperlidae	6	0.0912
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-10_2021-09-15	Nemouridae	20	0.1112
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-10_2021-09-15	Peltoperlidae	9	0.4872
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-10_2021-09-15	Perlodidae	1	0.0024
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-10_2021-09-15	Rhyacophilidae	5	0.3227
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-10_2021-09-15	Rhyacophilidae	2	0.424
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-10_2021-09-15	Chironomidae	407	4.3608
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-10_2021-09-15	Empididae	3	0.016
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-10_2021-09-15	Pelecorhyncidae	2	0.4184
RG_ERCKDT	9/15/2021	RG_ERCKDT_HESS-10_2021-09-15	Tipulidae	1	0.0032
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-1_2021-09-15	Nemata	4	4.00E-04
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-1_2021-09-15	Planariidae	16	0.11
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-1_2021-09-15	Naididae	1	0.032
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-1_2021-09-15	Ostracoda	2	0.002
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-1_2021-09-15	Capniidae	3	0.0376
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-1_2021-09-15	Chloroperlidae	8	0.0268
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-1_2021-09-15	Nemouridae	12	0.1192
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-1_2021-09-15	Peltoperlidae	69	1.1324
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-1_2021-09-15	Perlodidae	3	0.0312
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-1_2021-09-15	Glossosomatidae	2	0.0268
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-1_2021-09-15	Rhyacophilidae	24	4.6116
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-1_2021-09-15	Ceratopogonidae	1	4.00E-04
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-1_2021-09-15	Chironomidae	58	0.1668
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-1_2021-09-15	Empididae	5	0.0232

Raw Benthic Invertebrate Biomass and Taxa Composition from Hess Samples, EVO LAEMP, September 2021

Area	Date	Sample ID	Taxa	Count	Total Biomass
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-2_2021-09-15	Nemata	12	0.0016
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-2_2021-09-15	Planariidae	8	0.0976
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-2_2021-09-15	Enchytraeidae	2	0.002
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-2_2021-09-15	Sperchonidae	6	0.01
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-2_2021-09-15	Ostracoda	12	0.0088
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-2_2021-09-15	Capniidae	3	0.0328
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-2_2021-09-15	Chloroperlidae	7	0.0256
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-2_2021-09-15	Nemouridae	26	0.1868
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-2_2021-09-15	Peltoperlidae	103	1.3032
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-2_2021-09-15	Perlodidae	10	0.0252
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-2_2021-09-15	Glossosomatidae	1	8.00E-04
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-2_2021-09-15	Rhyacophilidae	2	0.2872
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-2_2021-09-15	Ceratopogonidae	1	8.00E-04
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-2_2021-09-15	Chironomidae	204	0.4336
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-2_2021-09-15	Empididae	21	0.0732
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-2_2021-09-15	Pelecorhyncidae	5	0.1412
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-3_2021-09-15	Planariidae	8	0.0868
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-3_2021-09-15	Enchytraeidae	1	4.00E-04
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-3_2021-09-15	Naididae	3	0.018
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-3_2021-09-15	Ostracoda	9	0.0088
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-3_2021-09-15	Capniidae	3	0.0312
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-3_2021-09-15	Chloroperlidae	14	0.0716
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-3_2021-09-15	Nemouridae	21	0.1012
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-3_2021-09-15	Peltoperlidae	42	1.03
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-3_2021-09-15	Perlodidae	4	0.056
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-3_2021-09-15	Limnephilidae	1	0.0028
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-3_2021-09-15	Rhyacophilidae	2	0.4084
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-3_2021-09-15	Chironomidae	62	0.1068
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-3_2021-09-15	Empididae	2	0.0072
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-3_2021-09-15	Pelecorhyncidae	1	0.0252
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-4_2021-09-15	Nemata	22	0.0144
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-4_2021-09-15	Planariidae	25	0.392
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-4_2021-09-15	Enchytraeidae	1	0.0016
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-4_2021-09-15	Sperchonidae	3	0.0288
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-4_2021-09-15	Ostracoda	25	0.088
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-4_2021-09-15	Capniidae	1	0.0272
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-4_2021-09-15	Chloroperlidae	8	0.0752
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-4_2021-09-15	Nemouridae	71	0.8256
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-4_2021-09-15	Peltoperlidae	36	1.5568
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-4_2021-09-15	Perlodidae	8	0.144
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-4_2021-09-15	Glossosomatidae	1	0.0016
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-4_2021-09-15	Rhyacophilidae	2	1.3536
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-4_2021-09-15	Chironomidae	155	1.0352
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-4_2021-09-15	Empididae	6	0.056
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-4_2021-09-15	Pelecorhyncidae	1	0.0016
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-5_2021-09-15	Nemata	5	0.0026
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-5_2021-09-15	Planariidae	5	0.0162
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-5_2021-09-15	Ostracoda	1	4.00E-04
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-5_2021-09-15	Chloroperlidae	6	0.0138
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-5_2021-09-15	Nemouridae	13	0.044
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-5_2021-09-15	Peltoperlidae	39	0.2668
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-5_2021-09-15	Perlodidae	8	0.0352
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-5_2021-09-15	Rhyacophilidae	8	0.455
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-5_2021-09-15	Chironomidae	68	0.08
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-5_2021-09-15	Empididae	3	0.003
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-5_2021-09-15	Pelecorhyncidae	1	0.0078
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-6_2021-09-15	Nemata	8	0.0024
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-6_2021-09-15	Planariidae	29	0.1868
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-6_2021-09-15	Sperchonidae	8	0.0152
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-6_2021-09-15	Ostracoda	21	0.0192
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-6_2021-09-15	Chloroperlidae	13	0.0784
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-6_2021-09-15	Nemouridae	40	0.1752
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-6_2021-09-15	Peltoperlidae	76	0.8352
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-6_2021-09-15	Perlodidae	3	0.0072
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-6_2021-09-15	Limnephilidae	5	0.0064
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-6_2021-09-15	Chironomidae	184	0.432
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-6_2021-09-15	Empididae	10	0.0372
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-6_2021-09-15	Pelecorhyncidae	1	0.0408
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-6_2021-09-15	Psychodidae	2	0.0056
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-7_2021-09-15	Nemata	3	2.00E-04
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-7_2021-09-15	Planariidae	18	0.0668
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-7_2021-09-15	Enchytraeidae	1	2.00E-04
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-7_2021-09-15	Sperchonidae	5	0.0034
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-7_2021-09-15	Ostracoda	7	0.0042
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-7_2021-09-15	Chloroperlidae	17	0.0282
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-7_2021-09-15	Nemouridae	47	0.1456
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-7_2021-09-15	Peltoperlidae	83	0.5474
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-7_2021-09-15	Perlodidae	8	0.02
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-7_2021-09-15	Rhyacophilidae	2	0.1388
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-7_2021-09-15	Chironomidae	165	0.1784
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-7_2021-09-15	Empididae	10	0.0178
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-8_2021-09-15	Nemata	5	0.0064
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-8_2021-09-15	Planariidae	11	0.1936
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-8_2021-09-15	Sperchonidae	2	0.0112
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-8_2021-09-15	Ostracoda	6	0.0176
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-8_2021-09-15	Staphylinidae	1	0.0224

Raw Benthic Invertebrate Biomass and Taxa Composition from Hess Samples, EVO LAEMP, September 2021

Area	Date	Sample ID	Taxa	Count	Total_Biomass
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-8_2021-09-15	Capniidae	1	0.0416
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-8_2021-09-15	Chloroperlidae	5	0.0656
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-8_2021-09-15	Nemouridae	46	0.4608
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-8_2021-09-15	Peltoperlidae	54	2.6784
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-8_2021-09-15	Perlodidae	1	0.0096
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-8_2021-09-15	Limnephilidae	1	0.0016
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-8_2021-09-15	Rhyacophilidae	1	1.4128
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-8_2021-09-15	Chironomidae	113	0.8496
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-8_2021-09-15	Empididae	1	0.0144
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-9_2021-09-15	Nemata	13	0.0448
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-9_2021-09-15	Planariidae	19	0.3328
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-9_2021-09-15	Enchytraeidae	4	0.0064
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-9_2021-09-15	Sperchonidae	4	0.0256
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-9_2021-09-15	Ostracoda	159	0.5408
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-9_2021-09-15	Chloroperlidae	15	0.0896
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-9_2021-09-15	Nemouridae	20	0.5408
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-9_2021-09-15	Peltoperlidae	78	5.392
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-9_2021-09-15	Perlodidae	9	0.08
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-9_2021-09-15	Limnephilidae	4	0.0192
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-9_2021-09-15	Rhyacophilidae	1	0.047
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-9_2021-09-15	Chironomidae	77	0.8208
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-9_2021-09-15	Empididae	2	0.0224
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-10_2021-09-15	Nemata	27	0.0112
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-10_2021-09-15	Planariidae	10	0.2008
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-10_2021-09-15	Enchytraeidae	1	8.00E-04
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-10_2021-09-15	Naididae	1	0.0048
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-10_2021-09-15	Sperchonidae	3	0.008
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-10_2021-09-15	Ostracoda	48	0.0824
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-10_2021-09-15	Capniidae	1	0.0368
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-10_2021-09-15	Chloroperlidae	12	0.0776
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-10_2021-09-15	Nemouridae	40	0.4032
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-10_2021-09-15	Peltoperlidae	61	1.424
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-10_2021-09-15	Perlodidae	2	0.3171
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-10_2021-09-15	Perlodidae	5	0.0312
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-10_2021-09-15	Limnephilidae	3	0.0096
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-10_2021-09-15	Rhyacophilidae	3	0.2672
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-10_2021-09-15	Chironomidae	133	0.6776
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-10_2021-09-15	Empididae	13	0.0792
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-10_2021-09-15	Pelecorhyncidae	4	0.0416
RG_ERCKUT	9/15/2021	RG_ERCKUT_HESS-10_2021-09-15	Tipulidae	1	8.00E-04

BENTHIC TISSUE CHEMISTRY

TrichAnalytics Laboratory Report
2021-260 (Finalized October 20, 2021)

T r i c h A n a l y t i c s   I n c .

Tissue Microchemistry Analysis Report

Client:	Peter Schnurr Aquatic Scientist Minnow Environmental	Date Received:	28 Sep 2021
		Date of Analysis:	18 Oct 2021
		Final Report Date:	20 Oct 2021
Phone:	(250) 595-1627	Project No.:	2021-260
Email:	pschnurr@minnow.ca	Method No.:	MET-002.05

Client Project: FRO LAEMP (21-11) (PO 748530)

Analytical Request: Composite-Taxa Benthic Invertebrate Tissue (total metals and moisture) - 42 samples.
See chain of custody form provided for sample identification numbers.

Notes:

Analytical results are expressed in parts per million (ppm) dry weight (equivalent to mg/kg).
Samples quantified using DORM-4, NIST-1566b, and NIST-2976 certified reference standards.
Aluminum concentrations above 1,000 ppm are outside linear range of the calibration curve.
RPD values calculated according to the British Columbia Environmental Laboratory Manual (2020) criteria.
Client specific DQO for Selenium accuracy is 90-110% of the certified value; result achieved 105% (ranging from 97-109%).

This report provides the analytical results only for tissue samples noted above as received from the Client.

Reviewed and Approved by Jennie Christensen, PhD, RPBio

20 Oct 2021
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_GATE_INV-1_2021-09-16	RG_GATE_INV-2_2021-09-16	RG_GATE_INV-3_2021-09-16	RG_GATEDP_INV-1_2021-09-16	RG_GATEDP_INV-2_2021-09-16
		Lab ID	608	609	610	611	612
		Wet Weight (g)	0.2843	0.3056	0.2425	0.2590	0.2462
		Dry Weight (g)	0.0597	0.0978	0.0529	0.0726	0.0733
		Moisture (%)	79.0	68.0	78.2	72.0	70.2
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.011	0.037	4.4	1.2	2.9	2.6	0.724
11B	0.101	0.337	5.0	1.8	6.0	2.0	1.1
23Na	1.9	6.3	7,802	3,460	4,867	4,530	1,862
24Mg	0.024	0.080	3,464	1,517	3,191	2,615	800
27Al	0.035	0.117	5,028	279	3,545	672	54
31P	33	110	14,680	9,143	14,248	12,094	5,180
39K	2.8	9.3	16,713	9,072	18,465	10,643	5,473
44Ca	9.5	32	10,790	2,896	9,437	7,482	1,432
49Ti	0.212	0.707	413	17	276	40	2.4
51V	0.066	0.220	8.4	0.657	6.1	1.1	0.144
52Cr	0.326	1.1	42	10	17	13	4.0
55Mn	0.008	0.027	146	45	185	57	22
57Fe	1.3	4.3	3,232	398	2,634	474	90
59Co	0.008	0.027	5.0	1.1	4.1	2.0	0.639
60Ni	0.037	0.123	114	21	79	33	7.6
63Cu	0.008	0.027	27	20	20	18	8.5
66Zn	0.341	1.1	255	148	294	282	86
75As	0.441	1.5	1.9	<0.441	2.6	<0.441	<0.441
77Se	0.390	1.3	34	21	24	18	8.7
88Sr	0.001	0.003	245	23	289	21	3.9
95Mo	0.001	0.003	0.933	0.203	0.872	0.324	0.101
107Ag	0.001	0.003	0.140	0.069	0.115	0.086	0.011
111Cd	0.059	0.197	5.1	1.6	4.8	9.4	1.7
118Sn	0.023	0.077	0.653	0.160	0.597	0.298	0.153
121Sb	0.005	0.017	0.255	0.054	0.235	0.069	0.015
137Ba	0.001	0.003	22,221	1,685	30,247	695	79
202Hg	0.023	0.077	0.096	0.048	0.088	0.048	0.016
205Tl	0.001	0.003	0.333	0.117	0.281	0.067	0.022
208Pb	0.001	0.003	1.1	0.072	0.777	0.168	0.018
238U	0.001	0.003	0.283	0.039	0.379	0.315	0.028

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_GATEDP_INV-3_2021-09-16	RG_BOCK_INV-1_2021-09-16	RG_BOCK_INV-2_2021-09-16	RG_BOCK_INV-3_2021-09-16	RG_ERCKDT_INV-1_2021-09-14
		Lab ID	613	614	615	616	617
		Wet Weight (g)	0.0643	0.1506	0.6665	0.7696	0.4500
		Dry Weight (g)	0.0162	0.0171	0.1204	0.1261	0.0936
		Moisture (%)	74.8	88.6	81.9	83.6	79.2
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.011	0.037	3.2	2.4	1.5	2.1	0.917
11B	0.101	0.337	2.0	5.1	1.5	2.2	1.5
23Na	1.9	6.3	6,146	16,416	10,177	12,519	2,297
24Mg	0.024	0.080	2,713	3,034	2,801	3,255	1,818
27Al	0.035	0.117	408	3,907	677	1,072	1,288
31P	33	110	13,224	12,303	11,876	13,732	8,302
39K	2.8	9.3	11,232	16,642	13,298	14,583	6,947
44Ca	9.5	32	5,466	4,891	2,689	3,551	5,190
49Ti	0.212	0.707	31	298	43	64	90
51V	0.066	0.220	1.0	6.2	1.4	2.1	2.6
52Cr	0.326	1.1	10	14	8.2	5.7	17
55Mn	0.008	0.027	35	30	12	14	177
57Fe	1.3	4.3	438	966	285	364	3,148
59Co	0.008	0.027	2.0	3.2	1.2	1.5	9.8
60Ni	0.037	0.123	23	120	26	28	36
63Cu	0.008	0.027	26	14	33	28	14
66Zn	0.341	1.1	292	144	100	112	144
75As	0.441	1.5	<0.441	0.677	0.677	0.867	2.0
77Se	0.390	1.3	20	92	49	69	12
88Sr	0.001	0.003	23	30	8.3	13	7.9
95Mo	0.001	0.003	0.446	0.892	0.183	0.266	0.642
107Ag	0.001	0.003	0.149	0.072	0.235	0.153	0.061
111Cd	0.059	0.197	10	2.3	0.540	0.796	1.3
118Sn	0.023	0.077	0.639	0.964	0.279	0.224	1.6
121Sb	0.005	0.017	0.141	0.245	0.076	0.101	0.100
137Ba	0.001	0.003	1,127	892	138	132	44
202Hg	0.023	0.077	0.056	0.056	0.056	0.067	0.036
205Tl	0.001	0.003	0.090	0.287	0.279	0.267	0.108
208Pb	0.001	0.003	0.177	1.3	0.247	0.343	0.849
238U	0.001	0.003	0.228	0.509	0.062	0.089	0.169

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_ERCKDT_INV-2_2021-09-14	RG_ERCKDT_INV-3_2021-09-14	RG_ERCKDT_INV-4_2021-09-14	RG_ERCKUT_INV-1_2021-09-15	RG_ERCKUT_INV-2_2021-09-15
		Lab ID	618	619	620	621	622
		Wet Weight (g)	0.4511	0.3908	0.3080	0.6035	0.5876
		Dry Weight (g)	0.0866	0.0741	0.0597	0.1545	0.1493
		Moisture (%)	80.8	81.0	80.6	74.4	74.6
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.011	0.037	1.0	0.872	0.822	0.374	0.422
11B	0.101	0.337	3.0	1.2	1.6	2.0	1.2
23Na	1.9	6.3	2,683	2,140	3,262	2,782	2,413
24Mg	0.024	0.080	2,674	1,907	2,631	1,996	1,618
27Al	0.035	0.117	1,832	744	894	207	198
31P	33	110	7,837	8,789	10,512	9,223	8,200
39K	2.8	9.3	9,172	8,066	9,722	8,294	7,257
44Ca	9.5	32	6,227	4,918	5,264	3,660	3,184
49Ti	0.212	0.707	125	44	66	11	12
51V	0.066	0.220	3.2	1.4	2.0	1.0	0.807
52Cr	0.326	1.1	17	9.8	14	4.8	6.0
55Mn	0.008	0.027	453	113	132	9.4	6.6
57Fe	1.3	4.3	3,449	1,848	2,050	177	173
59Co	0.008	0.027	20	5.7	7.9	0.222	0.264
60Ni	0.037	0.123	47	22	30	7.1	10
63Cu	0.008	0.027	14	17	16	19	17
66Zn	0.341	1.1	245	166	175	168	132
75As	0.441	1.5	2.7	1.3	1.4	<0.441	<0.441
77Se	0.390	1.3	17	16	20	5.8	4.1
88Sr	0.001	0.003	9.3	5.9	6.5	2.7	2.0
95Mo	0.001	0.003	0.930	0.708	0.553	0.133	0.089
107Ag	0.001	0.003	0.068	0.075	0.061	0.051	0.068
111Cd	0.059	0.197	2.7	0.446	1.8	1.9	1.3
118Sn	0.023	0.077	1.2	0.958	0.864	0.500	0.225
121Sb	0.005	0.017	0.168	0.072	0.087	0.094	0.086
137Ba	0.001	0.003	62	21	25	9.9	7.1
202Hg	0.023	0.077	0.054	<0.023	0.036	0.045	0.027
205Tl	0.001	0.003	0.672	0.094	0.125	0.023	0.018
208Pb	0.001	0.003	0.926	0.407	0.458	0.070	0.054
238U	0.001	0.003	0.248	0.154	0.182	0.122	0.095

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_ERCKUT_INV-3_2021-09-15	RG_ERCKUT_INV-4_2021-09-15	RG_ERCKUT_INV-5_2021-09-15	RG_ERCKDT_INV-5_2021-09-15	RG_MIDBO_INV-1_2021-09-11
		Lab ID	623	624	625	626	627
		Wet Weight (g)	1.1726	0.8104	0.4100	1.1524	1.4947
		Dry Weight (g)	0.2876	0.2099	0.1025	0.2143	0.3355
		Moisture (%)	75.5	74.1	75.0	81.4	77.6
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.011	0.037	0.363	0.380	0.446	1.2	3.7
11B	0.101	0.337	1.3	0.982	1.1	2.3	1.4
23Na	1.9	6.3	2,119	2,727	2,446	3,027	3,621
24Mg	0.024	0.080	1,850	1,820	1,612	2,403	1,163
27Al	0.035	0.117	140	180	157	1,405	166
31P	33	110	7,713	10,235	8,240	11,010	10,517
39K	2.8	9.3	6,280	8,381	7,581	9,111	9,909
44Ca	9.5	32	3,585	2,992	3,775	6,657	1,772
49Ti	0.212	0.707	8.5	10	6.5	109	8.1
51V	0.066	0.220	0.678	0.700	0.589	2.8	0.355
52Cr	0.326	1.1	3.6	3.7	3.5	15	3.6
55Mn	0.008	0.027	7.3	7.9	6.6	252	92
57Fe	1.3	4.3	129	137	120	2,514	177
59Co	0.008	0.027	0.109	0.176	0.142	17	2.4
60Ni	0.037	0.123	4.7	4.2	4.6	34	19
63Cu	0.008	0.027	16	19	18	16	12
66Zn	0.341	1.1	110	148	134	167	117
75As	0.441	1.5	<0.441	0.467	<0.441	1.9	0.577
77Se	0.390	1.3	4.8	6.4	5.6	18	7.0
88Sr	0.001	0.003	2.1	2.1	1.9	8.8	3.8
95Mo	0.001	0.003	0.111	0.169	0.097	0.701	0.254
107Ag	0.001	0.003	0.048	0.104	0.067	0.067	0.089
111Cd	0.059	0.197	1.1	1.6	1.1	1.1	0.712
118Sn	0.023	0.077	0.226	0.336	0.417	0.645	0.400
121Sb	0.005	0.017	0.086	0.124	0.081	0.156	0.023
137Ba	0.001	0.003	6.1	7.5	6.9	42	37
202Hg	0.023	0.077	0.027	0.057	0.038	<0.023	0.057
205Tl	0.001	0.003	0.019	0.014	0.012	0.081	0.017
208Pb	0.001	0.003	0.046	0.052	0.038	0.710	0.096
238U	0.001	0.003	0.110	0.146	0.118	0.218	0.027

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_MIDBO_INV-2_2021-09-11	RG_MIDBO_INV-3_2021-09-11	RG_MIDGA_INV-1_2021-09-11	RG_MIDGA_INV-2_2021-09-11	RG_MIDGA_INV-3_2021-09-11
		Lab ID	628	629	630	631	632
		Wet Weight (g)	1.7357	0.9464	1.2264	1.2599	0.9716
		Dry Weight (g)	0.3583	0.2102	0.2393	0.2938	0.2137
		Moisture (%)	79.4	77.8	80.5	76.7	78.0
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.011	0.037	0.948	0.452	6.0	3.7	1.7
11B	0.101	0.337	1.2	1.4	1.3	1.1	1.2
23Na	1.9	6.3	3,738	3,637	3,284	3,240	5,121
24Mg	0.024	0.080	1,691	1,649	1,092	1,411	1,214
27Al	0.035	0.117	204	241	414	190	247
31P	33	110	10,063	11,419	10,060	10,936	11,014
39K	2.8	9.3	8,356	11,088	9,702	9,608	9,563
44Ca	9.5	32	4,106	3,232	1,789	2,185	2,419
49Ti	0.212	0.707	12	16	29	8.5	13
51V	0.066	0.220	0.457	0.538	0.837	0.406	0.794
52Cr	0.326	1.1	5.8	4.5	7.6	3.2	9.1
55Mn	0.008	0.027	50	38	112	111	101
57Fe	1.3	4.3	239	219	457	269	373
59Co	0.008	0.027	2.2	3.5	3.3	3.7	4.3
60Ni	0.037	0.123	15	14	29	24	25
63Cu	0.008	0.027	16	13	8.3	9.8	11
66Zn	0.341	1.1	262	133	119	158	162
75As	0.441	1.5	<0.441	0.535	0.714	0.796	0.714
77Se	0.390	1.3	6.0	5.1	5.8	5.7	9.9
88Sr	0.001	0.003	7.9	5.6	4.0	4.9	4.9
95Mo	0.001	0.003	0.242	0.266	0.266	0.266	0.483
107Ag	0.001	0.003	0.196	0.178	0.067	0.096	0.111
111Cd	0.059	0.197	1.3	1.5	2.0	1.6	2.3
118Sn	0.023	0.077	0.273	0.384	0.354	0.300	0.358
121Sb	0.005	0.017	0.024	0.022	0.039	0.033	0.040
137Ba	0.001	0.003	43	31	98	68	83
202Hg	0.023	0.077	0.076	0.057	0.076	0.062	0.076
205Tl	0.001	0.003	0.022	0.033	0.040	0.032	0.032
208Pb	0.001	0.003	0.086	0.096	0.189	0.124	0.171
238U	0.001	0.003	0.033	0.033	0.059	0.041	0.077

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited
Tissue Analysis Results

Parameter	DL (ppm)	LOQ (ppm)	RG_MIDER_INV-1_2021-09-09	RG_MIDER_INV-2_2021-09-09	RG_MIDER_INV-3_2021-09-09	RG_ALUSM_INV-1_2021-09-12	RG_ALUSM_INV-2_2021-09-12
		Lab ID	633	634	635	636	637
		Wet Weight (g)	1.1411	0.8337	1.8467	1.4960	1.0551
		Dry Weight (g)	0.2855	0.1880	0.4664	0.2845	0.2111
		Moisture (%)	75.0	77.4	74.7	81.0	80.0
			(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.011	0.037	0.348	0.398	0.223	0.479	0.398
11B	0.101	0.337	1.5	1.6	1.0	1.9	1.9
23Na	1.9	6.3	4,333	4,762	3,819	4,274	3,234
24Mg	0.024	0.080	1,971	1,419	1,701	1,394	1,309
27Al	0.035	0.117	605	553	330	766	735
31P	33	110	11,583	12,508	12,152	12,784	9,964
39K	2.8	9.3	10,212	13,408	11,356	11,151	9,537
44Ca	9.5	32	4,213	2,721	2,484	2,072	2,148
49Ti	0.212	0.707	21	31	17	49	60
51V	0.066	0.220	0.741	1.1	0.590	1.2	0.952
52Cr	0.326	1.1	7.3	13	4.0	7.8	5.9
55Mn	0.008	0.027	63	80	78	128	78
57Fe	1.3	4.3	459	508	286	925	738
59Co	0.008	0.027	4.8	2.9	2.1	1.4	1.0
60Ni	0.037	0.123	18	25	11	12	10
63Cu	0.008	0.027	18	13	12	16	14
66Zn	0.341	1.1	213	141	118	171	127
75As	0.441	1.5	0.943	0.796	0.604	0.943	1.0
77Se	0.390	1.3	5.8	6.9	5.0	5.0	6.1
88Sr	0.001	0.003	8.5	5.5	5.0	4.4	4.5
95Mo	0.001	0.003	0.395	0.633	0.250	0.422	0.461
107Ag	0.001	0.003	0.151	0.092	0.134	0.092	0.076
111Cd	0.059	0.197	2.5	2.2	1.3	0.757	0.874
118Sn	0.023	0.077	0.199	0.262	0.080	0.114	0.241
121Sb	0.005	0.017	0.043	0.046	0.025	0.031	0.037
137Ba	0.001	0.003	40	76	41	86	54
202Hg	0.023	0.077	0.051	0.040	0.045	0.071	0.061
205Tl	0.001	0.003	0.048	0.060	0.038	0.047	0.039
208Pb	0.001	0.003	0.180	0.202	0.121	0.585	0.355
238U	0.001	0.003	0.036	0.042	0.029	0.074	0.052

Notes:
ppm = parts per million
DL = detection limit
LOQ = limit of quantitation
< = less than detection limit
g = grams
% = percent

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Tissue Analysis Results

		Client ID	RG_ALUSM_INV-3_2021-09-12	RG_BOCK_INVLUM-1_2021-09-16	RG_GATEDP_INVLUM-1_2021-09-16	RG_MI3_INV-1_2021-09-10	RG_MI3_INV-2_2021-09-10
		Lab ID	638	639	640	641	642
		Wet Weight (g)	1.4955	0.2343	0.0881	0.6412	0.8517
		Dry Weight (g)	0.2875	0.0540	0.0271	0.1190	0.2391
		Moisture (%)	80.8	77.0	69.2	81.4	71.9
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.011	0.037	0.452	4.7	3.6	0.348	0.134
11B	0.101	0.337	2.0	12	4.2	2.5	0.965
23Na	1.9	6.3	3,571	3,160	3,612	3,130	2,874
24Mg	0.024	0.080	1,291	3,207	2,617	1,573	2,854
27Al	0.035	0.117	926	12,949	3,475	565	221
31P	33	110	11,128	10,940	11,647	10,887	15,025
39K	2.8	9.3	9,683	11,060	10,877	9,999	11,273
44Ca	9.5	32	2,017	20,114	30,485	3,016	5,285
49Ti	0.212	0.707	67	970	321	41	8.9
51V	0.066	0.220	1.2	20	5.5	0.963	0.416
52Cr	0.326	1.1	6.0	29	13	8.5	4.6
55Mn	0.008	0.027	89	74	77	56	55
57Fe	1.3	4.3	1,021	3,040	1,922	466	247
59Co	0.008	0.027	1.0	12	7.3	1.9	0.818
60Ni	0.037	0.123	9.9	120	78	16	6.6
63Cu	0.008	0.027	14	27	13	12	21
66Zn	0.341	1.1	120	243	186	150	284
75As	0.441	1.5	1.0	6.4	11	0.987	0.639
77Se	0.390	1.3	5.4	240	138	4.5	5.9
88Sr	0.001	0.003	3.7	85	132	5.5	4.0
95Mo	0.001	0.003	0.409	1.6	1.1	0.475	0.252
107Ag	0.001	0.003	0.067	0.903	0.281	0.084	0.121
111Cd	0.059	0.197	0.807	5.0	4.9	1.9	0.765
118Sn	0.023	0.077	0.317	1.1	0.748	0.320	0.136
121Sb	0.005	0.017	0.041	0.721	0.217	0.033	0.030
137Ba	0.001	0.003	55	2,728	7,635	82	30
202Hg	0.023	0.077	0.051	0.354	0.303	0.061	0.042
205Tl	0.001	0.003	0.033	0.641	0.529	0.051	0.037
208Pb	0.001	0.003	0.609	3.5	0.868	0.198	0.119
238U	0.001	0.003	0.061	1.2	0.729	0.053	0.016

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_MI3_INV-3_2021-09-10	RG_ERCK_INV-1_2021-09-10	RG_MICOMP_INV-1_2021-09-13	RG_MICOMP_INV-2_2021-09-13	RG_MICOMP_INV-3_2021-09-13
		Lab ID	643	644	645	646	647
		Wet Weight (g)	0.8373	0.6746	0.8965	1.5421	0.7996
		Dry Weight (g)	0.1995	0.1798	0.1778	0.3437	0.1493
		Moisture (%)	76.2	73.3	80.2	77.7	81.3
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.011	0.037	0.268	0.418	0.455	0.358	0.256
11B	0.101	0.337	1.7	0.919	4.7	2.2	1.7
23Na	1.9	6.3	3,134	2,504	2,231	4,667	3,240
24Mg	0.024	0.080	1,312	1,548	1,025	2,108	988
27Al	0.035	0.117	452	89	802	182	107
31P	33	110	9,500	9,657	6,951	13,416	8,133
39K	2.8	9.3	9,863	8,322	6,763	10,645	7,205
44Ca	9.5	32	1,944	4,524	4,166	4,465	2,552
49Ti	0.212	0.707	27	3.7	55	11	5.4
51V	0.066	0.220	1.0	0.225	1.8	0.426	0.243
52Cr	0.326	1.1	10	3.8	18	4.6	3.4
55Mn	0.008	0.027	54	63	80	54	36
57Fe	1.3	4.3	195	127	699	372	159
59Co	0.008	0.027	0.831	3.4	3.6	4.2	1.2
60Ni	0.037	0.123	17	12	39	17	9.6
63Cu	0.008	0.027	14	10	11	22	8.7
66Zn	0.341	1.1	136	192	100	288	135
75As	0.441	1.5	0.528	<0.441	0.722	0.792	<0.441
77Se	0.390	1.3	3.0	3.3	4.5	5.1	2.7
88Sr	0.001	0.003	4.0	4.1	7.5	7.5	4.5
95Mo	0.001	0.003	0.299	0.299	0.435	0.353	0.163
107Ag	0.001	0.003	0.113	0.098	0.091	0.174	0.083
111Cd	0.059	0.197	1.2	0.315	2.3	2.0	0.811
118Sn	0.023	0.077	0.133	0.151	0.419	0.225	0.228
121Sb	0.005	0.017	0.030	0.024	0.039	0.023	0.008
137Ba	0.001	0.003	54	5.2	70	44	25
202Hg	0.023	0.077	0.067	0.034	0.063	0.084	0.067
205Tl	0.001	0.003	0.033	0.028	0.057	0.047	0.031
208Pb	0.001	0.003	0.167	0.033	0.237	0.130	0.058
238U	0.001	0.003	0.030	0.029	0.075	0.050	0.026

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_MICOMP_INV-4_2021-09-13	RG_MICOMP_INV-5_2021-09-13
		Lab ID	648	649
		Wet Weight (g)	0.8781	1.1884
		Dry Weight (g)	0.1578	0.2685
		Moisture (%)	82.0	77.4
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)
7Li	0.011	0.037	0.415	0.305
11B	0.101	0.337	2.1	1.1
23Na	1.9	6.3	3,067	2,756
24Mg	0.024	0.080	1,184	1,414
27Al	0.035	0.117	334	179
31P	33	110	9,929	9,273
39K	2.8	9.3	10,159	7,653
44Ca	9.5	32	2,620	2,023
49Ti	0.212	0.707	16	8.5
51V	0.066	0.220	0.609	0.423
52Cr	0.326	1.1	3.3	4.1
55Mn	0.008	0.027	97	47
57Fe	1.3	4.3	325	196
59Co	0.008	0.027	2.7	1.4
60Ni	0.037	0.123	15	11
63Cu	0.008	0.027	9.6	10
66Zn	0.341	1.1	142	125
75As	0.441	1.5	0.875	<0.441
77Se	0.390	1.3	4.3	3.5
88Sr	0.001	0.003	5.6	3.8
95Mo	0.001	0.003	0.408	0.217
107Ag	0.001	0.003	0.068	0.136
111Cd	0.059	0.197	1.1	0.645
118Sn	0.023	0.077	0.426	0.211
121Sb	0.005	0.017	0.024	0.020
137Ba	0.001	0.003	70	36
202Hg	0.023	0.077	0.038	0.055
205Tl	0.001	0.003	0.048	0.030
208Pb	0.001	0.003	0.148	0.089
238U	0.001	0.003	0.047	0.033

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Tissue QA/QC Relative Percent Difference Results

Client ID		RG_GATE_INV-3_2021-09-16			RG_BOCK_INV-2_2021-09-16			RG_BOCK_INV-3_2021-09-16		
Lab ID		610			615			616		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.011	2.9	3.4	16	1.5	1.3	14	2.1	1.9	10
11B	0.101	6.0	5.9	1.7	1.5	1.5	0.0	2.2	2.1	4.7
23Na	1.9	4,867	5,305	8.6	10,177	8,531	18	12,519	9,607	26
24Mg	0.024	3,191	3,426	7.1	2,801	2,503	11	3,255	3,152	3.2
27Al	0.035	3,545	4,409	22	677	824	20	1,072	1,138	6.0
31P	33	14,248	14,461	1.5	11,876	10,908	8.5	13,732	10,956	23
39K	2.8	18,465	18,116	1.9	13,298	11,930	11	14,583	12,517	15
44Ca	9.5	9,437	10,797	13	2,689	2,685	0.1	3,551	4,411	22
49Ti	0.212	276	349	23	43	39	9.8	64	71	10
51V	0.066	6.1	7.0	14	1.4	1.2	15	2.1	2.1	0.0
52Cr	0.326	17	18	5.7	8.2	8.4	2.4	5.7	5.5	3.6
55Mn	0.008	185	186	0.5	12	9.3	25	14	17	19
57Fe	1.3	2,634	3,356	24	285	265	7.3	364	405	11
59Co	0.008	4.1	4.4	7.1	1.2	1.2	0.0	1.5	1.5	0.0
60Ni	0.037	79	85	7.3	26	26	0.0	28	30	6.9
63Cu	0.008	20	19	5.1	33	30	9.5	28	25	11
66Zn	0.341	294	300	2.0	100	90	11	112	112	0.0
75As	0.441	2.6	2.3	-	0.677	0.702	-	0.867	0.921	-
77Se	0.390	24	23	4.3	49	50	2.0	69	60	14
88Sr	0.001	289	335	15	8.3	8.3	0.0	13	17	27
95Mo	0.001	0.872	0.892	2.3	0.183	0.183	0.0	0.266	0.376	34
107Ag	0.001	0.115	0.126	9.1	0.235	0.218	7.5	0.153	0.163	6.3
111Cd	0.059	4.8	5.2	8.0	0.540	0.600	-	0.796	0.859	7.6
118Sn	0.023	0.597	0.657	9.6	0.279	0.254	9.4	0.224	0.215	-
121Sb	0.005	0.235	0.236	0.4	0.076	0.078	2.6	0.101	0.109	7.6
137Ba	0.001	30,247	35,664	16	138	120	14	132	133	0.8
202Hg	0.023	0.088	0.088	-	0.056	0.048	-	0.067	0.080	-
205Tl	0.001	0.281	0.328	15	0.279	0.258	7.8	0.267	0.229	15
208Pb	0.001	0.777	0.926	18	0.247	0.250	1.2	0.343	0.396	14
238U	0.001	0.379	0.401	5.6	0.062	0.050	21	0.089	0.104	16

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_ERCKUT_INV-1_2021-09-15			RG_MIDER_INV-1_2021-09-09		
Lab ID		621			633		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.011	0.374	0.430	14	0.348	0.263	28
11B	0.101	2.0	1.7	16	1.5	1.1	31
23Na	1.9	2,782	2,929	5.1	4,333	5,042	15
24Mg	0.024	1,996	2,112	5.6	1,971	1,817	8.1
27Al	0.035	207	206	0.5	605	504	18
31P	33	9,223	10,349	12	11,583	12,056	4.0
39K	2.8	8,294	8,919	7.3	10,212	9,935	2.7
44Ca	9.5	3,660	3,439	6.2	4,213	4,476	6.1
49Ti	0.212	11	16	37	21	21	0.0
51V	0.066	1.0	0.907	9.8	0.741	0.778	4.9
52Cr	0.326	4.8	5.7	17	7.3	7.8	6.6
55Mn	0.008	9.4	8.5	10	63	57	10
57Fe	1.3	177	198	11	459	413	11
59Co	0.008	0.222	0.258	15	4.8	3.8	23
60Ni	0.037	7.1	10	34	18	16	12
63Cu	0.008	19	18	5.4	18	20	11
66Zn	0.341	168	163	3.0	213	242	13
75As	0.441	<0.441	0.460	-	0.943	0.855	-
77Se	0.390	5.8	5.4	7.1	5.8	5.2	11
88Sr	0.001	2.7	2.7	0.0	8.5	7.8	8.6
95Mo	0.001	0.133	0.155	15	0.395	0.335	16
107Ag	0.001	0.051	0.065	24	0.151	0.202	29
111Cd	0.059	1.9	1.6	17	2.5	2.2	13
118Sn	0.023	0.500	0.427	16	0.199	0.137	-
121Sb	0.005	0.094	0.082	14	0.043	0.032	-
137Ba	0.001	9.9	8.7	13	40	40	0.0
202Hg	0.023	0.045	0.027	-	0.051	0.071	-
205Tl	0.001	0.023	0.020	14	0.048	0.057	17
208Pb	0.001	0.070	0.051	31	0.180	0.139	26
238U	0.001	0.122	0.113	7.7	0.036	0.031	15

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	0.011	1.21	1.3	106	7.4	1.3	105	6.4
11B	0.101	4.5	4.9	109	4.4	4.8	107	2.4
23Na	1.9	14,000	15,956	114	7.6	15,091	108	4.3
24Mg	0.024	910	998	110	5.5	979	108	11
27Al	0.035	197.2	221	112	5.5	203	103	5.7
31P	33	8,000	9,016	113	4.1	8,654	108	4.9
39K	2.8	15,500	17,006	110	6.3	17,690	114	3.0
44Ca	9.5	2,360	2,573	109	3.9	2,636	112	5.7
49Ti	0.212	12.24	13	110	7.7	13	104	9.5
51V	0.066	1.57	1.9	119	8.2	1.8	117	5.7
52Cr	0.326	1.87	2.2	118	5.6	2.0	110	3.5
55Mn	0.008	3.17	3.5	112	6.5	3.6	113	11
57Fe	1.3	343	382	111	5.0	390	114	6.9
59Co	0.008	0.25	0.295	118	6.8	0.278	111	6.3
60Ni	0.037	1.34	1.6	117	6.8	1.5	111	1.5
63Cu	0.008	15.7	19	120	3.7	17	110	2.5
66Zn	0.341	51.6	58	113	3.3	59	114	3.1
75As	0.441	6.87	7.8	113	5.0	7.5	110	2.7
77Se	0.390	3.45	3.7	107	2.2	3.8	109	1.5
88Sr	0.001	10.1	11	110	5.7	12	115	7.2
95Mo	0.001	0.29	0.310	107	6.4	0.317	109	10
107Ag	0.001	0.0252	0.030	118	8.6	0.030	119	12
111Cd	0.059	0.299	0.340	114	10	0.312	104	12
118Sn	0.023	0.061	0.071	116	12	0.072	118	15
121Sb	0.005	0.011	0.013	120	17	0.011	96	18
137Ba	0.001	8.6	9.3	109	3.9	9.2	106	5.5
202Hg	0.023	0.412	0.423	103	4.9	0.458	111	5.6
205Tl	0.001	0.0013	-	-	-	-	-	-
208Pb	0.001	0.404	0.458	113	10	0.477	118	6.3
238U	0.001	0.05	0.059	119	12	0.058	116	6.4

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.

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	0.011	1.21	1.3	106	6.6	1.4	114	4.3
11B	0.101	4.5	4.6	103	1.7	4.8	106	2.1
23Na	1.9	14,000	14,307	102	4.6	14,996	107	3.1
24Mg	0.024	910	965	106	4.1	995	109	3.0
27Al	0.035	197.2	189	96	7.3	217	110	1.7
31P	33	8,000	8,165	102	3.9	8,650	108	2.9
39K	2.8	15,500	15,511	100	1.5	16,623	107	3.5
44Ca	9.5	2,360	2,367	100	2.8	2,633	112	3.8
49Ti	0.212	12.24	12	98	13	14	116	11
51V	0.066	1.57	1.5	96	9.6	1.6	104	9.8
52Cr	0.326	1.87	1.9	101	5.3	2.0	108	4.5
55Mn	0.008	3.17	3.1	99	4.6	3.7	116	6.7
57Fe	1.3	343	345	101	2.6	391	114	3.8
59Co	0.008	0.25	0.254	102	2.8	0.271	108	3.3
60Ni	0.037	1.34	1.3	98	2.1	1.5	114	6.1
63Cu	0.008	15.7	16	102	3.1	18	114	3.3
66Zn	0.341	51.6	52	100	3.0	55	107	1.8
75As	0.441	6.87	7.0	102	3.2	7.4	108	2.4
77Se	0.390	3.45	3.6	105	2.5	3.7	108	5.2
88Sr	0.001	10.1	10	101	3.1	11	110	4.8
95Mo	0.001	0.29	0.317	109	5.7	0.316	109	8.3
107Ag	0.001	0.0252	0.027	109	7.4	0.029	113	16
111Cd	0.059	0.299	0.320	107	11	0.328	110	6.5
118Sn	0.023	0.061	0.058	95	3.9	0.067	110	17
121Sb	0.005	0.011	0.015	136	14	0.012	108	4.1
137Ba	0.001	8.6	8.7	101	3.0	9.0	104	2.5
202Hg	0.023	0.412	0.438	106	5.3	0.439	106	4.4
205Tl	0.001	0.0013	-	-	-	-	-	-
208Pb	0.001	0.404	0.395	98	15	0.430	106	17
238U	0.001	0.05	0.048	95	7.4	0.054	108	7.4

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.

Teck Coal Limited

Tissue QA/QC Accuracy and Precision Results

Sample Group ID: 05

Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.011	1.21	1.2	98	8.9
11B	0.101	4.5	4.7	104	2.4
23Na	1.9	14,000	14,247	102	6.9
24Mg	0.024	910	879	97	3.1
27Al	0.035	197.2	186	94	5.2
31P	33	8,000	7,292	91	0.9
39K	2.8	15,500	15,289	99	2.5
44Ca	9.5	2,360	2,221	94	3.2
49Ti	0.212	12.24	11	92	10
51V	0.066	1.57	1.5	93	7.9
52Cr	0.326	1.87	1.9	99	0.6
55Mn	0.008	3.17	3.0	95	2.7
57Fe	1.3	343	339	99	3.5
59Co	0.008	0.25	0.242	97	4.0
60Ni	0.037	1.34	1.3	98	4.6
63Cu	0.008	15.7	16	104	4.4
66Zn	0.341	51.6	50	97	3.9
75As	0.441	6.87	6.6	96	3.7
77Se	0.390	3.45	3.3	97	2.6
88Sr	0.001	10.1	9.8	97	4.9
95Mo	0.001	0.29	0.288	99	14
107Ag	0.001	0.0252	0.026	102	16
111Cd	0.059	0.299	0.312	104	5.8
118Sn	0.023	0.061	0.054	89	7.1
121Sb	0.005	0.011	0.009	82	16
137Ba	0.001	8.6	8.4	98	4.4
202Hg	0.023	0.412	0.425	103	10
205Tl	0.001	0.0013	-	-	-
208Pb	0.001	0.404	0.357	88	9.8
238U	0.001	0.05	0.045	90	2.5

Notes:

ppm = parts per million; % = percent; DL = detection limit; RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Tl certified concentration from NIST-2976.

Accuracy and precision for Tl are not reported as the certified concentration is too close to the reportable detection limit.

Sample Group ID	Client ID	Lab ID	Date of Analysis
01	RG_GATE_INV-1_2021-09-16	608	18 Oct 2021
	RG_GATE_INV-2_2021-09-16	609	
	RG_GATE_INV-3_2021-09-16	610	
	RG_GATEDP_INV-1_2021-09-16	611	
	RG_GATEDP_INV-2_2021-09-16	612	
	RG_GATEDP_INV-3_2021-09-16	613	
	RG_BOCK_INV-1_2021-09-16	614	
	RG_BOCK_INV-2_2021-09-16	615	
02	RG_BOCK_INV-3_2021-09-16	616	18 Oct 2021
	RG_ERCKDT_INV-1_2021-09-14	617	
	RG_ERCKDT_INV-2_2021-09-14	618	
	RG_ERCKDT_INV-3_2021-09-14	619	
	RG_ERCKDT_INV-4_2021-09-14	620	
	RG_ERCKUT_INV-1_2021-09-15	621	
	RG_ERCKUT_INV-2_2021-09-15	622	
	RG_ERCKUT_INV-3_2021-09-15	623	
03	RG_ERCKUT_INV-4_2021-09-15	624	18 Oct 2021
	RG_ERCKUT_INV-5_2021-09-15	625	
	RG_ERCKDT_INV-5_2021-09-15	626	
	RG_MIDBO_INV-1_2021-09-11	627	
	RG_MIDBO_INV-2_2021-09-11	628	
	RG_MIDBO_INV-3_2021-09-11	629	
	RG_MIDGA_INV-1_2021-09-11	630	
	RG_MIDGA_INV-2_2021-09-11	631	
	RG_MIDGA_INV-3_2021-09-11	632	
04	RG_MIDER_INV-1_2021-09-09	633	18 Oct 2021
	RG_MIDER_INV-2_2021-09-09	634	
	RG_MIDER_INV-3_2021-09-09	635	
	RG_ALUSM_INV-1_2021-09-12	636	
	RG_ALUSM_INV-2_2021-09-12	637	
	RG_ALUSM_INV-3_2021-09-12	638	
	RG_BOCK_INVLUM-1_2021-09-16	639	
	RG_GATEDP_INVLUM-1_2021-09-16	640	
	RG_MI3_INV-1_2021-09-10	641	
05	RG_MI3_INV-2_2021-09-10	642	18 Oct 2021
	RG_MI3_INV-3_2021-09-10	643	
	RG_ERCK_INV-1_2021-09-10	644	
	RG_MICOMP_INV-1_2021-09-13	645	
	RG_MICOMP_INV-2_2021-09-13	646	
	RG_MICOMP_INV-3_2021-09-13	647	

Sample Group ID	Client ID	Lab ID	Date of Analysis
05	RG_MICOMP_INV-4_2021-09-13	648	18 Oct 2021
	RG_MICOMP_INV-5_2021-09-13	649	

TrichAnalytics Inc.
207-1753 Sean Heights, Saanichton, BC, V8M 0B3
Ph: (250) 532-1084

Chain of Custody (COC) for LA-ICP-MS Analysis

Invoicing		Reporting (if different from Invoicing)	
Project Number: FRO LAEMP (21-11) (PO 748530)			
Company Name:	Teck Coal Limited	Company Name:	Minnow Environmental
Contact Name:	Cait Good	Contact Name:	Peter Schnurr
Address:	421 Pine Avenue	Address:	2 Lamb Street
City, Province:	Sparwood, BC	City, Province:	Georgetown, ON
Postal Code:	V0B 2G0	Postal Code:	L7G 2G7
Phone:	250-425-8202	Phone:	250-595-1627
Email:	cait.good@teck.com	Email:	pschnurr@minnow.ca

Sample Analysis Requested

TRICH ID	#	Sample Identification:	Species	Sample type
608	1	RG_GATE_INV-1_2021-09-16 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
609	2	RG_GATE_INV-2_2021-09-16 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
610	3	RG_GATE_INV-3_2021-09-16 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
611	4	RG_GATEDP_INV-1_2021-09-16 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
612	5	RG_GATEDP_INV-2_2021-09-16 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
613	6	RG_GATEDP_INV-3_2021-09-16 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
614	7	RG_BOCK_INV-1_2021-09-16 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
615	8	RG_BOCK_INV-2_2021-09-16 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
616	9	RG_BOCK_INV-3_2021-09-16 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
617	10	RG_ERCKDT_INV-1_2021-09-14 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
618	11	RG_ERCKDT_INV-2_2021-09-14 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
619	12	RG_ERCKDT_INV-3_2021-09-14 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
620	13	RG_ERCKDT_INV-4_2021-09-14 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
621	14	RG_ERCKUT_INV-1_2021-09-15 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
622	15	RG_ERCKUT_INV-2_2021-09-15 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
623	16	RG_ERCKUT_INV-3_2021-09-15 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
624	17	RG_ERCKUT_INV-4_2021-09-15 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
625	18	RG_ERCKUT_INV-5_2021-09-15 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
626	19	RG_ERCKDT_INV-5_2021-09-15 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
627	20	RG_MIDBO_INV-1_2021-09-11 ✓	Composite	Composite-taxa benthic invertebrate tissue samples

Sample(s) Released By: K Valleau	Sample(s) Received By: Alex Wade
Signature: [signature]	Signature: [signature]
Date Sent: Sept 28/21	Date Received: (lab) 28 Sep 2021 (Proj # 2021-260)
Sample(s) Returned to Client By:	Shipping Conditions:
	Shipping Container:
Signature:	Date Sent:

aw 05oct2021

TrichAnalytics Inc.
207-1753 Sean Heights, Saanichton, BC, V8M 0B3
Ph: (250) 532-1084

Chain of Custody (COC)
for LA-ICP-MS Analysis

Invoicing		Reporting (if different from Invoicing)	
Project Number: FRO LAEMP (21-11) (PO 748530)			
Company Name:	Teck Coal Limited	Company Name:	Minnow Environmental
Contact Name:	Cait Good	Contact Name:	Peter Schnurr
Address:	421 Pine Avenue	Address:	2 Lamb Street
City, Province:	Sparwood, BC	City, Province:	Georgetown, ON
Postal Code:	V0B 2G0	Postal Code:	L7G 2G7
Phone:	250-425-8202	Phone:	250-595-1627
Email:	cait.good@teck.com	Email:	pschnurr@minnow.ca

Sample Analysis Requested

TRICH ID		Sample Identification:	Species	Sample type
628	21	RG_MIDBO_INV-2_2021-09-11 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
629	22	RG_MIDBO_INV-3_2021-09-11 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
630	23	RG_MIDGA_INV-1_2021-09-11 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
631	24	RG_MIDGA_INV-2_2021-09-11 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
632	25	RG_MIDGA_INV-3_2021-09-11 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
633	26	RG_MIDER_INV-1_2021-09-09 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
634	27	RG_MIDER_INV-2_2021-09-09 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
635	28	RG_MIDER_INV-3_2021-09-09 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
636	29	RG_ALUSM_INV-1_2021-09-12 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
637	30	RG_ALUSM_INV-2_2021-09-12 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
638	31	RG_ALUSM_INV-3_2021-09-12 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
639	32	RG_BOCK_INVLUM-1_2021-09-16 ✓	Single Taxon	Benthic invertebrate sample
640	33	RG_GATEDP_INVLUM-1_2021-09-16 ✓	Single Taxon	Benthic invertebrate sample
641	34	RG_MI3_INV-1_2021-09-10 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
642	35	RG_MI3_INV-2_2021-09-10 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
643	36	RG_MI3_INV-3_2021-09-10 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
644	37	RG_ERCK_INV-1_2021-09-10 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
645	38	RG_MICOMP_INV-1_2021-09-13 * ✓	Composite	Composite-taxa benthic invertebrate tissue samples
646	39	RG_MICOMP_INV-2_2021-09-13 * ✓	Composite	Composite-taxa benthic invertebrate tissue samples
647	40	RG_MICOMP_INV-3_2021-09-13 * ✓	Composite	Composite-taxa benthic invertebrate tissue samples

Sample(s) Released By:	Sample(s) Received By: Alex Wade
Signature:	Signature:
Date Sent:	Date Received: (lab) 28 Sep 2021 (Proj # 2021-260) aw 05 Oct 2021
Sample(s) Returned to Client By:	Shipping Conditions:
	Shipping Container:
Signature:	Date Sent:

aw 05 oct 2021 * Samples missing → samples located in another project bag (now in correct project bag) aw 05 Oct 2021

COM-011.01

TrichAnalytics Inc. 207-1753 Sean Heights, Saanichton, BC, V8M 0B3 Ph: (250) 532-1084	Chain of Custody (COC) for LA-ICP-MS Analysis

Invoicing		Reporting (if different from Invoicing)	
Project Number: FRO LAEMP (21-11) (PO 748530)			
Company Name:	Teck Coal Limited	Company Name:	Minnow Environmental
Contact Name:	Cait Good	Contact Name:	Tyler Mehler
Address:	421 Pine Avenue	Address:	2 Lamb Street
City, Province:	Sparwood, BC	City, Province:	Georgetown, ON
Postal Code:	V0B 2G0	Postal Code:	L7G 2G7
Phone:	250-425-8202	Phone:	
Email:	cait.good@teck.com	Email:	

Sample Analysis Requested

TRICH ID	Sample Identification:	Species	Sample type
648	41 RG_MICOMP_INV-4_2021-09-13 */	Composite	Composite-taxa benthic invertebrate tissue samples
649	42 RG_MICOMP_INV-5_2021-09-13 */	Composite	Composite-taxa benthic invertebrate tissue samples
	43		
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	58		
	59		
	60		

Sample(s) Released By:	Sample(s) Received By: Alex Wade
Signature:	Signature:
Date Sent:	Date Received: (lab) 28 Sep 2021 (Proj # 2021-260) aw 05 oct 2021
Sample(s) Returned to Client By:	Shipping Conditions:
	Shipping Container:
Signature:	Date Sent:

aw 05 oct 2021 * samples missing → samples located in another project bag (now in correct project bag) aw 05 oct 2021

COM-011.01

BENTHIC TISSUE CHEMISTRY

TrichAnalytics Laboratory Report 2021-285
(Finalized December 23, 2021)

TrichAnalytics Inc.

Tissue Microchemistry Analysis Report

Client:	Tyler Mehler Aquatic Scientist Minnow Environmental	Date Received:	17 Dec 2021
		Date of Analysis:	22 Dec 2021
		Final Report Date:	23 Dec 2021
Phone:	(587) 587-1612	Project No.:	2021-285
Email:	tyler.mehler@minnow.ca; jings@minnow.ca	Method No.:	MET-002.05

Client Project: EVO LAEMP (21-09) - PO 750554

Analytical Request: Composite-Taxa Benthic Invertebrate Tissue Microchemistry (total metals and moisture) - 17 samples. See chain of custody form provided for sample identification numbers.

Notes:

Analytical results are expressed in parts per million (ppm) dry weight (equivalent to mg/kg).
Samples quantified using DORM-4, NIST-1566b, and NIST-2976 certified reference standards.
Aluminum concentrations above 1,000 ppm are outside linear range of the calibration curve.
RPD values calculated according to the British Columbia Environmental Laboratory Manual (2020) criteria.
Client specific DQO for Selenium accuracy is 90-110% of the certified value; result achieved 104%.

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

23 Dec 2021
Date

TrichAnalytics Inc.
207-1753 Sean Heights
Saanichton, BC V8M 0B3
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CALA Testing Accreditation No. A4196

Tissue Analysis Results

		Client ID	RG_ERCKUT_INV-01_2021-12-15	RG_ERCKUT_INV-02_2021-12-15	RG_ERCKUT_INV-03_2021-12-15	RG_ERCKUT_INV-05_2021-12-15	RG_ERCK_INV-01_2021-12-14
		Lab ID	158	159	160	161	162
		Wet Weight (g)	0.1973	0.2583	0.1191	0.1069	0.4909
		Dry Weight (g)	0.0381	0.0507	0.0284	0.0302	0.1181
		Moisture (%)	80.7	80.4	76.2	71.7	75.9
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.007	0.023	0.375	0.459	0.487	0.304	0.736
11B	0.085	0.283	1.4	2.0	1.3	0.936	2.4
23Na	0.558	1.9	1,965	2,004	1,752	1,583	2,948
24Mg	0.017	0.057	1,892	2,256	2,763	1,510	1,620
27Al	0.040	0.133	75	180	219	108	1,279
31P	24	80	7,691	8,975	9,000	6,749	11,255
39K	1.7	5.7	6,003	7,206	6,071	5,305	8,729
44Ca	14	47	3,540	4,155	4,081	2,334	13,738
49Ti	0.001	0.003	4.3	8.0	13	5.6	85
51V	0.058	0.193	0.358	0.974	0.873	0.326	2.6
52Cr	0.193	0.643	2.6	6.0	7.2	3.1	16
55Mn	0.005	0.017	8.4	7.6	8.1	5.0	72
57Fe	0.834	2.8	76	188	191	101	598
59Co	0.005	0.017	0.218	0.133	0.345	0.136	4.7
60Ni	0.039	0.130	3.5	8.7	10	3.2	37
63Cu	0.010	0.033	20	22	18	15	12
66Zn	0.457	1.5	149	141	162	131	191
75As	0.451	1.5	<0.451	0.602	<0.451	<0.451	0.486
77Se	0.307	1.0	3.9	3.8	4.4	4.0	4.6
88Sr	0.001	0.003	2.5	2.5	3.1	1.5	13
95Mo	0.001	0.003	0.111	0.148	0.204	0.074	0.352
107Ag	0.001	0.003	0.049	0.049	0.049	0.049	0.113
111Cd	0.039	0.130	1.4	2.0	1.6	0.739	1.6
118Sn	0.022	0.073	0.642	0.916	0.710	0.402	0.171
121Sb	0.003	0.010	0.056	0.066	0.108	0.061	0.078
137Ba	0.001	0.003	5.2	6.3	9.1	3.9	36
202Hg	0.025	0.083	0.045	0.030	<0.025	0.030	0.045
205Tl	0.001	0.003	0.011	0.008	0.015	0.010	0.049
208Pb	0.001	0.003	0.040	0.059	0.062	0.029	0.297
238U	0.001	0.003	0.086	0.112	0.143	0.062	0.112

Notes:

ppm = parts per million
DL = detection limit
LOQ = limit of quantitation
< = less than detection limit
g = grams
% = percent

		Client ID	RG_ERCK_INV-02_2021-12-14	RG_ERCK_INV-03_2021-12-14	RG_ERCKDT_INV-01_2021-12-15	RG_ERCKDT_INV-02_2021-12-15	RG_ERCKDT_INV-03_2021-12-15
		Lab ID	163	164	165	166	167
		Wet Weight (g)	0.3020	0.3250	0.2201	0.1046	0.1007
		Dry Weight (g)	0.0520	0.0734	0.0444	0.0160	0.0168
		Moisture (%)	82.8	77.4	79.8	84.7	83.3
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.007	0.023	1.2	0.827	0.567	0.768	1.3
11B	0.085	0.283	2.2	3.6	2.4	3.3	4.6
23Na	0.558	1.9	3,781	2,835	2,486	2,776	2,474
24Mg	0.017	0.057	1,533	1,835	1,760	1,820	2,074
27Al	0.040	0.133	1,225	1,679	235	728	1,641
31P	24	80	10,962	10,935	7,223	7,984	8,579
39K	1.7	5.7	8,997	7,694	6,835	6,567	6,616
44Ca	14	47	4,104	7,409	2,858	5,613	7,537
49Ti	0.001	0.003	78	138	16	45	125
51V	0.058	0.193	2.2	3.6	0.531	1.6	3.6
52Cr	0.193	0.643	4.0	30	3.5	9.0	31
55Mn	0.005	0.017	59	111	152	359	620
57Fe	0.834	2.8	444	923	537	2,288	3,576
59Co	0.005	0.017	2.3	7.2	5.2	16	26
60Ni	0.039	0.130	14	52	16	27	75
63Cu	0.010	0.033	13	16	15	20	19
66Zn	0.457	1.5	210	263	263	200	218
75As	0.451	1.5	<0.451	0.465	<0.451	1.4	1.8
77Se	0.307	1.0	5.2	5.9	13	15	21
88Sr	0.001	0.003	5.3	8.6	3.3	6.8	9.9
95Mo	0.001	0.003	0.389	0.500	0.963	1.0	1.1
107Ag	0.001	0.003	0.119	0.119	0.027	0.081	0.070
111Cd	0.039	0.130	1.8	3.2	1.0	0.907	1.2
118Sn	0.022	0.073	0.561	0.312	0.256	0.750	0.970
121Sb	0.003	0.010	0.061	0.070	0.086	0.167	0.242
137Ba	0.001	0.003	28	33	22	38	59
202Hg	0.025	0.083	0.075	0.075	0.045	0.049	0.053
205Tl	0.001	0.003	0.048	0.093	0.044	0.066	0.094
208Pb	0.001	0.003	0.313	0.313	0.231	0.587	1.1
238U	0.001	0.003	0.112	0.134	0.118	0.223	0.325

Notes:
ppm = parts per million
DL = detection limit
LOQ = limit of quantitation
< = less than detection limit
g = grams
% = percent

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Tissue Analysis Results

		Client ID	RG_ERCKDT_INV-04_2021-12-15	RG_ERCKDT_INV-05_2021-12-15	EV_EC_FLOW2_INV-01_2021-12-15	EV_EC_FLOW2_INV-02_2021-12-15	EV_EC_FLOW2_INV-03_2021-12-15
		Lab ID	168	169	170	171	172
		Wet Weight (g)	0.1189	0.2913	0.1186	0.1013	0.1674
		Dry Weight (g)	0.0218	0.0538	0.0248	0.0149	0.0208
		Moisture (%)	81.7	81.5	79.1	85.3	87.6
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.007	0.023	0.815	1.6	0.632	0.534	0.567
11B	0.085	0.283	2.3	4.3	2.3	1.4	1.4
23Na	0.558	1.9	2,324	3,094	1,851	3,030	2,453
24Mg	0.017	0.057	1,487	1,891	1,590	1,855	1,969
27Al	0.040	0.133	1,251	2,495	798	372	140
31P	24	80	6,862	9,811	7,038	8,740	8,238
39K	1.7	5.7	5,710	8,976	5,334	7,389	5,838
44Ca	14	47	3,974	7,051	4,242	3,934	3,729
49Ti	0.001	0.003	111	193	52	28	8.6
51V	0.058	0.193	2.7	6.1	1.5	0.959	0.373
52Cr	0.193	0.643	21	67	8.0	7.7	5.0
55Mn	0.005	0.017	197	394	222	227	167
57Fe	0.834	2.8	2,091	2,942	1,568	1,348	819
59Co	0.005	0.017	9.5	24	9.5	8.3	5.8
60Ni	0.039	0.130	45	113	26	21	15
63Cu	0.010	0.033	15	16	15	15	15
66Zn	0.457	1.5	171	168	133	199	185
75As	0.451	1.5	0.993	1.2	0.887	0.972	0.592
77Se	0.307	1.0	20	22	8.2	9.0	8.8
88Sr	0.001	0.003	5.3	8.3	5.7	4.8	4.4
95Mo	0.001	0.003	0.592	1.0	0.537	0.648	0.778
107Ag	0.001	0.003	0.049	0.065	0.038	0.043	0.054
111Cd	0.039	0.130	0.784	1.4	0.873	0.750	0.537
118Sn	0.022	0.073	0.550	0.444	0.525	0.781	0.460
121Sb	0.003	0.010	0.132	0.247	0.091	0.068	0.052
137Ba	0.001	0.003	41	53	25	20	11
202Hg	0.025	0.083	<0.025	0.045	0.038	0.053	0.045
205Tl	0.001	0.003	0.068	0.082	0.065	0.064	0.056
208Pb	0.001	0.003	0.602	0.750	0.457	0.400	0.287
238U	0.001	0.003	0.206	0.255	0.161	0.152	0.104

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

		Client ID	EV_EC_FLOW2_INV-04_2021-12-15	EV_EC_FLOW2_INV-05_2021-12-15
		Lab ID	173	174
		Wet Weight (g)	0.1212	0.0757
		Dry Weight (g)	0.0182	0.0121
		Moisture (%)	85.0	84.0
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)
7Li	0.007	0.023	1.1	1.1
11B	0.085	0.283	3.9	2.2
23Na	0.558	1.9	3,228	3,802
24Mg	0.017	0.057	2,660	2,017
27Al	0.040	0.133	1,004	552
31P	24	80	8,316	10,087
39K	1.7	5.7	7,053	8,162
44Ca	14	47	42,044	6,913
49Ti	0.001	0.003	73	45
51V	0.058	0.193	2.5	1.3
52Cr	0.193	0.643	17	11
55Mn	0.005	0.017	712	699
57Fe	0.834	2.8	2,366	2,562
59Co	0.005	0.017	38	23
60Ni	0.039	0.130	88	45
63Cu	0.010	0.033	17	22
66Zn	0.457	1.5	210	282
75As	0.451	1.5	1.4	1.5
77Se	0.307	1.0	15	14
88Sr	0.001	0.003	22	7.9
95Mo	0.001	0.003	1.0	0.833
107Ag	0.001	0.003	0.070	0.105
111Cd	0.039	0.130	1.7	1.1
118Sn	0.022	0.073	0.866	1.1
121Sb	0.003	0.010	0.225	0.146
137Ba	0.001	0.003	116	46
202Hg	0.025	0.083	0.053	0.060
205Tl	0.001	0.003	0.129	0.085
208Pb	0.001	0.003	0.707	0.600
238U	0.001	0.003	0.551	0.198

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

		RG_ERCK_INV-01_2021-12-14			RG_ERCKDT_INV-05_2021-12-15		
Client ID		RG_ERCK_INV-01_2021-12-14			RG_ERCKDT_INV-05_2021-12-15		
Lab ID		162			169		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.007	0.736	0.932	24	1.6	1.5	6.5
11B	0.085	2.4	3.1	26	4.3	3.7	15
23Na	0.558	2,948	2,956	0.3	3,094	3,009	2.8
24Mg	0.017	1,620	2,096	26	1,891	1,795	5.2
27Al	0.040	1,279	1,908	40	2,495	2,423	2.9
31P	24	11,255	10,961	2.6	9,811	9,353	4.8
39K	1.7	8,729	9,377	7.2	8,976	8,037	11
44Ca	14	13,738	17,242	23	7,051	6,624	6.2
49Ti	0.001	85	86	1.2	193	162	18
51V	0.058	2.6	3.7	35	6.1	5.7	6.8
52Cr	0.193	16	14	13	67	77	14
55Mn	0.005	72	80	11	394	340	15
57Fe	0.834	598	690	14	2,942	3,221	9.1
59Co	0.005	4.7	5.7	19	24	24	0.0
60Ni	0.039	37	34	8.5	113	139	21
63Cu	0.010	12	15	22	16	16	0.0
66Zn	0.457	191	187	2.1	168	150	11
75As	0.451	0.486	<0.451	-	1.2	1.2	-
77Se	0.307	4.6	5.4	16	22	21	4.7
88Sr	0.001	13	15	14	8.3	7.9	4.9
95Mo	0.001	0.352	0.389	10	1.0	1.1	9.5
107Ag	0.001	0.113	0.135	18	0.065	0.059	9.7
111Cd	0.039	1.6	1.9	17	1.4	1.3	7.4
118Sn	0.022	0.171	0.230	-	0.444	0.561	23
121Sb	0.003	0.078	0.074	5.3	0.247	0.220	12
137Ba	0.001	36	42	15	53	49	7.8
202Hg	0.025	0.045	0.045	-	0.045	0.045	-
205Tl	0.001	0.049	0.050	2.0	0.082	0.075	8.9
208Pb	0.001	0.297	0.341	14	0.750	0.670	11
238U	0.001	0.112	0.152	30	0.255	0.229	11

Notes:

ppm = parts per million

RPD = relative percent difference

DL = detection limit

< = less than detection limit

% = percent

Data Quality Objectives:

Laboratory Duplicates - RPD ≤40% for all elements, except Ca and Sr, which are ≤60%

Minimum DQOs apply to individual samples at concentrations above 10x DL

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Tissue QA/QC Accuracy and Precision Results

Sample Group ID: 01

Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.007	1.21	1.3	107	7.2
11B	0.085	4.5	4.7	105	3.0
23Na	0.558	14,000	14,801	106	5.8
24Mg	0.017	910	999	110	2.7
27Al	0.040	197.2	203	103	7.1
31P	24	8,000	8,864	111	4.2
39K	1.7	15,500	16,461	106	5.7
44Ca	14	2,360	2,605	110	4.4
49Ti	0.001	12.24	14	112	13
51V	0.058	1.57	1.8	115	11
52Cr	0.193	1.87	2.2	117	3.7
55Mn	0.005	3.17	3.5	111	2.2
57Fe	0.834	343	402	117	3.6
59Co	0.005	0.25	0.293	117	1.4
60Ni	0.039	1.34	1.6	117	3.5
63Cu	0.010	15.7	19	118	2.8
66Zn	0.457	51.6	58	113	1.7
75As	0.451	6.87	7.5	110	3.6
77Se	0.307	3.45	3.6	104	3.8
88Sr	0.001	10.1	11	107	3.8
95Mo	0.001	0.29	0.296	102	4.4
107Ag	0.001	0.0252	0.032	129	12
111Cd	0.039	0.299	0.336	112	9.1
118Sn	0.022	0.061	0.067	110	11
121Sb	0.003	0.011	0.011	100	18
137Ba	0.001	8.6	8.6	100	2.0
202Hg	0.025	0.412	0.452	110	3.0
205Tl	0.001	0.0013	-	-	-
208Pb	0.001	0.404	0.416	103	17
238U	0.001	0.05	0.048	95	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% for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Tl certified concentration from NIST-2976.

Accuracy and precision for Tl are not reported as the certified concentration is too close to the reportable detection limit.

Teck Coal Limited
Sample Group Information

Sample Group ID	Client ID	Lab ID	Date of Analysis
01	RG_ERCKUT_INV-01_2021-12-15	158	22 Dec 2021
	RG_ERCKUT_INV-02_2021-12-15	159	
	RG_ERCKUT_INV-03_2021-12-15	160	
	RG_ERCKUT_INV-05_2021-12-15	161	
	RG_ERCK_INV-01_2021-12-14	162	
	RG_ERCK_INV-02_2021-12-14	163	
	RG_ERCK_INV-03_2021-12-14	164	
	RG_ERCKDT_INV-01_2021-12-15	165	
	RG_ERCKDT_INV-02_2021-12-15	166	
	RG_ERCKDT_INV-03_2021-12-15	167	
	RG_ERCKDT_INV-04_2021-12-15	168	
	RG_ERCKDT_INV-05_2021-12-15	169	
	EV_EC_FLOW2_INV-01_2021-12-15	170	
	EV_EC_FLOW2_INV-02_2021-12-15	171	
	EV_EC_FLOW2_INV-03_2021-12-15	172	
	EV_EC_FLOW2_INV-04_2021-12-15	173	
	EV_EC_FLOW2_INV-05_2021-12-15	174	

TrichAnalytics Inc. 207-1753 Sean Heights, Saanichton, BC, V8M 0B3 Ph: (250) 532-1084		Chain of Custody (COC) for LA-ICP-MS Analysis	
Invoicing		Reporting (if different from Invoicing)	
Project Number: EVO LAEMP (21-09) -- PO: VPO00750554			
Company Name:	Teck Coal Limited	Company Name:	Minnow Environmental
Contact Name:	Mike Pope	Contact Name:	Tyler Mehler
Address:	421 Pine Avenue	Address:	101a Centennial Square
City, Province:	Sparwood, BC	City, Province:	Sparwood, BC
Postal Code:	V0B 2G0	Postal Code:	V0B2G0
Phone:	250-425-8202	Phone:	587-587-1612
Email:	mike.pope@Teck.com; jessica.ritz@teck.com; allie.ferguson@Teck.com	Email:	tyler.mehler@minnow.ca; jings@minnow.ca

Sample Analysis Requested

TRICH ID		Sample Identification:	Sample Type: Species	Sample type
158	1	RG_ERCKUT_INV-01_2021-12-15 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
159	2	RG_ERCKUT_INV-02_2021-12-15 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
160	3	RG_ERCKUT_INV-03_2021-12-15 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
161	4	RG_ERCKUT_INV-05_2021-12-15 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
162	5	RG_ERCK_INV-01_2021-12-14 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
163	6	RG_ERCK_INV-02_2021-12-14 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
164	7	RG_ERCK_INV-03_2021-12-14 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
165	8	RG_ERCKDT_INV-01_2021-12-15 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
166	9	RG_ERCKDT_INV-02_2021-12-15 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
167	10	RG_ERCKDT_INV-03_2021-12-15 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
168	11	RG_ERCKDT_INV-04_2021-12-15 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
169	12	RG_ERCKDT_INV-05_2021-12-15 *	Composite	Composite-taxa benthic invertebrate tissue samples
170	13	EV_EC_FLOW2_INV-01_2021-12-15 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
171	14	EV_EC_FLOW2_INV-02_2021-12-15 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
172	15	EV_EC_FLOW2_INV-03_2021-12-15 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
173	16	EV_EC_FLOW2_INV-04_2021-12-15 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
174	17	EV_EC_FLOW2_INV-05_2021-12-15 ✓	Composite	Composite-taxa benthic invertebrate tissue samples
	18			
	19			
	20			

Sample(s) Released By: W. Tyler Mehler		Sample(s) Received By:	Alex Wade
Signature:		Signature:	[signature]
Date Sent:	12.17.2021	Date Received:	20 Dec 2021 (Lab) (Project #: 2021-285)
Sample(s) Returned to Client By:		Shipping Conditions:	
		Shipping Container:	
Signature:	WTM	Date Sent:	

aw 20 Dec 2021 * Lid label has 2021-12-14, side label has 2021-12-15

COM-011.01

BRYOPHYTE AND PERIPHYTON TISSUE CHEMISTRY

ALS Laboratory Report CG2106913

(Finalized February 28, 2022)

CERTIFICATE OF ANALYSIS

Work Order	: **CG2106913**	Page	: 1 of 20
Amendment	: **1**		
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Mike Pope	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Avenue Sparwood BC Canada	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 17-Dec-2021 08:45
PO	: VPO00748510	Date Analysis Commenced	: 07-Feb-2022
C-O-C number	: December EVO LAEMP 2021	Issue Date	: 28-Feb-2022 17:28
Sampler	: Tyler Mehler		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 19		
No. of samples analysed	: 19		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Salimah Khimani	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

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

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

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

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

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
mg/kg wwt	milligrams per kilogram wet weight

<: less than.

>: greater than.

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

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

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

Workorder Comments

Samples 005, 009, 018, 019 are low in volume and will be done as Micro digestion.

Qualifiers

Qualifier	*Description*
DLA	*Detection Limit adjusted for required dilution.*

Analytical Results

Sub-Matrix: Tissue (Matrix: Biota)				Client sample ID	RG_ERCKDT_BRYO-01_2021-12-15	RG_ERCKDT_BRYO-02_2021-12-15	RG_ERCKDT_BRYO-03_2021-12-15	RG_ERCKDT_BRYO-04_2021-12-15	RG_ERCKDT_PERI-02_2021-12-15
				Client sampling date / time	15-Dec-2021 12:00	15-Dec-2021 12:00	15-Dec-2021 12:00	15-Dec-2021 12:00	15-Dec-2021 12:00
Analyte	CAS Number	Method	LOR	Unit	CG2106913-001	CG2106913-002	CG2106913-003	CG2106913-004	CG2106913-005
					Result	Result	Result	Result	Result
Physical Tests									
moisture	----	E144	0.50	%	83.6	86.8	90.8	87.2	----
moisture	----	E144-H	2.0	%	----	----	----	----	37.4
Metals									
aluminum	7429-90-5	E440	2.0	mg/kg	1200	1560	433	1740	----
aluminum	7429-90-5	E472	5.0	mg/kg	----	----	----	----	610
aluminum	7429-90-5	E440A	0.40	mg/kg wwt	197	194	39.7	223	----
aluminum	7429-90-5	E472A	1.0	mg/kg wwt	----	----	----	----	382
antimony	7440-36-0	E472	0.010	mg/kg	----	----	----	----	0.296
antimony	7440-36-0	E440	0.010	mg/kg	0.402	0.880	0.585	0.295	----
antimony	7440-36-0	E472A	0.0020	mg/kg wwt	----	----	----	----	0.185
antimony	7440-36-0	E440A	0.0020	mg/kg wwt	0.0660	0.116	0.0537	0.0378	----
arsenic	7440-38-2	E440	0.020	mg/kg	4.65	9.26	3.86	7.51	----
arsenic	7440-38-2	E472	0.030	mg/kg	----	----	----	----	1.20
arsenic	7440-38-2	E440A	0.0040	mg/kg wwt	0.762	1.24	0.355	0.960	----
arsenic	7440-38-2	E472A	0.0060	mg/kg wwt	----	----	----	----	0.752
barium	7440-39-3	E472	0.050	mg/kg	----	----	----	----	332
barium	7440-39-3	E440	0.050	mg/kg	110	204	82.3	110	----
barium	7440-39-3	E472A	0.010	mg/kg wwt	----	----	----	----	208
barium	7440-39-3	E440A	0.010	mg/kg wwt	18.0	30.1	7.56	14.1	----
beryllium	7440-41-7	E472	0.010	mg/kg	----	----	----	----	0.058
beryllium	7440-41-7	E440	0.010	mg/kg	0.387	0.660	0.538	0.594	----
beryllium	7440-41-7	E472A	0.0020	mg/kg wwt	----	----	----	----	0.0366
beryllium	7440-41-7	E440A	0.0020	mg/kg wwt	0.0635	0.0858	0.0494	0.0760	----
bismuth	7440-69-9	E472	0.010	mg/kg	----	----	----	----	<0.014 DLA
bismuth	7440-69-9	E440	0.010	mg/kg	0.031	0.033	0.011	0.036	----
bismuth	7440-69-9	E472A	0.0020	mg/kg wwt	----	----	----	----	<0.0136 DLA
bismuth	7440-69-9	E440A	0.0020	mg/kg wwt	0.0051	<0.0073 DLA	<0.0020	0.0046	----
boron	7440-42-8	E472	1.0	mg/kg	----	----	----	----	11.2
boron	7440-42-8	E440	1.0	mg/kg	47.5	61.5	85.8	56.1	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

				Client sample ID	RG_ERCKDT_BRYO-01_2021-12-15	RG_ERCKDT_BRYO-02_2021-12-15	RG_ERCKDT_BRYO-03_2021-12-15	RG_ERCKDT_BRYO-04_2021-12-15	RG_ERCKDT_PERI-02_2021-12-15
				Client sampling date / time	15-Dec-2021 12:00	15-Dec-2021 12:00	15-Dec-2021 12:00	15-Dec-2021 12:00	15-Dec-2021 12:00
Analyte	CAS Number	Method	LOR	Unit	CG2106913-001	CG2106913-002	CG2106913-003	CG2106913-004	CG2106913-005
					Result	Result	Result	Result	Result
Metals									
boron	7440-42-8	E472A	0.20	mg/kg wwt	----	----	----	----	7.02
boron	7440-42-8	E440A	0.20	mg/kg wwt	7.79	7.90	7.88	7.17	----
cadmium	7440-43-9	E440	0.0050	mg/kg	3.15	7.01	3.58	4.80	----
cadmium	7440-43-9	E472	0.010	mg/kg	----	----	----	----	5.01
cadmium	7440-43-9	E440A	0.0010	mg/kg wwt	0.516	0.929	0.329	0.614	----
cadmium	7440-43-9	E472A	0.0020	mg/kg wwt	----	----	----	----	3.14
calcium	7440-70-2	E472	20	mg/kg	----	----	----	----	261000
calcium	7440-70-2	E440	20	mg/kg	56400	55000	21300	63300	----
calcium	7440-70-2	E472A	4.0	mg/kg wwt	----	----	----	----	163000
calcium	7440-70-2	E440A	4.0	mg/kg wwt	9260	7580	1960	8090	----
cesium	7440-46-2	E472	0.0050	mg/kg	----	----	----	----	0.176
cesium	7440-46-2	E440	0.0050	mg/kg	0.524	0.584	0.163	0.796	----
cesium	7440-46-2	E472A	0.0010	mg/kg wwt	----	----	----	----	0.110
cesium	7440-46-2	E440A	0.0010	mg/kg wwt	0.0859	0.0785	0.0149	0.102	----
chromium	7440-47-3	E440	0.050	mg/kg	3.07	4.62	1.64	4.01	----
chromium	7440-47-3	E472	0.20	mg/kg	----	----	----	----	3.76
chromium	7440-47-3	E440A	0.010	mg/kg wwt	0.503	0.603	0.151	0.513	----
chromium	7440-47-3	E472A	0.040	mg/kg wwt	----	----	----	----	2.35
cobalt	7440-48-4	E472	0.020	mg/kg	----	----	----	----	214
cobalt	7440-48-4	E440	0.020	mg/kg	222	672	274	73.2	----
cobalt	7440-48-4	E472A	0.0040	mg/kg wwt	----	----	----	----	134
cobalt	7440-48-4	E440A	0.0040	mg/kg wwt	36.4	91.8	25.2	9.36	----
copper	7440-50-8	E440	0.10	mg/kg	7.84	15.8	11.3	9.35	----
copper	7440-50-8	E472	0.20	mg/kg	----	----	----	----	2.28
copper	7440-50-8	E440A	0.020	mg/kg wwt	1.29	2.21	1.03	1.20	----
copper	7440-50-8	E472A	0.040	mg/kg wwt	----	----	----	----	1.43
iron	7439-89-6	E440	3.0	mg/kg	8660	13500	6140	13400	----
iron	7439-89-6	E472	5.0	mg/kg	----	----	----	----	1470
iron	7439-89-6	E440A	0.60	mg/kg wwt	1420	1850	564	1720	----
iron	7439-89-6	E472A	1.0	mg/kg wwt	----	----	----	----	923

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	RG_ERCKDT_BRYO-01_2021-12-15	RG_ERCKDT_BRYO-02_2021-12-15	RG_ERCKDT_BRYO-03_2021-12-15	RG_ERCKDT_BRYO-04_2021-12-15	RG_ERCKDT_PERI-02_2021-12-15
				Client sampling date / time	15-Dec-2021 12:00	15-Dec-2021 12:00	15-Dec-2021 12:00	15-Dec-2021 12:00	15-Dec-2021 12:00
					CG2106913-001	CG2106913-002	CG2106913-003	CG2106913-004	CG2106913-005
					Result	Result	Result	Result	Result
Metals									
lead	7439-92-1	E440	0.020	mg/kg	3.05	4.86	2.00	4.42	----
lead	7439-92-1	E472	0.050	mg/kg	----	----	----	----	0.735
lead	7439-92-1	E440A	0.0040	mg/kg wwt	0.501	0.699	0.184	0.565	----
lead	7439-92-1	E472A	0.010	mg/kg wwt	----	----	----	----	0.460
lithium	7439-93-2	E472	0.50	mg/kg	----	----	----	----	1.22
lithium	7439-93-2	E440	0.50	mg/kg	1.65	2.54	1.11	4.37	----
lithium	7439-93-2	E472A	0.10	mg/kg wwt	----	----	----	----	0.77
lithium	7439-93-2	E440A	0.10	mg/kg wwt	0.27	<0.36 DLA	0.10	0.56	----
magnesium	7439-95-4	E472	2.0	mg/kg	----	----	----	----	3520
magnesium	7439-95-4	E440	2.0	mg/kg	4880	7480	6650	7390	----
magnesium	7439-95-4	E472A	0.40	mg/kg wwt	----	----	----	----	2200
magnesium	7439-95-4	E440A	0.40	mg/kg wwt	801	949	611	946	----
manganese	7439-96-5	E472	0.050	mg/kg	----	----	----	----	5890
manganese	7439-96-5	E440	0.050	mg/kg	5720	18600	6940	1780	----
manganese	7439-96-5	E472A	0.010	mg/kg wwt	----	----	----	----	3690
manganese	7439-96-5	E440A	0.010	mg/kg wwt	939	2460	637	228	----
molybdenum	7439-98-7	E440	0.020	mg/kg	3.23	8.88	5.26	1.97	----
molybdenum	7439-98-7	E472	0.040	mg/kg	----	----	----	----	3.22
molybdenum	7439-98-7	E440A	0.0040	mg/kg wwt	0.530	1.18	0.483	0.252	----
molybdenum	7439-98-7	E472A	0.0080	mg/kg wwt	----	----	----	----	2.02
nickel	7440-02-0	E472	0.20	mg/kg	----	----	----	----	102
nickel	7440-02-0	E440	0.20	mg/kg	110	288	148	162	----
nickel	7440-02-0	E472A	0.040	mg/kg wwt	----	----	----	----	63.9
nickel	7440-02-0	E440A	0.040	mg/kg wwt	18.1	39.5	13.6	20.8	----
phosphorus	7723-14-0	E472	10	mg/kg	----	----	----	----	490
phosphorus	7723-14-0	E440	10	mg/kg	3460	5740	5610	4020	----
phosphorus	7723-14-0	E472A	2.0	mg/kg wwt	----	----	----	----	307
phosphorus	7723-14-0	E440A	2.0	mg/kg wwt	567	717	515	514	----
potassium	7440-09-7	E472	20	mg/kg	----	----	----	----	367
potassium	7440-09-7	E440	20	mg/kg	6180	7530	12400	5670	----

Analytical Results

Sub-Matrix: **Tissue**

(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	RG_ERCKDT_BRYO-01_2021-12-15	RG_ERCKDT_BRYO-02_2021-12-15	RG_ERCKDT_BRYO-03_2021-12-15	RG_ERCKDT_BRYO-04_2021-12-15	RG_ERCKDT_PERI-02_2021-12-15
				Client sampling date / time	15-Dec-2021 12:00	15-Dec-2021 12:00	15-Dec-2021 12:00	15-Dec-2021 12:00	15-Dec-2021 12:00
					CG2106913-001	CG2106913-002	CG2106913-003	CG2106913-004	CG2106913-005
					Result	Result	Result	Result	Result
Metals									
potassium	7440-09-7	E472A	4.0	mg/kg wwt	----	----	----	----	230
potassium	7440-09-7	E440A	4.0	mg/kg wwt	1010	1060	1140	725	----
rubidium	7440-17-7	E472	0.050	mg/kg	----	----	----	----	1.40
rubidium	7440-17-7	E440	0.050	mg/kg	5.94	7.40	6.63	8.39	----
rubidium	7440-17-7	E472A	0.010	mg/kg wwt	----	----	----	----	0.874
rubidium	7440-17-7	E440A	0.010	mg/kg wwt	0.975	0.987	0.609	1.07	----
selenium	7782-49-2	E440	0.050	mg/kg	16.6	40.1	38.4	31.5	----
selenium	7782-49-2	E472	0.10	mg/kg	----	----	----	----	10.1
selenium	7782-49-2	E440A	0.010	mg/kg wwt	2.73	5.65	3.52	4.03	----
selenium	7782-49-2	E472A	0.020	mg/kg wwt	----	----	----	----	6.33
sodium	7440-23-5	E472	20	mg/kg	----	----	----	----	77
sodium	7440-23-5	E440	20	mg/kg	78	208	164	520	----
sodium	7440-23-5	E472A	4.0	mg/kg wwt	----	----	----	----	48.1
sodium	7440-23-5	E440A	4.0	mg/kg wwt	12.8	26.3	15.1	66.5	----
strontium	7440-24-6	E440	0.050	mg/kg	41.8	53.9	24.1	51.7	----
strontium	7440-24-6	E472	0.10	mg/kg	----	----	----	----	130
strontium	7440-24-6	E440A	0.010	mg/kg wwt	6.85	7.43	2.21	6.61	----
strontium	7440-24-6	E472A	0.020	mg/kg wwt	----	----	----	----	81.4
tellurium	13494-80-9	E472	0.020	mg/kg	----	----	----	----	<0.027 DLA
tellurium	13494-80-9	E440	0.020	mg/kg	<0.020	<0.020	<0.020	<0.020	----
tellurium	13494-80-9	E472A	0.0040	mg/kg wwt	----	----	----	----	<0.0272 DLA
tellurium	13494-80-9	E440A	0.0040	mg/kg wwt	<0.0040	<0.0146 DLA	<0.0040	<0.0040	----
thallium	7440-28-0	E472	0.0020	mg/kg	----	----	----	----	0.0741
thallium	7440-28-0	E440	0.0020	mg/kg	0.137	0.292	0.109	0.284	----
thallium	7440-28-0	E472A	0.00040	mg/kg wwt	----	----	----	----	0.0464
thallium	7440-28-0	E440A	0.00040	mg/kg wwt	0.0224	0.0424	0.0100	0.0363	----
tin	7440-31-5	E472	0.10	mg/kg	----	----	----	----	<0.14 DLA
tin	7440-31-5	E440	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	----
tin	7440-31-5	E472A	0.020	mg/kg wwt	----	----	----	----	<0.136 DLA
tin	7440-31-5	E440A	0.020	mg/kg wwt	<0.020	<0.073 DLA	<0.020	<0.020	----

Analytical Results

Sub-Matrix: **Tissue**

(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	RG_ERCKDT_BRYO-01_2021-12-15	RG_ERCKDT_BRYO-02_2021-12-15	RG_ERCKDT_BRYO-03_2021-12-15	RG_ERCKDT_BRYO-04_2021-12-15	RG_ERCKDT_PERI-02_2021-12-15
Client sampling date / time					15-Dec-2021 12:00	15-Dec-2021 12:00	15-Dec-2021 12:00	15-Dec-2021 12:00	15-Dec-2021 12:00
					CG2106913-001	CG2106913-002	CG2106913-003	CG2106913-004	CG2106913-005
					Result	Result	Result	Result	Result
Metals									
titanium	7440-32-6	E440.Ti	0.25	mg/kg	6.85	10.9	5.59	13.4	----
titanium	7440-32-6	E472.Ti	0.50	mg/kg	----	----	----	----	3.24
titanium	7440-32-6	E440A.Ti	0.050	mg/kg wwt	1.12	1.01	0.514	1.71	----
titanium	7440-32-6	E472A.Ti	0.10	mg/kg wwt	----	----	----	----	2.03
uranium	7440-61-1	E472	0.0020	mg/kg	----	----	----	----	0.648
uranium	7440-61-1	E440	0.0020	mg/kg	0.948	1.71	1.07	1.44	----
uranium	7440-61-1	E472A	0.00040	mg/kg wwt	----	----	----	----	0.405
uranium	7440-61-1	E440A	0.00040	mg/kg wwt	0.155	0.228	0.0986	0.185	----
vanadium	7440-62-2	E472	0.10	mg/kg	----	----	----	----	2.85
vanadium	7440-62-2	E440	0.10	mg/kg	8.18	11.6	3.35	10.2	----
vanadium	7440-62-2	E472A	0.020	mg/kg wwt	----	----	----	----	1.78
vanadium	7440-62-2	E440A	0.020	mg/kg wwt	1.34	1.48	0.307	1.30	----
zinc	7440-66-6	E440	0.50	mg/kg	235	443	306	285	----
zinc	7440-66-6	E472	1.0	mg/kg	----	----	----	----	138
zinc	7440-66-6	E440A	0.10	mg/kg wwt	38.6	62.0	28.0	36.5	----
zinc	7440-66-6	E472A	0.20	mg/kg wwt	----	----	----	----	86.4
zirconium	7440-67-7	E472	0.20	mg/kg	----	----	----	----	0.41
zirconium	7440-67-7	E440	0.20	mg/kg	0.89	1.02	0.82	1.70	----
zirconium	7440-67-7	E472A	0.040	mg/kg wwt	----	----	----	----	<0.272 DLA
zirconium	7440-67-7	E440A	0.040	mg/kg wwt	0.146	0.157	0.075	0.218	----

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

Analytical Results

Sub-Matrix: Tissue

(Matrix: Biota)

Analyte	CAS Number	Method	LOR	Unit	RG_ERCKDT_PERI-03_2021-12-15	RG_ERCKDT_PERI-04_2021-12-15	RG_ERCK_BRYO-01_2021-12-15	RG_ERCK_PERI-02_2021-12-15	EV_EC_FLOW2_BRYO-01_2021-12-15
				Client sampling date / time	15-Dec-2021 12:00	15-Dec-2021 12:00	14-Dec-2021 09:45	14-Dec-2021 09:45	15-Dec-2021 14:00
					CG2106913-006	CG2106913-007	CG2106913-008	CG2106913-009	CG2106913-010
					Result	Result	Result	Result	Result
Physical Tests									
moisture	----	E144	0.50	%	----	----	----	----	80.7
moisture	----	E144-H	2.0	%	83.9	61.8	92.5	29.4	----
Metals									
aluminum	7429-90-5	E440	2.0	mg/kg	----	----	----	----	324
aluminum	7429-90-5	E472	5.0	mg/kg	634	2820	1180	213	----
aluminum	7429-90-5	E440A	0.40	mg/kg wwt	----	----	----	----	62.6
aluminum	7429-90-5	E472A	1.0	mg/kg wwt	102	1080	87.9	150	----
antimony	7440-36-0	E472	0.010	mg/kg	0.332	0.159	0.138	0.068	----
antimony	7440-36-0	E440	0.010	mg/kg	----	----	----	----	0.162
antimony	7440-36-0	E472A	0.0020	mg/kg wwt	0.0533	0.0606	0.0103	0.0484	----
antimony	7440-36-0	E440A	0.0020	mg/kg wwt	----	----	----	----	0.0314
arsenic	7440-38-2	E440	0.020	mg/kg	----	----	----	----	2.51
arsenic	7440-38-2	E472	0.030	mg/kg	4.38	4.23	4.42	0.737	----
arsenic	7440-38-2	E440A	0.0040	mg/kg wwt	----	----	----	----	0.484
arsenic	7440-38-2	E472A	0.0060	mg/kg wwt	0.703	1.61	0.330	0.520	----
barium	7440-39-3	E472	0.050	mg/kg	78.2	165	24.5	118	----
barium	7440-39-3	E440	0.050	mg/kg	----	----	----	----	163
barium	7440-39-3	E472A	0.010	mg/kg wwt	12.6	63.0	1.83	83.3	----
barium	7440-39-3	E440A	0.010	mg/kg wwt	----	----	----	----	31.5
beryllium	7440-41-7	E472	0.010	mg/kg	0.078	0.228	0.080	<0.017 DLA	----
beryllium	7440-41-7	E440	0.010	mg/kg	----	----	----	----	0.167
beryllium	7440-41-7	E472A	0.0020	mg/kg wwt	0.0126	0.0870	0.0059	<0.0169 DLA	----
beryllium	7440-41-7	E440A	0.0020	mg/kg wwt	----	----	----	----	0.0323
bismuth	7440-69-9	E472	0.010	mg/kg	<0.010	0.034	0.017	<0.017 DLA	----
bismuth	7440-69-9	E440	0.010	mg/kg	----	----	----	----	<0.018 DLA
bismuth	7440-69-9	E472A	0.0020	mg/kg wwt	<0.0020	0.0132	<0.0020	<0.0169 DLA	----
bismuth	7440-69-9	E440A	0.0020	mg/kg wwt	----	----	----	----	<0.0036 DLA
boron	7440-42-8	E472	1.0	mg/kg	62.0	24.6	200	10.7	----
boron	7440-42-8	E440	1.0	mg/kg	----	----	----	----	34.7
boron	7440-42-8	E472A	0.20	mg/kg wwt	9.95	9.40	14.9	7.54	----

Analytical Results

Sub-Matrix: Tissue
(Matrix: Biota)

Analyte	CAS Number	Method	LOR	Unit	RG_ERCKDT_PERI-03_2021-12-15	RG_ERCKDT_PERI-04_2021-12-15	RG_ERCK_BRYO-01_2021-12-15	RG_ERCK_PERI-02_2021-12-15	EV_EC_FLOW2_BRYO-01_2021-12-15
				Client sampling date / time	15-Dec-2021 12:00	15-Dec-2021 12:00	14-Dec-2021 09:45	14-Dec-2021 09:45	15-Dec-2021 14:00
					CG2106913-006	CG2106913-007	CG2106913-008	CG2106913-009	CG2106913-010
					Result	Result	Result	Result	Result
Metals									
boron	7440-42-8	E440A	0.20	mg/kg wwt	----	----	----	----	6.71
cadmium	7440-43-9	E440	0.0050	mg/kg	----	----	----	----	4.57
cadmium	7440-43-9	E472	0.010	mg/kg	15.8	2.89	0.959	0.378	----
cadmium	7440-43-9	E440A	0.0010	mg/kg wwt	----	----	----	----	0.882
cadmium	7440-43-9	E472A	0.0020	mg/kg wwt	2.54	1.10	0.0715	0.267	----
calcium	7440-70-2	E472	20	mg/kg	30200	155000	20200	324000	----
calcium	7440-70-2	E440	20	mg/kg	----	----	----	----	228000
calcium	7440-70-2	E472A	4.0	mg/kg wwt	4840	59100	1510	228000	----
calcium	7440-70-2	E440A	4.0	mg/kg wwt	----	----	----	----	44000
cesium	7440-46-2	E472	0.0050	mg/kg	0.155	0.640	0.290	0.0316	----
cesium	7440-46-2	E440	0.0050	mg/kg	----	----	----	----	0.101
cesium	7440-46-2	E472A	0.0010	mg/kg wwt	0.0248	0.244	0.0216	0.0223	----
cesium	7440-46-2	E440A	0.0010	mg/kg wwt	----	----	----	----	0.0195
chromium	7440-47-3	E440	0.050	mg/kg	----	----	----	----	0.771
chromium	7440-47-3	E472	0.20	mg/kg	17.3	43.6	3.08	1.07	----
chromium	7440-47-3	E440A	0.010	mg/kg wwt	----	----	----	----	0.149
chromium	7440-47-3	E472A	0.040	mg/kg wwt	2.78	16.6	0.230	0.758	----
cobalt	7440-48-4	E472	0.020	mg/kg	0.704	142	6.35	11.7	----
cobalt	7440-48-4	E440	0.020	mg/kg	----	----	----	----	57.7
cobalt	7440-48-4	E472A	0.0040	mg/kg wwt	0.113	54.3	0.473	8.24	----
cobalt	7440-48-4	E440A	0.0040	mg/kg wwt	----	----	----	----	11.2
copper	7440-50-8	E440	0.10	mg/kg	----	----	----	----	3.57
copper	7440-50-8	E472	0.20	mg/kg	6.77	5.50	3.98	<0.34 DLA	----
copper	7440-50-8	E440A	0.020	mg/kg wwt	----	----	----	----	0.690
copper	7440-50-8	E472A	0.040	mg/kg wwt	1.09	2.10	0.297	<0.339 DLA	----
iron	7439-89-6	E440	3.0	mg/kg	----	----	----	----	4310
iron	7439-89-6	E472	5.0	mg/kg	1200	5570	2300	210	----
iron	7439-89-6	E440A	0.60	mg/kg wwt	----	----	----	----	833
iron	7439-89-6	E472A	1.0	mg/kg wwt	192	2130	171	148	----
lead	7439-92-1	E440	0.020	mg/kg	----	----	----	----	1.09

Analytical Results

Sub-Matrix: **Tissue**

(Matrix: **Biota**)

				Client sample ID	RG_ERCKDT_PERI-03_2021-12-15	RG_ERCKDT_PERI-04_2021-12-15	RG_ERCK_BRYO-01_2021-12-15	RG_ERCK_PERI-02_2021-12-15	EV_EC_FLOW2_BRYO-01_2021-12-15
				Client sampling date / time	15-Dec-2021 12:00	15-Dec-2021 12:00	14-Dec-2021 09:45	14-Dec-2021 09:45	15-Dec-2021 14:00
Analyte	CAS Number	Method	LOR	Unit	CG2106913-006	CG2106913-007	CG2106913-008	CG2106913-009	CG2106913-010
					Result	Result	Result	Result	Result
Metals									
lead	7439-92-1	E472	0.050	mg/kg	0.551	2.69	1.11	0.152	----
lead	7439-92-1	E440A	0.0040	mg/kg wwt	----	----	----	----	0.211
lead	7439-92-1	E472A	0.010	mg/kg wwt	0.088	1.03	0.083	0.107	----
lithium	7439-93-2	E472	0.50	mg/kg	0.96	4.08	2.57	2.18	----
lithium	7439-93-2	E440	0.50	mg/kg	----	----	----	----	2.28
lithium	7439-93-2	E472A	0.10	mg/kg wwt	0.15	1.56	0.19	1.54	----
lithium	7439-93-2	E440A	0.10	mg/kg wwt	----	----	----	----	0.44
magnesium	7439-95-4	E472	2.0	mg/kg	4780	9270	6200	5780	----
magnesium	7439-95-4	E440	2.0	mg/kg	----	----	----	----	5560
magnesium	7439-95-4	E472A	0.40	mg/kg wwt	767	3540	462	4080	----
magnesium	7439-95-4	E440A	0.40	mg/kg wwt	----	----	----	----	1070
manganese	7439-96-5	E472	0.050	mg/kg	38.2	3620	233	398	----
manganese	7439-96-5	E440	0.050	mg/kg	----	----	----	----	2250
manganese	7439-96-5	E472A	0.010	mg/kg wwt	6.14	1380	17.4	281	----
manganese	7439-96-5	E440A	0.010	mg/kg wwt	----	----	----	----	435
molybdenum	7439-98-7	E440	0.020	mg/kg	----	----	----	----	5.18
molybdenum	7439-98-7	E472	0.040	mg/kg	0.533	2.51	0.690	0.118	----
molybdenum	7439-98-7	E440A	0.0040	mg/kg wwt	----	----	----	----	1.00
molybdenum	7439-98-7	E472A	0.0080	mg/kg wwt	0.0856	0.958	0.0514	0.0835	----
nickel	7440-02-0	E472	0.20	mg/kg	10.8	87.4	17.4	24.4	----
nickel	7440-02-0	E440	0.20	mg/kg	----	----	----	----	71.3
nickel	7440-02-0	E472A	0.040	mg/kg wwt	1.73	33.4	1.30	17.2	----
nickel	7440-02-0	E440A	0.040	mg/kg wwt	----	----	----	----	13.8
phosphorus	7723-14-0	E472	10	mg/kg	3510	1670	4780	383	----
phosphorus	7723-14-0	E440	10	mg/kg	----	----	----	----	2260
phosphorus	7723-14-0	E472A	2.0	mg/kg wwt	563	639	356	270	----
phosphorus	7723-14-0	E440A	2.0	mg/kg wwt	----	----	----	----	437
potassium	7440-09-7	E472	20	mg/kg	3850	2320	20300	412	----
potassium	7440-09-7	E440	20	mg/kg	----	----	----	----	4500
potassium	7440-09-7	E472A	4.0	mg/kg wwt	617	886	1510	291	----

Analytical Results

Sub-Matrix: Tissue
(Matrix: Biota)

				Client sample ID	RG_ERCKDT_PERI-03_2021-12-15	RG_ERCKDT_PERI-04_2021-12-15	RG_ERCK_BRYO-01_2021-12-15	RG_ERCK_PERI-02_2021-12-15	EV_EC_FLOW2_BRYO-01_2021-12-15
				Client sampling date / time	15-Dec-2021 12:00	15-Dec-2021 12:00	14-Dec-2021 09:45	14-Dec-2021 09:45	15-Dec-2021 14:00
Analyte	CAS Number	Method	LOR	Unit	CG2106913-006	CG2106913-007	CG2106913-008	CG2106913-009	CG2106913-010
					Result	Result	Result	Result	Result
Metals									
potassium	7440-09-7	E440A	4.0	mg/kg wwt	----	----	----	----	869
rubidium	7440-17-7	E472	0.050	mg/kg	3.56	6.30	18.0	0.596	----
rubidium	7440-17-7	E440	0.050	mg/kg	----	----	----	----	2.80
rubidium	7440-17-7	E472A	0.010	mg/kg wwt	0.571	2.40	1.34	0.420	----
rubidium	7440-17-7	E440A	0.010	mg/kg wwt	----	----	----	----	0.542
selenium	7782-49-2	E440	0.050	mg/kg	----	----	----	----	7.60
selenium	7782-49-2	E472	0.10	mg/kg	4.67	4.55	2.45	1.73	----
selenium	7782-49-2	E440A	0.010	mg/kg wwt	----	----	----	----	1.47
selenium	7782-49-2	E472A	0.020	mg/kg wwt	0.750	1.74	0.183	1.22	----
sodium	7440-23-5	E472	20	mg/kg	102	128	301	136	----
sodium	7440-23-5	E440	20	mg/kg	----	----	----	----	230
sodium	7440-23-5	E472A	4.0	mg/kg wwt	16.3	49.0	22.4	96.2	----
sodium	7440-23-5	E440A	4.0	mg/kg wwt	----	----	----	----	44.4
strontium	7440-24-6	E440	0.050	mg/kg	----	----	----	----	93.8
strontium	7440-24-6	E472	0.10	mg/kg	21.7	100	27.2	207	----
strontium	7440-24-6	E440A	0.010	mg/kg wwt	----	----	----	----	18.1
strontium	7440-24-6	E472A	0.020	mg/kg wwt	3.49	38.2	2.02	146	----
tellurium	13494-80-9	E472	0.020	mg/kg	<0.020	<0.024 DLA	<0.027 DLA	<0.034 DLA	----
tellurium	13494-80-9	E440	0.020	mg/kg	----	----	----	----	<0.036 DLA
tellurium	13494-80-9	E472A	0.0040	mg/kg wwt	<0.0040	<0.0123 DLA	<0.0040	<0.0339 DLA	----
tellurium	13494-80-9	E440A	0.0040	mg/kg wwt	----	----	----	----	<0.0071 DLA
thallium	7440-28-0	E472	0.0020	mg/kg	0.0275	0.116	0.153	0.0186	----
thallium	7440-28-0	E440	0.0020	mg/kg	----	----	----	----	0.0889
thallium	7440-28-0	E472A	0.00040	mg/kg wwt	0.00442	0.0443	0.0114	0.0131	----
thallium	7440-28-0	E440A	0.00040	mg/kg wwt	----	----	----	----	0.0172
tin	7440-31-5	E472	0.10	mg/kg	<0.10	<0.12 DLA	0.20	<0.17 DLA	----
tin	7440-31-5	E440	0.10	mg/kg	----	----	----	----	<0.18 DLA
tin	7440-31-5	E472A	0.020	mg/kg wwt	<0.020	<0.061 DLA	<0.020	<0.169 DLA	----
tin	7440-31-5	E440A	0.020	mg/kg wwt	----	----	----	----	<0.036 DLA
titanium	7440-32-6	E440.Ti	0.25	mg/kg	----	----	----	----	4.31

Analytical Results

Sub-Matrix: **Tissue**

(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	RG_ERCKDT_PERI-03_2021-12-15	RG_ERCKDT_PERI-04_2021-12-15	RG_ERCK_BRYO-01_2021-12-15	RG_ERCK_PERI-02_2021-12-15	EV_EC_FLOW2_BRYO-01_2021-12-15
				Client sampling date / time	15-Dec-2021 12:00	15-Dec-2021 12:00	14-Dec-2021 09:45	14-Dec-2021 09:45	15-Dec-2021 14:00
					CG2106913-006	CG2106913-007	CG2106913-008	CG2106913-009	CG2106913-010
					Result	Result	Result	Result	Result
Metals									
titanium	7440-32-6	E472.Ti	0.50	mg/kg	7.16	12.4	21.8	1.64	----
titanium	7440-32-6	E440A.Ti	0.050	mg/kg wwt	----	----	----	----	0.833
titanium	7440-32-6	E472A.Ti	0.10	mg/kg wwt	1.15	4.75	1.63	1.16	----
uranium	7440-61-1	E472	0.0020	mg/kg	1.74	1.11	0.453	2.28	----
uranium	7440-61-1	E440	0.0020	mg/kg	----	----	----	----	2.23
uranium	7440-61-1	E472A	0.00040	mg/kg wwt	0.279	0.422	0.0338	1.61	----
uranium	7440-61-1	E440A	0.00040	mg/kg wwt	----	----	----	----	0.431
vanadium	7440-62-2	E472	0.10	mg/kg	10.3	12.6	5.75	0.97	----
vanadium	7440-62-2	E440	0.10	mg/kg	----	----	----	----	1.86
vanadium	7440-62-2	E472A	0.020	mg/kg wwt	1.65	4.82	0.429	0.684	----
vanadium	7440-62-2	E440A	0.020	mg/kg wwt	----	----	----	----	0.360
zinc	7440-66-6	E440	0.50	mg/kg	----	----	----	----	231
zinc	7440-66-6	E472	1.0	mg/kg	65.8	153	33.0	9.7	----
zinc	7440-66-6	E440A	0.10	mg/kg wwt	----	----	----	----	44.6
zinc	7440-66-6	E472A	0.20	mg/kg wwt	10.6	58.4	2.46	6.85	----
zirconium	7440-67-7	E472	0.20	mg/kg	13.5	1.76	8.30	0.37	----
zirconium	7440-67-7	E440	0.20	mg/kg	----	----	----	----	0.53
zirconium	7440-67-7	E472A	0.040	mg/kg wwt	2.17	0.673	0.619	<0.339 DLA	----
zirconium	7440-67-7	E440A	0.040	mg/kg wwt	----	----	----	----	0.103

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

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	EV_EC_FLOW2_BRYO-02_2021-12-15	EV_EC_FLOW2_BRYO-03_2021-12-15	EV_EC_FLOW2_BRYO-04_2021-12-15	EV_EC_FLOW2_BRYO-05_2021-12-15	RG_ERCKUT_BRYO-01_2021-12-15
Client sampling date / time					15-Dec-2021 14:00	15-Dec-2021 14:00	15-Dec-2021 14:00	15-Dec-2021 14:00	15-Dec-2021 13:00
					CG2106913-011	CG2106913-012	CG2106913-013	CG2106913-014	CG2106913-015
					Result	Result	Result	Result	Result
Physical Tests									
moisture	----	E144	0.50	%	66.2	89.1	90.1	90.2	87.8
Metals									
aluminum	7429-90-5	E440	2.0	mg/kg	363	700	1160	720	1420
aluminum	7429-90-5	E440A	0.40	mg/kg wwt	122	76.4	114	70.5	174
antimony	7440-36-0	E440	0.010	mg/kg	0.135	0.349	0.579	0.247	4.09
antimony	7440-36-0	E440A	0.0020	mg/kg wwt	0.0457	0.0381	0.0573	0.0242	0.500
arsenic	7440-38-2	E440	0.020	mg/kg	2.27	11.7	23.1	12.3	1.82
arsenic	7440-38-2	E440A	0.0040	mg/kg wwt	0.767	1.28	2.28	1.20	0.223
barium	7440-39-3	E440	0.050	mg/kg	192	135	187	102	80.0
barium	7440-39-3	E440A	0.010	mg/kg wwt	64.9	14.8	18.5	9.99	9.78
beryllium	7440-41-7	E440	0.010	mg/kg	0.115	0.371	0.593	0.289	0.285
beryllium	7440-41-7	E440A	0.0020	mg/kg wwt	0.0388	0.0405	0.0587	0.0283	0.0348
bismuth	7440-69-9	E440	0.010	mg/kg	<0.015 DLA	0.021	<0.062 DLA	<0.034 DLA	0.025
bismuth	7440-69-9	E440A	0.0020	mg/kg wwt	<0.0074 DLA	0.0023	<0.0062 DLA	<0.0034 DLA	0.0031
boron	7440-42-8	E440	1.0	mg/kg	15.7	58.6	72.6	31.0	11.9
boron	7440-42-8	E440A	0.20	mg/kg wwt	5.30	6.40	7.19	3.03	1.45
cadmium	7440-43-9	E440	0.0050	mg/kg	4.71	6.10	10.6	5.17	6.79
cadmium	7440-43-9	E440A	0.0010	mg/kg wwt	1.59	0.665	1.05	0.506	0.830
calcium	7440-70-2	E440	20	mg/kg	286000	124000	82600	41600	76200
calcium	7440-70-2	E440A	4.0	mg/kg wwt	96800	13500	8180	4070	9320
cesium	7440-46-2	E440	0.0050	mg/kg	0.112	0.326	0.582	0.333	0.404
cesium	7440-46-2	E440A	0.0010	mg/kg wwt	0.0380	0.0356	0.0576	0.0326	0.0494
chromium	7440-47-3	E440	0.050	mg/kg	0.877	1.91	3.25	1.93	4.64
chromium	7440-47-3	E440A	0.010	mg/kg wwt	0.296	0.209	0.321	0.189	0.568
cobalt	7440-48-4	E440	0.020	mg/kg	57.6	152	272	163	1.76
cobalt	7440-48-4	E440A	0.0040	mg/kg wwt	19.4	16.5	26.9	15.9	0.216
copper	7440-50-8	E440	0.10	mg/kg	2.61	8.03	13.7	6.96	24.6
copper	7440-50-8	E440A	0.020	mg/kg wwt	0.881	0.876	1.36	0.681	3.01
iron	7439-89-6	E440	3.0	mg/kg	3640	18900	38100	20300	4220
iron	7439-89-6	E440A	0.60	mg/kg wwt	1230	2070	3770	1980	516

Analytical Results

Sub-Matrix: Tissue
(Matrix: Biota)

				Client sample ID	EV_EC_FLOW2_BRYO-02_2021-12-15	EV_EC_FLOW2_BRYO-03_2021-12-15	EV_EC_FLOW2_BRYO-04_2021-12-15	EV_EC_FLOW2_BRYO-05_2021-12-15	RG_ERCKUT_BRYO-01_2021-12-15
				Client sampling date / time	15-Dec-2021 14:00	15-Dec-2021 14:00	15-Dec-2021 14:00	15-Dec-2021 14:00	15-Dec-2021 13:00
Analyte	CAS Number	Method	LOR	Unit	CG2106913-011	CG2106913-012	CG2106913-013	CG2106913-014	CG2106913-015
					Result	Result	Result	Result	Result
Metals									
lead	7439-92-1	E440	0.020	mg/kg	0.952	4.15	8.49	4.45	1.75
lead	7439-92-1	E440A	0.0040	mg/kg wwt	0.322	0.453	0.841	0.436	0.214
lithium	7439-93-2	E440	0.50	mg/kg	2.10	3.86	4.04	1.92	2.45
lithium	7439-93-2	E440A	0.10	mg/kg wwt	0.71	0.42	0.40	0.19	0.30
magnesium	7439-95-4	E440	2.0	mg/kg	5110	6360	7580	3570	4980
magnesium	7439-95-4	E440A	0.40	mg/kg wwt	1720	694	751	350	609
manganese	7439-96-5	E440	0.050	mg/kg	2080	6220	10200	6220	91.3
manganese	7439-96-5	E440A	0.010	mg/kg wwt	702	678	1010	609	11.2
molybdenum	7439-98-7	E440	0.020	mg/kg	1.44	8.38	9.72	4.19	1.71
molybdenum	7439-98-7	E440A	0.0040	mg/kg wwt	0.488	0.914	0.962	0.410	0.209
nickel	7440-02-0	E440	0.20	mg/kg	86.1	147	210	112	10.7
nickel	7440-02-0	E440A	0.040	mg/kg wwt	29.1	16.0	20.8	11.0	1.31
phosphorus	7723-14-0	E440	10	mg/kg	1230	3100	4110	1750	4320
phosphorus	7723-14-0	E440A	2.0	mg/kg wwt	416	338	407	171	529
potassium	7440-09-7	E440	20	mg/kg	1750	6810	8750	3870	15600
potassium	7440-09-7	E440A	4.0	mg/kg wwt	590	743	867	379	1910
rubidium	7440-17-7	E440	0.050	mg/kg	1.69	5.31	6.72	3.63	10.6
rubidium	7440-17-7	E440A	0.010	mg/kg wwt	0.570	0.580	0.665	0.355	1.30
selenium	7782-49-2	E440	0.050	mg/kg	5.70	20.4	35.7	18.7	7.45
selenium	7782-49-2	E440A	0.010	mg/kg wwt	1.92	2.22	3.54	1.83	0.911
sodium	7440-23-5	E440	20	mg/kg	153	521	437	186	153
sodium	7440-23-5	E440A	4.0	mg/kg wwt	51.7	56.9	43.3	18.2	18.7
strontium	7440-24-6	E440	0.050	mg/kg	111	85.4	72.5	35.2	39.8
strontium	7440-24-6	E440A	0.010	mg/kg wwt	37.5	9.32	7.18	3.44	4.87
tellurium	13494-80-9	E440	0.020	mg/kg	<0.029 DLA	<0.020	<0.124 DLA	<0.068 DLA	<0.020
tellurium	13494-80-9	E440A	0.0040	mg/kg wwt	<0.0147 DLA	<0.0040	<0.0124 DLA	<0.0068 DLA	<0.0040
thallium	7440-28-0	E440	0.0020	mg/kg	0.0966	0.337	0.609	0.371	0.122
thallium	7440-28-0	E440A	0.00040	mg/kg wwt	0.0326	0.0368	0.0603	0.0363	0.0149
tin	7440-31-5	E440	0.10	mg/kg	<0.15 DLA	<0.10	<0.62 DLA	<0.34 DLA	<0.10
tin	7440-31-5	E440A	0.020	mg/kg wwt	<0.074 DLA	<0.020	<0.062 DLA	<0.034 DLA	<0.020

Analytical Results

Sub-Matrix: **Tissue**

(Matrix: **Biota)**

				Client sample ID	EV_EC_FLOW2_BRYO-02_2021-12-15	EV_EC_FLOW2_BRYO-03_2021-12-15	EV_EC_FLOW2_BRYO-04_2021-12-15	EV_EC_FLOW2_BRYO-05_2021-12-15	RG_ERCKUT_BRYO-01_2021-12-15
				Client sampling date / time	15-Dec-2021 14:00	15-Dec-2021 14:00	15-Dec-2021 14:00	15-Dec-2021 14:00	15-Dec-2021 13:00
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	**CG2106913-011**	**CG2106913-012**	**CG2106913-013**	**CG2106913-014**	**CG2106913-015**
					Result	Result	Result	Result	Result
Metals									
titanium	7440-32-6	E440.Ti	0.25	mg/kg	4.36	10.8	11.6	6.09	12.6
titanium	7440-32-6	E440A.Ti	0.050	mg/kg wwt	1.47	1.17	1.14	0.597	1.55
uranium	7440-61-1	E440	0.0020	mg/kg	2.74	1.63	1.88	0.946	2.30
uranium	7440-61-1	E440A	0.00040	mg/kg wwt	0.924	0.177	0.186	0.0926	0.281
vanadium	7440-62-2	E440	0.10	mg/kg	2.20	6.34	11.0	6.22	12.2
vanadium	7440-62-2	E440A	0.020	mg/kg wwt	0.743	0.691	1.09	0.609	1.50
zinc	7440-66-6	E440	0.50	mg/kg	179	479	672	342	54.4
zinc	7440-66-6	E440A	0.10	mg/kg wwt	60.4	52.3	66.5	33.5	6.65
zirconium	7440-67-7	E440	0.20	mg/kg	0.43	1.29	1.53	0.81	4.85
zirconium	7440-67-7	E440A	0.040	mg/kg wwt	<0.147 DLA	0.141	0.152	0.080	0.593

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

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	RG_ERCKUT_BRYO-02_2021-12-15	RG_ERCKUT_BRYO-03_2021-12-15	RG_ERCKUT_PERI-02_2021-12-15	RG_ERCKUT_PERI-03_2021-12-15	----
				Client sampling date / time	15-Dec-2021 13:00	15-Dec-2021 13:00	15-Dec-2021 13:00	15-Dec-2021 13:00	----
					CG2106913-016	CG2106913-017	CG2106913-018	CG2106913-019	--------
					Result	Result	Result	Result	----
Physical Tests									
moisture	----	E144	0.50	%	----	78.1	----	----	----
moisture	----	E144-H	2.0	%	71.8	----	80.7	81.0	----
Metals									
aluminum	7429-90-5	E440	2.0	mg/kg	----	374	----	----	----
aluminum	7429-90-5	E472	5.0	mg/kg	4000	----	1320	581	----
aluminum	7429-90-5	E440A	0.40	mg/kg wwt	----	81.8	----	----	----
aluminum	7429-90-5	E472A	1.0	mg/kg wwt	1130	----	255	111	----
antimony	7440-36-0	E472	0.010	mg/kg	0.456	----	0.246	0.289	----
antimony	7440-36-0	E440	0.010	mg/kg	----	1.10	----	----	----
antimony	7440-36-0	E472A	0.0020	mg/kg wwt	0.129	----	0.0476	0.0550	----
antimony	7440-36-0	E440A	0.0020	mg/kg wwt	----	0.242	----	----	----
arsenic	7440-38-2	E440	0.020	mg/kg	----	0.379	----	----	----
arsenic	7440-38-2	E472	0.030	mg/kg	2.94	----	4.08	3.87	----
arsenic	7440-38-2	E440A	0.0040	mg/kg wwt	----	0.0831	----	----	----
arsenic	7440-38-2	E472A	0.0060	mg/kg wwt	0.829	----	0.788	0.738	----
barium	7440-39-3	E472	0.050	mg/kg	129	----	37.1	176	----
barium	7440-39-3	E440	0.050	mg/kg	----	46.5	----	----	----
barium	7440-39-3	E472A	0.010	mg/kg wwt	36.5	----	7.16	33.6	----
barium	7440-39-3	E440A	0.010	mg/kg wwt	----	10.2	----	----	----
beryllium	7440-41-7	E472	0.010	mg/kg	0.493	----	0.123	0.073	----
beryllium	7440-41-7	E440	0.010	mg/kg	----	0.261	----	----	----
beryllium	7440-41-7	E472A	0.0020	mg/kg wwt	0.139	----	0.0237	0.0139	----
beryllium	7440-41-7	E440A	0.0020	mg/kg wwt	----	0.0572	----	----	----
bismuth	7440-69-9	E472	0.010	mg/kg	0.071	----	0.015	<0.010	----
bismuth	7440-69-9	E440	0.010	mg/kg	----	<0.010	----	----	----
bismuth	7440-69-9	E472A	0.0020	mg/kg wwt	0.0201	----	0.0028	<0.0020	----
bismuth	7440-69-9	E440A	0.0020	mg/kg wwt	----	<0.0020	----	----	----
boron	7440-42-8	E472	1.0	mg/kg	19.4	----	50.1	51.3	----
boron	7440-42-8	E440	1.0	mg/kg	----	39.4	----	----	----
boron	7440-42-8	E472A	0.20	mg/kg wwt	5.48	----	9.68	9.77	----

Analytical Results

Sub-Matrix: **Tissue**

(Matrix: **Biota**)

				Client sample ID	RG_ERCKUT_BRYO-02_2021-12-15	RG_ERCKUT_BRYO-03_2021-12-15	RG_ERCKUT_PERI-02_2021-12-15	RG_ERCKUT_PERI-03_2021-12-15	----
				Client sampling date / time	15-Dec-2021 13:00	15-Dec-2021 13:00	15-Dec-2021 13:00	15-Dec-2021 13:00	----
Analyte	CAS Number	Method	LOR	Unit	CG2106913-016	CG2106913-017	CG2106913-018	CG2106913-019	--------
					Result	Result	Result	Result	----
Metals									
boron	7440-42-8	E440A	0.20	mg/kg wwt	----	8.63	----	----	----
cadmium	7440-43-9	E440	0.0050	mg/kg	----	2.87	----	----	----
cadmium	7440-43-9	E472	0.010	mg/kg	3.24	----	12.9	11.9	----
cadmium	7440-43-9	E440A	0.0010	mg/kg wwt	----	0.629	----	----	----
cadmium	7440-43-9	E472A	0.0020	mg/kg wwt	0.915	----	2.50	2.27	----
calcium	7440-70-2	E472	20	mg/kg	50500	----	57700	55000	----
calcium	7440-70-2	E440	20	mg/kg	----	23600	----	----	----
calcium	7440-70-2	E472A	4.0	mg/kg wwt	14200	----	11100	10500	----
calcium	7440-70-2	E440A	4.0	mg/kg wwt	----	5180	----	----	----
cesium	7440-46-2	E472	0.0050	mg/kg	1.21	----	0.351	0.136	----
cesium	7440-46-2	E440	0.0050	mg/kg	----	0.0955	----	----	----
cesium	7440-46-2	E472A	0.0010	mg/kg wwt	0.342	----	0.0677	0.0260	----
cesium	7440-46-2	E440A	0.0010	mg/kg wwt	----	0.0209	----	----	----
chromium	7440-47-3	E440	0.050	mg/kg	----	2.61	----	----	----
chromium	7440-47-3	E472	0.20	mg/kg	10.8	----	13.1	23.3	----
chromium	7440-47-3	E440A	0.010	mg/kg wwt	----	0.571	----	----	----
chromium	7440-47-3	E472A	0.040	mg/kg wwt	3.03	----	2.54	4.44	----
cobalt	7440-48-4	E472	0.020	mg/kg	2.86	----	1.00	0.507	----
cobalt	7440-48-4	E440	0.020	mg/kg	----	0.249	----	----	----
cobalt	7440-48-4	E472A	0.0040	mg/kg wwt	0.808	----	0.193	0.0966	----
cobalt	7440-48-4	E440A	0.0040	mg/kg wwt	----	0.0545	----	----	----
copper	7440-50-8	E440	0.10	mg/kg	----	11.7	----	----	----
copper	7440-50-8	E472	0.20	mg/kg	12.8	----	6.32	6.64	----
copper	7440-50-8	E440A	0.020	mg/kg wwt	----	2.56	----	----	----
copper	7440-50-8	E472A	0.040	mg/kg wwt	3.61	----	1.22	1.26	----
iron	7439-89-6	E440	3.0	mg/kg	----	226	----	----	----
iron	7439-89-6	E472	5.0	mg/kg	9310	----	1700	1260	----
iron	7439-89-6	E440A	0.60	mg/kg wwt	----	49.5	----	----	----
iron	7439-89-6	E472A	1.0	mg/kg wwt	2630	----	329	241	----
lead	7439-92-1	E440	0.020	mg/kg	----	0.514	----	----	----

Analytical Results

Sub-Matrix: Tissue
(Matrix: Biota)

Analyte	CAS Number	Method	LOR	Unit	RG_ERCKUT_BRYO-02_2021-12-15	RG_ERCKUT_BRYO-03_2021-12-15	RG_ERCKUT_PERI-02_2021-12-15	RG_ERCKUT_PERI-03_2021-12-15	----
Client sampling date / time					15-Dec-2021 13:00	15-Dec-2021 13:00	15-Dec-2021 13:00	15-Dec-2021 13:00	----
					CG2106913-016	CG2106913-017	CG2106913-018	CG2106913-019	--------
					Result	Result	Result	Result	----
Metals									
lead	7439-92-1	E472	0.050	mg/kg	5.09	----	1.07	0.502	----
lead	7439-92-1	E440A	0.0040	mg/kg wwt	----	0.113	----	----	----
lead	7439-92-1	E472A	0.010	mg/kg wwt	1.44	----	0.206	0.096	----
lithium	7439-93-2	E472	0.50	mg/kg	3.92	----	1.55	0.88	----
lithium	7439-93-2	E440	0.50	mg/kg	----	0.71	----	----	----
lithium	7439-93-2	E472A	0.10	mg/kg wwt	1.11	----	0.30	0.17	----
lithium	7439-93-2	E440A	0.10	mg/kg wwt	----	0.16	----	----	----
magnesium	7439-95-4	E472	2.0	mg/kg	3970	----	2780	5140	----
magnesium	7439-95-4	E440	2.0	mg/kg	----	5410	----	----	----
magnesium	7439-95-4	E472A	0.40	mg/kg wwt	1120	----	536	978	----
magnesium	7439-95-4	E440A	0.40	mg/kg wwt	----	1180	----	----	----
manganese	7439-96-5	E472	0.050	mg/kg	107	----	60.8	35.7	----
manganese	7439-96-5	E440	0.050	mg/kg	----	26.0	----	----	----
manganese	7439-96-5	E472A	0.010	mg/kg wwt	30.1	----	11.7	6.80	----
manganese	7439-96-5	E440A	0.010	mg/kg wwt	----	5.70	----	----	----
molybdenum	7439-98-7	E440	0.020	mg/kg	----	1.52	----	----	----
molybdenum	7439-98-7	E472	0.040	mg/kg	1.20	----	0.468	0.658	----
molybdenum	7439-98-7	E440A	0.0040	mg/kg wwt	----	0.332	----	----	----
molybdenum	7439-98-7	E472A	0.0080	mg/kg wwt	0.339	----	0.0903	0.125	----
nickel	7440-02-0	E472	0.20	mg/kg	17.0	----	9.42	12.6	----
nickel	7440-02-0	E440	0.20	mg/kg	----	14.4	----	----	----
nickel	7440-02-0	E472A	0.040	mg/kg wwt	4.79	----	1.82	2.41	----
nickel	7440-02-0	E440A	0.040	mg/kg wwt	----	3.15	----	----	----
phosphorus	7723-14-0	E472	10	mg/kg	3160	----	3300	3020	----
phosphorus	7723-14-0	E440	10	mg/kg	----	7360	----	----	----
phosphorus	7723-14-0	E472A	2.0	mg/kg wwt	893	----	638	574	----
phosphorus	7723-14-0	E440A	2.0	mg/kg wwt	----	1610	----	----	----
potassium	7440-09-7	E472	20	mg/kg	3940	----	3900	3230	----
potassium	7440-09-7	E440	20	mg/kg	----	4770	----	----	----
potassium	7440-09-7	E472A	4.0	mg/kg wwt	1110	----	754	615	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	RG_ERCKUT_BRYO-02_2021-12-15	RG_ERCKUT_BRYO-03_2021-12-15	RG_ERCKUT_PERI-02_2021-12-15	RG_ERCKUT_PERI-03_2021-12-15	----
Client sampling date / time					15-Dec-2021 13:00	15-Dec-2021 13:00	15-Dec-2021 13:00	15-Dec-2021 13:00	----
					CG2106913-016	CG2106913-017	CG2106913-018	CG2106913-019	--------
					Result	Result	Result	Result	----
Metals									
potassium	7440-09-7	E440A	4.0	mg/kg wwt	----	1040	----	----	----
rubidium	7440-17-7	E472	0.050	mg/kg	10.7	----	4.99	3.02	----
rubidium	7440-17-7	E440	0.050	mg/kg	----	1.91	----	----	----
rubidium	7440-17-7	E472A	0.010	mg/kg wwt	3.02	----	0.963	0.574	----
rubidium	7440-17-7	E440A	0.010	mg/kg wwt	----	0.419	----	----	----
selenium	7782-49-2	E440	0.050	mg/kg	----	5.02	----	----	----
selenium	7782-49-2	E472	0.10	mg/kg	5.77	----	4.86	5.05	----
selenium	7782-49-2	E440A	0.010	mg/kg wwt	----	1.10	----	----	----
selenium	7782-49-2	E472A	0.020	mg/kg wwt	1.63	----	0.938	0.961	----
sodium	7440-23-5	E472	20	mg/kg	262	----	97	93	----
sodium	7440-23-5	E440	20	mg/kg	----	245	----	----	----
sodium	7440-23-5	E472A	4.0	mg/kg wwt	73.8	----	18.7	17.6	----
sodium	7440-23-5	E440A	4.0	mg/kg wwt	----	53.7	----	----	----
strontium	7440-24-6	E440	0.050	mg/kg	----	21.5	----	----	----
strontium	7440-24-6	E472	0.10	mg/kg	47.8	----	76.7	36.4	----
strontium	7440-24-6	E440A	0.010	mg/kg wwt	----	4.71	----	----	----
strontium	7440-24-6	E472A	0.020	mg/kg wwt	13.5	----	14.8	6.93	----
tellurium	13494-80-9	E472	0.020	mg/kg	0.025	----	<0.020	<0.020	----
tellurium	13494-80-9	E440	0.020	mg/kg	----	<0.020	----	----	----
tellurium	13494-80-9	E472A	0.0040	mg/kg wwt	0.0071	----	<0.0040	<0.0040	----
tellurium	13494-80-9	E440A	0.0040	mg/kg wwt	----	<0.0040	----	----	----
thallium	7440-28-0	E472	0.0020	mg/kg	0.150	----	0.0590	0.0256	----
thallium	7440-28-0	E440	0.0020	mg/kg	----	0.0506	----	----	----
thallium	7440-28-0	E472A	0.00040	mg/kg wwt	0.0423	----	0.0114	0.00487	----
thallium	7440-28-0	E440A	0.00040	mg/kg wwt	----	0.0111	----	----	----
tin	7440-31-5	E472	0.10	mg/kg	<0.10	----	<0.10	<0.10	----
tin	7440-31-5	E440	0.10	mg/kg	----	<0.10	----	----	----
tin	7440-31-5	E472A	0.020	mg/kg wwt	<0.020	----	<0.020	<0.020	----
tin	7440-31-5	E440A	0.020	mg/kg wwt	----	<0.020	----	----	----
titanium	7440-32-6	E440.Ti	0.25	mg/kg	----	2.18	----	----	----

Analytical Results

Sub-Matrix: **Tissue**

(Matrix: **Biota**)

				Client sample ID	RG_ERCKUT_BRYO-02_2021-12-15	RG_ERCKUT_BRYO-03_2021-12-15	RG_ERCKUT_PERI-02_2021-12-15	RG_ERCKUT_PERI-03_2021-12-15	----
				Client sampling date / time	15-Dec-2021 13:00	15-Dec-2021 13:00	15-Dec-2021 13:00	15-Dec-2021 13:00	----
Analyte	CAS Number	Method	LOR	Unit	CG2106913-016	CG2106913-017	CG2106913-018	CG2106913-019	--------
					Result	Result	Result	Result	----
Metals									
titanium	7440-32-6	E472.Ti	0.50	mg/kg	9.02	----	10.5	6.65	----
titanium	7440-32-6	E440A.Ti	0.050	mg/kg wwt	----	0.476	----	----	----
titanium	7440-32-6	E472A.Ti	0.10	mg/kg wwt	2.54	----	2.02	1.27	----
uranium	7440-61-1	E472	0.0020	mg/kg	1.73	----	2.04	1.41	----
uranium	7440-61-1	E440	0.0020	mg/kg	----	3.35	----	----	----
uranium	7440-61-1	E472A	0.00040	mg/kg wwt	0.488	----	0.394	0.269	----
uranium	7440-61-1	E440A	0.00040	mg/kg wwt	----	0.733	----	----	----
vanadium	7440-62-2	E472	0.10	mg/kg	24.8	----	9.88	9.88	----
vanadium	7440-62-2	E440	0.10	mg/kg	----	6.92	----	----	----
vanadium	7440-62-2	E472A	0.020	mg/kg wwt	7.00	----	1.91	1.88	----
vanadium	7440-62-2	E440A	0.020	mg/kg wwt	----	1.52	----	----	----
zinc	7440-66-6	E440	0.50	mg/kg	----	76.4	----	----	----
zinc	7440-66-6	E472	1.0	mg/kg	94.3	----	71.7	55.0	----
zinc	7440-66-6	E440A	0.10	mg/kg wwt	----	16.7	----	----	----
zinc	7440-66-6	E472A	0.20	mg/kg wwt	26.6	----	13.8	10.5	----
zirconium	7440-67-7	E472	0.20	mg/kg	0.93	----	9.18	11.8	----
zirconium	7440-67-7	E440	0.20	mg/kg	----	0.70	----	----	----
zirconium	7440-67-7	E472A	0.040	mg/kg wwt	0.262	----	1.77	2.24	----
zirconium	7440-67-7	E440A	0.040	mg/kg wwt	----	0.154	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2106913**	Page	: 1 of 16
Amendment	: 1		
Client	: **Teck Coal Limited**	Laboratory	: Calgary - Environmental
Contact	: Mike Pope	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Avenue Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 17-Dec-2021 08:45
PO	: VPO00748510	Issue Date	: 28-Feb-2022 17:29
C-O-C number	: December EVO LAEMP 2021		
Sampler	: Tyler Mehler		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 19		
No. of samples analysed	: 19		

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

Key

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

CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- Reference Material (RM) Sample outliers occur - please see the following pages for full details.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Biota**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Metals	CG2106913-016	RG_ERCKUT_BRYO-02_2021-12-15	magnesium	7439-95-4	E472	54.2 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	CG2106913-016	RG_ERCKUT_BRYO-02_2021-12-15	magnesium	7439-95-4	E472A	54.2 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	CG2106913-016	RG_ERCKUT_BRYO-02_2021-12-15	tellurium	13494-80-9	E472A	0.0084 % DUP-H	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).

Result Qualifiers

Qualifier	*Description*
DUP-H	*Duplicate results outside ALS DQO, due to sample heterogeneity.*

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Reference Material (RM) Sample								
Metals	QC-MRG2-419710003	----	lead	7439-92-1	E472	134 % MES	70.0-130%	Recovery greater than upper control limit
Metals	QC-MRG2-401542003	----	lead	7439-92-1	E472A	134 % MES	70.0-130%	Recovery greater than upper control limit

Result Qualifiers

Qualifier	*Description*
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).*

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Biota**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag RG_ERCKDT_PERI-02_2021-12-15	E472	15-Dec-2021	28-Feb-2022	----	----		28-Feb-2022	730 days	75 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag RG_ERCKDT_PERI-03_2021-12-15	E472	15-Dec-2021	28-Feb-2022	----	----		28-Feb-2022	730 days	75 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
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LDPE bag RG_ERCK_BRYO-01_2021-12-15	E472	14-Dec-2021	28-Feb-2022	----	----		28-Feb-2022	730 days	76 days	✓

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LDPE bag RG_ERCKDT_BRYO-01_2021-12-15	E440A.Ti	15-Dec-2021	07-Feb-2022	----	----		07-Feb-2022	730 days	54 days	✓
Metals : Titanium in Biota by CRC ICPMS (WET units, Routine)										
LDPE bag RG_ERCKDT_BRYO-02_2021-12-15	E440A.Ti	15-Dec-2021	07-Feb-2022	----	----		07-Feb-2022	730 days	54 days	✓
Metals : Titanium in Biota by CRC ICPMS (WET units, Routine)										
LDPE bag RG_ERCKDT_BRYO-03_2021-12-15	E440A.Ti	15-Dec-2021	07-Feb-2022	----	----		07-Feb-2022	730 days	54 days	✓
Metals : Titanium in Biota by CRC ICPMS (WET units, Routine)										
LDPE bag RG_ERCKDT_BRYO-04_2021-12-15	E440A.Ti	15-Dec-2021	07-Feb-2022	----	----		07-Feb-2022	730 days	54 days	✓
Metals : Titanium in Biota by CRC ICPMS (WET units, Routine)										
LDPE bag RG_ERCKUT_BRYO-01_2021-12-15	E440A.Ti	15-Dec-2021	07-Feb-2022	----	----		07-Feb-2022	730 days	54 days	✓
Metals : Titanium in Biota by CRC ICPMS (WET units, Routine)										
LDPE bag RG_ERCKUT_BRYO-03_2021-12-15	E440A.Ti	15-Dec-2021	07-Feb-2022	----	----		07-Feb-2022	730 days	54 days	✓
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag RG_ERCK_BRYO-01_2021-12-15	E144-H	14-Dec-2021	----	----	----		17-Feb-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag RG_ERCK_PERI-02_2021-12-15	E144-H	14-Dec-2021	----	----	----		17-Feb-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag RG_ERCKDT_PERI-02_2021-12-15	E144-H	15-Dec-2021	----	----	----		17-Feb-2022	----	----	

Matrix: **Biota**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag RG_ERCKDT_PERI-03_2021-12-15	E144-H	15-Dec-2021	----	----	----		17-Feb-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag RG_ERCKDT_PERI-04_2021-12-15	E144-H	15-Dec-2021	----	----	----		17-Feb-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag RG_ERCKUT_BRYO-02_2021-12-15	E144-H	15-Dec-2021	----	----	----		17-Feb-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag RG_ERCKUT_PERI-02_2021-12-15	E144-H	15-Dec-2021	----	----	----		17-Feb-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag RG_ERCKUT_PERI-03_2021-12-15	E144-H	15-Dec-2021	----	----	----		17-Feb-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag EV_EC_FLOW2_BRYO-01_2021-12-15	E144	15-Dec-2021	----	----	----		17-Feb-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag EV_EC_FLOW2_BRYO-02_2021-12-15	E144	15-Dec-2021	----	----	----		17-Feb-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag EV_EC_FLOW2_BRYO-03_2021-12-15	E144	15-Dec-2021	----	----	----		17-Feb-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag EV_EC_FLOW2_BRYO-04_2021-12-15	E144	15-Dec-2021	----	----	----		17-Feb-2022	----	----	

Matrix: **Biota**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag EV_EC_FLOW2_BRYO-05_2021-12-15	E144	15-Dec-2021	----	----	----		17-Feb-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag RG_ERCKDT_BRYO-01_2021-12-15	E144	15-Dec-2021	----	----	----		17-Feb-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag RG_ERCKDT_BRYO-02_2021-12-15	E144	15-Dec-2021	----	----	----		17-Feb-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag RG_ERCKDT_BRYO-03_2021-12-15	E144	15-Dec-2021	----	----	----		17-Feb-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag RG_ERCKDT_BRYO-04_2021-12-15	E144	15-Dec-2021	----	----	----		17-Feb-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag RG_ERCKUT_BRYO-01_2021-12-15	E144	15-Dec-2021	----	----	----		17-Feb-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag RG_ERCKUT_BRYO-03_2021-12-15	E144	15-Dec-2021	----	----	----		17-Feb-2022	----	----	

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

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

Matrix: **Biota**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Metals in Biota by CRC ICPMS (DRY units, Micro)	E472	419710	1	8	12.5	5.0	✓
Metals in Biota by CRC ICPMS (DRY units, Routine)	E440	419708	1	11	9.0	5.0	✓
Metals in Biota by CRC ICPMS (WET units, Micro)	E472A	401542	1	8	12.5	5.0	✓
Metals in Biota by CRC ICPMS (WET units, Routine)	E440A	401732	1	11	9.0	5.0	✓
Moisture Content by Gravimetry	E144	412812	1	11	9.0	5.0	✓
Moisture Content by Gravimetry (Micro)	E144-H	412843	1	8	12.5	5.0	✓
Titanium in Biota by CRC ICPMS (DRY units, Micro)	E472.Ti	419711	1	8	12.5	5.0	✓
Titanium in Biota by CRC ICPMS (DRY units, Routine)	E440.Ti	419709	1	11	9.0	5.0	✓
Titanium in Biota by CRC ICPMS (WET units, Micro)	E472A.Ti	401543	1	8	12.5	5.0	✓
Titanium in Biota by CRC ICPMS (WET units, Routine)	E440A.Ti	401731	1	11	9.0	5.0	✓
Laboratory Control Samples (LCS)							
Metals in Biota by CRC ICPMS (DRY units, Micro)	E472	419710	2	8	25.0	10.0	✓
Metals in Biota by CRC ICPMS (DRY units, Routine)	E440	419708	2	11	18.1	10.0	✓
Metals in Biota by CRC ICPMS (WET units, Micro)	E472A	401542	2	8	25.0	10.0	✓
Metals in Biota by CRC ICPMS (WET units, Routine)	E440A	401732	2	11	18.1	10.0	✓
Moisture Content by Gravimetry	E144	412812	1	11	9.0	5.0	✓
Moisture Content by Gravimetry (Micro)	E144-H	412843	1	8	12.5	5.0	✓
Titanium in Biota by CRC ICPMS (DRY units, Micro)	E472.Ti	419711	1	8	12.5	10.0	✓
Titanium in Biota by CRC ICPMS (DRY units, Routine)	E440.Ti	419709	1	11	9.0	10.0	×
Titanium in Biota by CRC ICPMS (WET units, Micro)	E472A.Ti	401543	1	8	12.5	10.0	✓
Titanium in Biota by CRC ICPMS (WET units, Routine)	E440A.Ti	401731	1	11	9.0	10.0	×
Method Blanks (MB)							
Metals in Biota by CRC ICPMS (DRY units, Micro)	E472	419710	1	8	12.5	5.0	✓
Metals in Biota by CRC ICPMS (DRY units, Routine)	E440	419708	1	11	9.0	5.0	✓
Metals in Biota by CRC ICPMS (WET units, Micro)	E472A	401542	1	8	12.5	5.0	✓
Metals in Biota by CRC ICPMS (WET units, Routine)	E440A	401732	1	11	9.0	5.0	✓
Moisture Content by Gravimetry	E144	412812	1	11	9.0	5.0	✓
Moisture Content by Gravimetry (Micro)	E144-H	412843	1	8	12.5	5.0	✓
Titanium in Biota by CRC ICPMS (DRY units, Micro)	E472.Ti	419711	1	8	12.5	5.0	✓
Titanium in Biota by CRC ICPMS (DRY units, Routine)	E440.Ti	419709	1	11	9.0	5.0	✓
Titanium in Biota by CRC ICPMS (WET units, Micro)	E472A.Ti	401543	1	8	12.5	5.0	✓
Titanium in Biota by CRC ICPMS (WET units, Routine)	E440A.Ti	401731	1	11	9.0	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Moisture Content by Gravimetry	E144 Vancouver - Environmental	Biota	Puget Sound Water Quality Authority/CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Moisture Content by Gravimetry (Micro)	E144-H Vancouver - Environmental	Biota	Puget Sound Water Quality Authority/BC MOE Lab Manual	Moisture is measured gravimetrically by drying the sample at <60°C for a minimum of 3 days to constant weight. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of soil, expressed as a percentage.
Metals in Biota by CRC ICPMS (DRY units, Routine)	E440 Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Tissue samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Titanium in Biota by CRC ICPMS (DRY units, Routine)	E440.Ti Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Tissue samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Metals in Biota by CRC ICPMS (WET units, Routine)	E440A Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Tissue samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Titanium in Biota by CRC ICPMS (WET units, Routine)	E440A.Ti Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Tissue samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Metals in Biota by CRC ICPMS (DRY units, Micro)	E472 Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Tissue samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Titanium in Biota by CRC ICPMS (DRY units, Micro)	E472.Ti Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Tissue samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Metals in Biota by CRC ICPMS (WET units, Micro)	E472A Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Tissue samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Titanium in Biota by CRC ICPMS (WET units, Micro)	E472A.Ti Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Tissue samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by High Resolution ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Metals and Mercury Biota Digestion	EP440 Vancouver - Environmental	Biota	EPA 200.3	This method uses a heated strong acid digestion with HNO3, HCl, and H2O2 and is intended to provide a conservative estimate of bio-available metals.
Metals and Mercury Biota Digestion (Micro)	EP472 Vancouver - Environmental	Biota	EPA 200.3	This method, designed for small sample amounts, uses a heated strong acid digestion with HNO3, HCl, and H2O2 and is intended to provide a conservative estimate of bio-available metals.

QUALITY CONTROL REPORT

Work Order	: **CG2106913**	Page	: 1 of 21
Amendment	: **1**		
Client	: Teck Coal Limited	Laboratory	: Calgary - Environmental
Contact	: Mike Pope	Account Manager	: Lyudmyla Shvets
Address	: 421 Pine Avenue Sparwood BC Canada	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: REGIONAL EFFECTS PROGRAM	Date Samples Received	: 17-Dec-2021 08:45
PO	: VPO00748510	Date Analysis Commenced	: 07-Feb-2022
C-O-C number	: December EVO LAEMP 2021	Issue Date	: 28-Feb-2022 17:29
Sampler	: Tyler Mehler		
Site	: ----		
Quote number	: Teck Coal Master Quote		
No. of samples received	: 19		
No. of samples analysed	: 19		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Salimah Khimani	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

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

Key :

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

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

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percentage Difference

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Biota**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 412812)											
CG2106913-017	RG_ERCKUT_BRYO-03_2021-12-15	moisture	----	E144	0.50	%	78.1	78.0	0.128%	20%	----
Physical Tests (QC Lot: 412843)											
CG2106913-016	RG_ERCKUT_BRYO-02_2021-12-15	moisture	----	E144-H	2.0	%	71.8	71.7	0.0861%	20%	----
Metals (QC Lot: 401542)											
CG2106913-016	RG_ERCKUT_BRYO-02_2021-12-15	aluminum	7429-90-5	E472A	1.0	mg/kg wwt	1130	1100	2.20%	40%	----
		antimony	7440-36-0	E472A	0.0020	mg/kg wwt	0.129	0.178	31.9%	40%	----
		arsenic	7440-38-2	E472A	0.0060	mg/kg wwt	0.829	0.959	14.5%	40%	----
		barium	7440-39-3	E472A	0.010	mg/kg wwt	36.5	38.2	4.49%	40%	----
		beryllium	7440-41-7	E472A	0.0020	mg/kg wwt	0.139	0.116	18.3%	40%	----
		bismuth	7440-69-9	E472A	0.0020	mg/kg wwt	0.0201	0.0194	3.44%	40%	----
		boron	7440-42-8	E472A	0.20	mg/kg wwt	5.48	5.40	1.47%	40%	----
		cadmium	7440-43-9	E472A	0.0020	mg/kg wwt	0.915	0.864	5.70%	40%	----
		calcium	7440-70-2	E472A	4.0	mg/kg wwt	14200	15200	6.43%	60%	----
		cesium	7440-46-2	E472A	0.0010	mg/kg wwt	0.342	0.275	21.4%	40%	----
		chromium	7440-47-3	E472A	0.040	mg/kg wwt	3.03	3.47	13.4%	40%	----
		cobalt	7440-48-4	E472A	0.0040	mg/kg wwt	0.808	0.796	1.47%	40%	----
		copper	7440-50-8	E472A	0.040	mg/kg wwt	3.61	3.05	16.8%	40%	----
		iron	7439-89-6	E472A	1.0	mg/kg wwt	2630	2270	14.7%	40%	----
		lead	7439-92-1	E472A	0.010	mg/kg wwt	1.44	1.25	13.8%	40%	----
		lithium	7439-93-2	E472A	0.10	mg/kg wwt	1.11	1.12	1.09%	40%	----
		magnesium	7439-95-4	E472A	0.40	mg/kg wwt	1120	1950	54.2%	40%	DUP-H
		manganese	7439-96-5	E472A	0.010	mg/kg wwt	30.1	36.7	19.7%	40%	----
		molybdenum	7439-98-7	E472A	0.0080	mg/kg wwt	0.339	0.325	4.30%	40%	----
		nickel	7440-02-0	E472A	0.040	mg/kg wwt	4.79	4.78	0.0394%	40%	----
		phosphorus	7723-14-0	E472A	2.0	mg/kg wwt	893	904	1.23%	40%	----
		potassium	7440-09-7	E472A	4.0	mg/kg wwt	1110	1030	7.66%	40%	----
		rubidium	7440-17-7	E472A	0.010	mg/kg wwt	3.02	2.53	17.7%	40%	----
		selenium	7782-49-2	E472A	0.020	mg/kg wwt	1.63	1.58	2.84%	40%	----
		sodium	7440-23-5	E472A	4.0	mg/kg wwt	73.8	72.4	1.93%	40%	----
		strontium	7440-24-6	E472A	0.020	mg/kg wwt	13.5	14.2	5.00%	60%	----

Sub-Matrix: **Biota**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Metals (QC Lot: 401542) - continued											
CG2106913-016	RG_ERCKUT_BRYO-02_2021-12-15	tellurium	13494-80-9	E472A	0.0040	mg/kg wwt	0.0071	# 0.0155	0.0084	Diff <2x LOR	DUP-H
		thallium	7440-28-0	E472A	0.00040	mg/kg wwt	0.0423	0.0480	12.7%	40%	----
		tin	7440-31-5	E472A	0.020	mg/kg wwt	<0.020	0.029	0.009	Diff <2x LOR	----
		uranium	7440-61-1	E472A	0.00040	mg/kg wwt	0.488	0.451	7.96%	40%	----
		vanadium	7440-62-2	E472A	0.020	mg/kg wwt	7.00	5.48	24.3%	40%	----
		zinc	7440-66-6	E472A	0.20	mg/kg wwt	26.6	22.7	15.7%	40%	----
		zirconium	7440-67-7	E472A	0.040	mg/kg wwt	0.262	0.266	1.80%	40%	----
Metals (QC Lot: 401543)											
CG2106913-016	RG_ERCKUT_BRYO-02_2021-12-15	titanium	7440-32-6	E472A.Ti	0.10	mg/kg wwt	2.54	2.56	0.684%	40%	----
Metals (QC Lot: 401731)											
CG2106913-012	EV_EC_FLOW2_BRYO-03_2021-12-15	titanium	7440-32-6	E440A.Ti	0.050	mg/kg wwt	1.17	1.22	3.62%	40%	----
Metals (QC Lot: 401732)											
CG2106913-012	EV_EC_FLOW2_BRYO-03_2021-12-15	aluminum	7429-90-5	E440A	0.40	mg/kg wwt	76.4	82.8	8.13%	40%	----
		antimony	7440-36-0	E440A	0.0020	mg/kg wwt	0.0381	0.0401	5.11%	40%	----
		arsenic	7440-38-2	E440A	0.0040	mg/kg wwt	1.28	1.21	5.72%	40%	----
		barium	7440-39-3	E440A	0.010	mg/kg wwt	14.8	13.2	11.2%	40%	----
		beryllium	7440-41-7	E440A	0.0020	mg/kg wwt	0.0405	0.0393	3.00%	40%	----
		bismuth	7440-69-9	E440A	0.0020	mg/kg wwt	0.0023	0.0021	0.0002	Diff <2x LOR	----
		boron	7440-42-8	E440A	0.20	mg/kg wwt	6.40	6.59	2.90%	40%	----
		cadmium	7440-43-9	E440A	0.0010	mg/kg wwt	0.665	0.634	4.80%	40%	----
		calcium	7440-70-2	E440A	4.0	mg/kg wwt	13500	13200	2.62%	60%	----
		cesium	7440-46-2	E440A	0.0010	mg/kg wwt	0.0356	0.0352	1.14%	40%	----
		chromium	7440-47-3	E440A	0.010	mg/kg wwt	0.209	0.208	0.205%	40%	----
		cobalt	7440-48-4	E440A	0.0040	mg/kg wwt	16.5	15.6	5.84%	40%	----
		copper	7440-50-8	E440A	0.020	mg/kg wwt	0.876	0.848	3.28%	40%	----
		iron	7439-89-6	E440A	0.60	mg/kg wwt	2070	2030	1.90%	40%	----
		lead	7439-92-1	E440A	0.0040	mg/kg wwt	0.453	0.432	4.80%	40%	----
		lithium	7439-93-2	E440A	0.10	mg/kg wwt	0.42	0.41	0.007	Diff <2x LOR	----
		magnesium	7439-95-4	E440A	0.40	mg/kg wwt	694	668	3.73%	40%	----
		manganese	7439-96-5	E440A	0.010	mg/kg wwt	678	644	5.22%	40%	----
		molybdenum	7439-98-7	E440A	0.0040	mg/kg wwt	0.914	0.855	6.69%	40%	----
		nickel	7440-02-0	E440A	0.040	mg/kg wwt	16.0	15.2	5.37%	40%	----
		phosphorus	7723-14-0	E440A	2.0	mg/kg wwt	338	330	2.27%	40%	----
		potassium	7440-09-7	E440A	4.0	mg/kg wwt	743	726	2.32%	40%	----

Sub-Matrix: **Biota**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Metals (QC Lot: 401732) - continued											
CG2106913-012	EV_EC_FLOW2_BRYO-03 _2021-12-15	rubidium	7440-17-7	E440A	0.010	mg/kg wwt	0.580	0.583	0.602%	40%	----
		selenium	7782-49-2	E440A	0.010	mg/kg wwt	2.22	2.16	2.60%	40%	----
		sodium	7440-23-5	E440A	4.0	mg/kg wwt	56.9	54.5	4.30%	40%	----
		strontium	7440-24-6	E440A	0.010	mg/kg wwt	9.32	9.13	2.01%	60%	----
		tellurium	13494-80-9	E440A	0.0040	mg/kg wwt	<0.0040	<0.0040	0	Diff <2x LOR	----
		thallium	7440-28-0	E440A	0.00040	mg/kg wwt	0.0368	0.0354	3.79%	40%	----
		tin	7440-31-5	E440A	0.020	mg/kg wwt	<0.020	<0.020	0	Diff <2x LOR	----
		uranium	7440-61-1	E440A	0.00040	mg/kg wwt	0.177	0.169	5.00%	40%	----
		vanadium	7440-62-2	E440A	0.020	mg/kg wwt	0.691	0.663	4.23%	40%	----
		zinc	7440-66-6	E440A	0.10	mg/kg wwt	52.3	48.2	7.98%	40%	----
		zirconium	7440-67-7	E440A	0.040	mg/kg wwt	0.141	0.130	0.011	Diff <2x LOR	----
Metals (QC Lot: 419708)											
CG2106913-012	EV_EC_FLOW2_BRYO-03 _2021-12-15	aluminum	7429-90-5	E440	2.0	mg/kg	700	759	8.13%	40%	----
		antimony	7440-36-0	E440	0.010	mg/kg	0.349	0.368	5.11%	40%	----
		arsenic	7440-38-2	E440	0.020	mg/kg	11.7	11.1	5.72%	40%	----
		barium	7440-39-3	E440	0.050	mg/kg	135	121	11.2%	40%	----
		beryllium	7440-41-7	E440	0.010	mg/kg	0.371	0.360	3.00%	40%	----
		bismuth	7440-69-9	E440	0.010	mg/kg	0.021	0.019	0.002	Diff <2x LOR	----
		boron	7440-42-8	E440	1.0	mg/kg	58.6	60.4	2.90%	40%	----
		cadmium	7440-43-9	E440	0.0050	mg/kg	6.10	5.81	4.80%	40%	----
		calcium	7440-70-2	E440	20	mg/kg	124000	120000	2.62%	60%	----
		cesium	7440-46-2	E440	0.0050	mg/kg	0.326	0.323	1.14%	40%	----
		chromium	7440-47-3	E440	0.050	mg/kg	1.91	1.91	0.205%	40%	----
		cobalt	7440-48-4	E440	0.020	mg/kg	152	143	5.84%	40%	----
		copper	7440-50-8	E440	0.10	mg/kg	8.03	7.77	3.28%	40%	----
		iron	7439-89-6	E440	3.0	mg/kg	18900	18600	1.90%	40%	----
		lead	7439-92-1	E440	0.020	mg/kg	4.15	3.96	4.80%	40%	----
		lithium	7439-93-2	E440	0.50	mg/kg	3.86	3.79	1.78%	40%	----
		magnesium	7439-95-4	E440	2.0	mg/kg	6360	6120	3.73%	40%	----
		manganese	7439-96-5	E440	0.050	mg/kg	6220	5900	5.22%	40%	----
		molybdenum	7439-98-7	E440	0.020	mg/kg	8.38	7.83	6.69%	40%	----
		nickel	7440-02-0	E440	0.20	mg/kg	147	139	5.37%	40%	----
		phosphorus	7723-14-0	E440	10	mg/kg	3100	3030	2.27%	40%	----
		potassium	7440-09-7	E440	20	mg/kg	6810	6650	2.32%	40%	----
		rubidium	7440-17-7	E440	0.050	mg/kg	5.31	5.34	0.602%	40%	----

Sub-Matrix: **Biota**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
					Laboratory Duplicate (DUP) Report						
Metals (QC Lot: 419708) - continued											
CG2106913-012	EV_EC_FLOW2_BRYO-03 _2021-12-15	selenium	7782-49-2	E440	0.050	mg/kg	20.4	19.8	2.60%	40%	----
		sodium	7440-23-5	E440	20	mg/kg	521	499	4.30%	40%	----
		strontium	7440-24-6	E440	0.050	mg/kg	85.4	83.7	2.01%	60%	----
		tellurium	13494-80-9	E440	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		thallium	7440-28-0	E440	0.0020	mg/kg	0.337	0.325	3.79%	40%	----
		tin	7440-31-5	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		uranium	7440-61-1	E440	0.0020	mg/kg	1.63	1.55	5.00%	40%	----
		vanadium	7440-62-2	E440	0.10	mg/kg	6.34	6.07	4.23%	40%	----
		zinc	7440-66-6	E440	0.50	mg/kg	479	442	7.98%	40%	----
		zirconium	7440-67-7	E440	0.20	mg/kg	1.29	1.19	7.99%	40%	----
Metals (QC Lot: 419709)											
CG2106913-012	EV_EC_FLOW2_BRYO-03 _2021-12-15	titanium	7440-32-6	E440.Ti	0.25	mg/kg	10.8	11.2	3.62%	40%	----
Metals (QC Lot: 419710)											
CG2106913-016	RG_ERCKUT_BRYO-02_2 021-12-15	aluminum	7429-90-5	E472	5.0	mg/kg	4000	3910	2.20%	40%	----
		antimony	7440-36-0	E472	0.010	mg/kg	0.456	0.630	31.9%	40%	----
		arsenic	7440-38-2	E472	0.030	mg/kg	2.94	3.40	14.5%	40%	----
		barium	7440-39-3	E472	0.050	mg/kg	129	135	4.49%	40%	----
		beryllium	7440-41-7	E472	0.010	mg/kg	0.493	0.410	18.3%	40%	----
		bismuth	7440-69-9	E472	0.010	mg/kg	0.071	0.069	3.44%	40%	----
		boron	7440-42-8	E472	1.0	mg/kg	19.4	19.2	1.47%	40%	----
		cadmium	7440-43-9	E472	0.010	mg/kg	3.24	3.06	5.70%	40%	----
		calcium	7440-70-2	E472	20	mg/kg	50500	53900	6.43%	60%	----
		cesium	7440-46-2	E472	0.0050	mg/kg	1.21	0.976	21.4%	40%	----
		chromium	7440-47-3	E472	0.20	mg/kg	10.8	12.3	13.4%	40%	----
		cobalt	7440-48-4	E472	0.020	mg/kg	2.86	2.82	1.47%	40%	----
		copper	7440-50-8	E472	0.20	mg/kg	12.8	10.8	16.8%	40%	----
		iron	7439-89-6	E472	5.0	mg/kg	9310	8040	14.7%	40%	----
		lead	7439-92-1	E472	0.050	mg/kg	5.09	4.43	13.8%	40%	----
		lithium	7439-93-2	E472	0.50	mg/kg	3.92	3.97	1.09%	40%	----
		magnesium	7439-95-4	E472	2.0	mg/kg	3970	6930	54.2%	40%	DUP-H
		manganese	7439-96-5	E472	0.050	mg/kg	107	130	19.7%	40%	----
		molybdenum	7439-98-7	E472	0.040	mg/kg	1.20	1.15	4.30%	40%	----
		nickel	7440-02-0	E472	0.20	mg/kg	17.0	17.0	0.0394%	40%	----
		phosphorus	7723-14-0	E472	10	mg/kg	3160	3200	1.23%	40%	----

Sub-Matrix: **Biota**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Metals (QC Lot: 419710) - continued											
CG2106913-016	RG_ERCKUT_BRYO-02_2021-12-15	potassium	7440-09-7	E472	20	mg/kg	3940	3650	7.66%	40%	----
		rubidium	7440-17-7	E472	0.050	mg/kg	10.7	8.95	17.7%	40%	----
		selenium	7782-49-2	E472	0.10	mg/kg	5.77	5.60	2.84%	40%	----
		sodium	7440-23-5	E472	20	mg/kg	262	257	1.93%	40%	----
		strontium	7440-24-6	E472	0.10	mg/kg	47.8	50.3	5.00%	60%	----
		tellurium	13494-80-9	E472	0.020	mg/kg	0.025	0.055	0.030	Diff <2x LOR	----
		thallium	7440-28-0	E472	0.0020	mg/kg	0.150	0.170	12.7%	40%	----
		tin	7440-31-5	E472	0.10	mg/kg	<0.10	0.10	0.003	Diff <2x LOR	----
		uranium	7440-61-1	E472	0.0020	mg/kg	1.73	1.60	7.96%	40%	----
		vanadium	7440-62-2	E472	0.10	mg/kg	24.8	19.4	24.3%	40%	----
		zinc	7440-66-6	E472	1.0	mg/kg	94.3	80.6	15.7%	40%	----
		zirconium	7440-67-7	E472	0.20	mg/kg	0.93	0.94	0.02	Diff <2x LOR	----
Metals (QC Lot: 419711)											
CG2106913-016	RG_ERCKUT_BRYO-02_2021-12-15	titanium	7440-32-6	E472.Ti	0.50	mg/kg	9.02	9.08	0.684%	40%	----

Qualifiers

Qualifier	*Description*
DUP-H	*Duplicate results outside ALS DQO, due to sample heterogeneity.*

Method Blank (MB) Report

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

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 412812)						
moisture	----	E144	0.5	%	<0.50	----
Physical Tests (QCLot: 412843)						
moisture	----	E144-H	2	%	<2.0	----
Metals (QCLot: 401542)						
aluminum	7429-90-5	E472A	1	mg/kg wwt	<1.0	----
antimony	7440-36-0	E472A	0.002	mg/kg wwt	<0.0020	----
arsenic	7440-38-2	E472A	0.006	mg/kg wwt	<0.0060	----
barium	7440-39-3	E472A	0.01	mg/kg wwt	<0.010	----
beryllium	7440-41-7	E472A	0.002	mg/kg wwt	<0.0020	----
bismuth	7440-69-9	E472A	0.002	mg/kg wwt	<0.0020	----
boron	7440-42-8	E472A	0.2	mg/kg wwt	<0.20	----
cadmium	7440-43-9	E472A	0.002	mg/kg wwt	<0.0020	----
calcium	7440-70-2	E472A	4	mg/kg wwt	<4.0	----
cesium	7440-46-2	E472A	0.001	mg/kg wwt	<0.0010	----
chromium	7440-47-3	E472A	0.04	mg/kg wwt	<0.040	----
cobalt	7440-48-4	E472A	0.004	mg/kg wwt	<0.0040	----
copper	7440-50-8	E472A	0.04	mg/kg wwt	<0.040	----
iron	7439-89-6	E472A	1	mg/kg wwt	<1.0	----
lead	7439-92-1	E472A	0.01	mg/kg wwt	<0.010	----
lithium	7439-93-2	E472A	0.1	mg/kg wwt	<0.10	----
magnesium	7439-95-4	E472A	0.4	mg/kg wwt	<0.40	----
manganese	7439-96-5	E472A	0.01	mg/kg wwt	<0.010	----
molybdenum	7439-98-7	E472A	0.008	mg/kg wwt	<0.0080	----
nickel	7440-02-0	E472A	0.04	mg/kg wwt	<0.040	----
phosphorus	7723-14-0	E472A	2	mg/kg wwt	<2.0	----
potassium	7440-09-7	E472A	4	mg/kg wwt	<4.0	----
rubidium	7440-17-7	E472A	0.01	mg/kg wwt	<0.010	----
selenium	7782-49-2	E472A	0.02	mg/kg wwt	<0.020	----
sodium	7440-23-5	E472A	4	mg/kg wwt	<4.0	----
strontium	7440-24-6	E472A	0.02	mg/kg wwt	<0.020	----
tellurium	13494-80-9	E472A	0.004	mg/kg wwt	<0.0040	----
thallium	7440-28-0	E472A	0.0004	mg/kg wwt	<0.00040	----
tin	7440-31-5	E472A	0.02	mg/kg wwt	<0.020	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 401542) - continued						
uranium	7440-61-1	E472A	0.0004	mg/kg wwt	<0.00040	----
vanadium	7440-62-2	E472A	0.02	mg/kg wwt	<0.020	----
zinc	7440-66-6	E472A	0.2	mg/kg wwt	<0.20	----
zirconium	7440-67-7	E472A	0.04	mg/kg wwt	<0.040	----
Metals (QCLot: 401543)						
titanium	7440-32-6	E472A.Ti	0.1	mg/kg wwt	<0.10	----
Metals (QCLot: 401731)						
titanium	7440-32-6	E440A.Ti	0.05	mg/kg wwt	<0.050	----
Metals (QCLot: 401732)						
aluminum	7429-90-5	E440A	0.4	mg/kg wwt	<0.40	----
antimony	7440-36-0	E440A	0.002	mg/kg wwt	<0.0020	----
arsenic	7440-38-2	E440A	0.004	mg/kg wwt	<0.0040	----
barium	7440-39-3	E440A	0.01	mg/kg wwt	<0.010	----
beryllium	7440-41-7	E440A	0.002	mg/kg wwt	<0.0020	----
bismuth	7440-69-9	E440A	0.002	mg/kg wwt	<0.0020	----
boron	7440-42-8	E440A	0.2	mg/kg wwt	<0.20	----
cadmium	7440-43-9	E440A	0.001	mg/kg wwt	<0.0010	----
calcium	7440-70-2	E440A	4	mg/kg wwt	<4.0	----
cesium	7440-46-2	E440A	0.001	mg/kg wwt	<0.0010	----
chromium	7440-47-3	E440A	0.01	mg/kg wwt	<0.010	----
cobalt	7440-48-4	E440A	0.004	mg/kg wwt	<0.0040	----
copper	7440-50-8	E440A	0.02	mg/kg wwt	<0.020	----
iron	7439-89-6	E440A	0.6	mg/kg wwt	<0.60	----
lead	7439-92-1	E440A	0.004	mg/kg wwt	<0.0040	----
lithium	7439-93-2	E440A	0.1	mg/kg wwt	<0.10	----
magnesium	7439-95-4	E440A	0.4	mg/kg wwt	<0.40	----
manganese	7439-96-5	E440A	0.01	mg/kg wwt	<0.010	----
molybdenum	7439-98-7	E440A	0.004	mg/kg wwt	<0.0040	----
nickel	7440-02-0	E440A	0.04	mg/kg wwt	<0.040	----
phosphorus	7723-14-0	E440A	2	mg/kg wwt	<2.0	----
potassium	7440-09-7	E440A	4	mg/kg wwt	<4.0	----
rubidium	7440-17-7	E440A	0.01	mg/kg wwt	<0.010	----
selenium	7782-49-2	E440A	0.01	mg/kg wwt	<0.010	----
sodium	7440-23-5	E440A	4	mg/kg wwt	<4.0	----
strontium	7440-24-6	E440A	0.01	mg/kg wwt	<0.010	----
tellurium	13494-80-9	E440A	0.004	mg/kg wwt	<0.0040	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 401732) - continued						
thallium	7440-28-0	E440A	0.0004	mg/kg wwt	<0.00040	----
tin	7440-31-5	E440A	0.02	mg/kg wwt	<0.020	----
uranium	7440-61-1	E440A	0.0004	mg/kg wwt	<0.00040	----
vanadium	7440-62-2	E440A	0.02	mg/kg wwt	<0.020	----
zinc	7440-66-6	E440A	0.1	mg/kg wwt	<0.10	----
zirconium	7440-67-7	E440A	0.04	mg/kg wwt	<0.040	----
Metals (QCLot: 419708)						
aluminum	7429-90-5	E440	2	mg/kg	<2.0	----
antimony	7440-36-0	E440	0.01	mg/kg	<0.010	----
arsenic	7440-38-2	E440	0.02	mg/kg	<0.020	----
barium	7440-39-3	E440	0.05	mg/kg	<0.050	----
beryllium	7440-41-7	E440	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E440	0.01	mg/kg	<0.010	----
boron	7440-42-8	E440	1	mg/kg	<1.0	----
cadmium	7440-43-9	E440	0.005	mg/kg	<0.0050	----
calcium	7440-70-2	E440	20	mg/kg	<20	----
cesium	7440-46-2	E440	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E440	0.05	mg/kg	<0.050	----
cobalt	7440-48-4	E440	0.02	mg/kg	<0.020	----
copper	7440-50-8	E440	0.1	mg/kg	<0.10	----
iron	7439-89-6	E440	3	mg/kg	<3.0	----
lead	7439-92-1	E440	0.02	mg/kg	<0.020	----
lithium	7439-93-2	E440	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E440	2	mg/kg	<2.0	----
manganese	7439-96-5	E440	0.05	mg/kg	<0.050	----
molybdenum	7439-98-7	E440	0.02	mg/kg	<0.020	----
nickel	7440-02-0	E440	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E440	10	mg/kg	<10	----
potassium	7440-09-7	E440	20	mg/kg	<20	----
rubidium	7440-17-7	E440	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E440	0.05	mg/kg	<0.050	----
sodium	7440-23-5	E440	20	mg/kg	<20	----
strontium	7440-24-6	E440	0.05	mg/kg	<0.050	----
tellurium	13494-80-9	E440	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E440	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E440	0.1	mg/kg	<0.10	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 419708) - continued						
uranium	7440-61-1	E440	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E440	0.1	mg/kg	<0.10	----
zinc	7440-66-6	E440	0.5	mg/kg	<0.50	----
zirconium	7440-67-7	E440	0.2	mg/kg	<0.20	----
Metals (QCLot: 419709)						
titanium	7440-32-6	E440.Ti	0.25	mg/kg	<0.25	----
Metals (QCLot: 419710)						
aluminum	7429-90-5	E472	5	mg/kg	<5.0	----
antimony	7440-36-0	E472	0.01	mg/kg	<0.010	----
arsenic	7440-38-2	E472	0.03	mg/kg	<0.030	----
barium	7440-39-3	E472	0.05	mg/kg	<0.050	----
beryllium	7440-41-7	E472	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E472	0.01	mg/kg	<0.010	----
boron	7440-42-8	E472	1	mg/kg	<1.0	----
cadmium	7440-43-9	E472	0.01	mg/kg	<0.010	----
calcium	7440-70-2	E472	20	mg/kg	<20	----
cesium	7440-46-2	E472	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E472	0.2	mg/kg	<0.20	----
cobalt	7440-48-4	E472	0.02	mg/kg	<0.020	----
copper	7440-50-8	E472	0.2	mg/kg	<0.20	----
iron	7439-89-6	E472	5	mg/kg	<5.0	----
lead	7439-92-1	E472	0.05	mg/kg	<0.050	----
lithium	7439-93-2	E472	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E472	2	mg/kg	<2.0	----
manganese	7439-96-5	E472	0.05	mg/kg	<0.050	----
molybdenum	7439-98-7	E472	0.04	mg/kg	<0.040	----
nickel	7440-02-0	E472	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E472	10	mg/kg	<10	----
potassium	7440-09-7	E472	20	mg/kg	<20	----
rubidium	7440-17-7	E472	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E472	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E472	20	mg/kg	<20	----
strontium	7440-24-6	E472	0.1	mg/kg	<0.10	----
tellurium	13494-80-9	E472	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E472	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E472	0.1	mg/kg	<0.10	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 419710) - continued						
uranium	7440-61-1	E472	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E472	0.1	mg/kg	<0.10	----
zinc	7440-66-6	E472	1	mg/kg	<1.0	----
zirconium	7440-67-7	E472	0.2	mg/kg	<0.20	----
Metals (QCLot: 419711)						
titanium	7440-32-6	E472.Ti	0.5	mg/kg	<0.50	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Physical Tests (QCLot: 412812)									
moisture	----	E144	0.5	%	50 %	100	90.0	110	----
Physical Tests (QCLot: 412843)									
moisture	----	E144-H	2	%	100 %	100	90.0	110	----
Metals (QCLot: 401542)									
aluminum	7429-90-5	E472A	1	mg/kg wwt	20 mg/kg wwt	106	80.0	120	----
antimony	7440-36-0	E472A	0.002	mg/kg wwt	10 mg/kg wwt	102	80.0	120	----
arsenic	7440-38-2	E472A	0.006	mg/kg wwt	10 mg/kg wwt	102	80.0	120	----
barium	7440-39-3	E472A	0.01	mg/kg wwt	2.5 mg/kg wwt	101	80.0	120	----
beryllium	7440-41-7	E472A	0.002	mg/kg wwt	1 mg/kg wwt	103	80.0	120	----
bismuth	7440-69-9	E472A	0.002	mg/kg wwt	10 mg/kg wwt	100	80.0	120	----
boron	7440-42-8	E472A	0.2	mg/kg wwt	10 mg/kg wwt	95.3	80.0	120	----
cadmium	7440-43-9	E472A	0.002	mg/kg wwt	1 mg/kg wwt	99.9	80.0	120	----
calcium	7440-70-2	E472A	4	mg/kg wwt	500 mg/kg wwt	96.9	80.0	120	----
cesium	7440-46-2	E472A	0.001	mg/kg wwt	0.5 mg/kg wwt	106	80.0	120	----
chromium	7440-47-3	E472A	0.04	mg/kg wwt	2.5 mg/kg wwt	104	80.0	120	----
cobalt	7440-48-4	E472A	0.004	mg/kg wwt	2.5 mg/kg wwt	103	80.0	120	----
copper	7440-50-8	E472A	0.04	mg/kg wwt	2.5 mg/kg wwt	101	80.0	120	----
iron	7439-89-6	E472A	1	mg/kg wwt	10 mg/kg wwt	102	80.0	120	----
lead	7439-92-1	E472A	0.01	mg/kg wwt	5 mg/kg wwt	101	80.0	120	----
lithium	7439-93-2	E472A	0.1	mg/kg wwt	2.5 mg/kg wwt	102	80.0	120	----
magnesium	7439-95-4	E472A	0.4	mg/kg wwt	500 mg/kg wwt	101	80.0	120	----
manganese	7439-96-5	E472A	0.01	mg/kg wwt	2.5 mg/kg wwt	106	80.0	120	----
molybdenum	7439-98-7	E472A	0.008	mg/kg wwt	2.5 mg/kg wwt	109	80.0	120	----
nickel	7440-02-0	E472A	0.04	mg/kg wwt	5 mg/kg wwt	100	80.0	120	----
phosphorus	7723-14-0	E472A	2	mg/kg wwt	100 mg/kg wwt	110	80.0	120	----
potassium	7440-09-7	E472A	4	mg/kg wwt	500 mg/kg wwt	103	80.0	120	----
rubidium	7440-17-7	E472A	0.01	mg/kg wwt	1 mg/kg wwt	108	80.0	120	----
selenium	7782-49-2	E472A	0.02	mg/kg wwt	10 mg/kg wwt	92.4	80.0	120	----
sodium	7440-23-5	E472A	4	mg/kg wwt	500 mg/kg wwt	110	80.0	120	----
strontium	7440-24-6	E472A	0.02	mg/kg wwt	2.5 mg/kg wwt	105	80.0	120	----
tellurium	13494-80-9	E472A	0.004	mg/kg wwt	1 mg/kg wwt	99.6	80.0	120	----
thallium	7440-28-0	E472A	0.0004	mg/kg wwt	10 mg/kg wwt	99.2	80.0	120	----
tin	7440-31-5	E472A	0.02	mg/kg wwt	5 mg/kg wwt	103	80.0	120	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Metals (QCLot: 401542) - continued									
uranium	7440-61-1	E472A	0.0004	mg/kg wwt	0.05 mg/kg wwt	102	80.0	120	----
vanadium	7440-62-2	E472A	0.02	mg/kg wwt	5 mg/kg wwt	107	80.0	120	----
zinc	7440-66-6	E472A	0.2	mg/kg wwt	5 mg/kg wwt	98.2	80.0	120	----
zirconium	7440-67-7	E472A	0.04	mg/kg wwt	1 mg/kg wwt	104	80.0	120	----
Metals (QCLot: 401543)									
titanium	7440-32-6	E472A.Ti	0.1	mg/kg wwt	2.5 mg/kg wwt	103	80.0	120	----
Metals (QCLot: 401731)									
titanium	7440-32-6	E440A.Ti	0.05	mg/kg wwt	2.5 mg/kg wwt	107	80.0	120	----
Metals (QCLot: 401732)									
aluminum	7429-90-5	E440A	0.4	mg/kg wwt	20 mg/kg wwt	103	80.0	120	----
antimony	7440-36-0	E440A	0.002	mg/kg wwt	10 mg/kg wwt	110	80.0	120	----
arsenic	7440-38-2	E440A	0.004	mg/kg wwt	10 mg/kg wwt	104	80.0	120	----
barium	7440-39-3	E440A	0.01	mg/kg wwt	2.5 mg/kg wwt	101	80.0	120	----
beryllium	7440-41-7	E440A	0.002	mg/kg wwt	1 mg/kg wwt	100	80.0	120	----
bismuth	7440-69-9	E440A	0.002	mg/kg wwt	10 mg/kg wwt	100	80.0	120	----
boron	7440-42-8	E440A	0.2	mg/kg wwt	10 mg/kg wwt	94.9	80.0	120	----
cadmium	7440-43-9	E440A	0.001	mg/kg wwt	1 mg/kg wwt	104	80.0	120	----
calcium	7440-70-2	E440A	4	mg/kg wwt	500 mg/kg wwt	102	80.0	120	----
cesium	7440-46-2	E440A	0.001	mg/kg wwt	0.5 mg/kg wwt	110	80.0	120	----
chromium	7440-47-3	E440A	0.01	mg/kg wwt	2.5 mg/kg wwt	103	80.0	120	----
cobalt	7440-48-4	E440A	0.004	mg/kg wwt	2.5 mg/kg wwt	102	80.0	120	----
copper	7440-50-8	E440A	0.02	mg/kg wwt	2.5 mg/kg wwt	102	80.0	120	----
iron	7439-89-6	E440A	0.6	mg/kg wwt	10 mg/kg wwt	104	80.0	120	----
lead	7439-92-1	E440A	0.004	mg/kg wwt	5 mg/kg wwt	103	80.0	120	----
lithium	7439-93-2	E440A	0.1	mg/kg wwt	2.5 mg/kg wwt	100	80.0	120	----
magnesium	7439-95-4	E440A	0.4	mg/kg wwt	500 mg/kg wwt	107	80.0	120	----
manganese	7439-96-5	E440A	0.01	mg/kg wwt	2.5 mg/kg wwt	104	80.0	120	----
molybdenum	7439-98-7	E440A	0.004	mg/kg wwt	2.5 mg/kg wwt	110	80.0	120	----
nickel	7440-02-0	E440A	0.04	mg/kg wwt	5 mg/kg wwt	101	80.0	120	----
phosphorus	7723-14-0	E440A	2	mg/kg wwt	100 mg/kg wwt	114	80.0	120	----
potassium	7440-09-7	E440A	4	mg/kg wwt	500 mg/kg wwt	104	80.0	120	----
rubidium	7440-17-7	E440A	0.01	mg/kg wwt	1 mg/kg wwt	108	80.0	120	----
selenium	7782-49-2	E440A	0.01	mg/kg wwt	10 mg/kg wwt	102	80.0	120	----
sodium	7440-23-5	E440A	4	mg/kg wwt	500 mg/kg wwt	111	80.0	120	----
strontium	7440-24-6	E440A	0.01	mg/kg wwt	2.5 mg/kg wwt	110	80.0	120	----
tellurium	13494-80-9	E440A	0.004	mg/kg wwt	1 mg/kg wwt	106	80.0	120	----
thallium	7440-28-0	E440A	0.0004	mg/kg wwt	10 mg/kg wwt	103	80.0	120	----

Sub-Matrix: **Biota**

Laboratory Control Sample (LCS) Report

Analyte	CAS Number	Method	LOR	Unit	Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Metals (QCLot: 401732) - continued									
tin	7440-31-5	E440A	0.02	mg/kg wwt	5 mg/kg wwt	107	80.0	120	----
uranium	7440-61-1	E440A	0.0004	mg/kg wwt	0.05 mg/kg wwt	103	80.0	120	----
vanadium	7440-62-2	E440A	0.02	mg/kg wwt	5 mg/kg wwt	106	80.0	120	----
zinc	7440-66-6	E440A	0.1	mg/kg wwt	5 mg/kg wwt	99.1	80.0	120	----
zirconium	7440-67-7	E440A	0.04	mg/kg wwt	1 mg/kg wwt	103	80.0	120	----
Metals (QCLot: 419708)									
aluminum	7429-90-5	E440	2	mg/kg	20 mg/kg	103	80.0	120	----
antimony	7440-36-0	E440	0.01	mg/kg	10 mg/kg	110	80.0	120	----
arsenic	7440-38-2	E440	0.02	mg/kg	10 mg/kg	104	80.0	120	----
barium	7440-39-3	E440	0.05	mg/kg	2.5 mg/kg	101	80.0	120	----
beryllium	7440-41-7	E440	0.01	mg/kg	1 mg/kg	100	80.0	120	----
bismuth	7440-69-9	E440	0.01	mg/kg	10 mg/kg	100	80.0	120	----
boron	7440-42-8	E440	1	mg/kg	10 mg/kg	94.9	80.0	120	----
cadmium	7440-43-9	E440	0.005	mg/kg	1 mg/kg	104	80.0	120	----
calcium	7440-70-2	E440	20	mg/kg	500 mg/kg	102	80.0	120	----
cesium	7440-46-2	E440	0.005	mg/kg	0.5 mg/kg	110	80.0	120	----
chromium	7440-47-3	E440	0.05	mg/kg	2.5 mg/kg	103	80.0	120	----
cobalt	7440-48-4	E440	0.02	mg/kg	2.5 mg/kg	102	80.0	120	----
copper	7440-50-8	E440	0.1	mg/kg	2.5 mg/kg	102	80.0	120	----
iron	7439-89-6	E440	3	mg/kg	10 mg/kg	104	80.0	120	----
lead	7439-92-1	E440	0.02	mg/kg	5 mg/kg	103	80.0	120	----
lithium	7439-93-2	E440	0.5	mg/kg	2.5 mg/kg	100	80.0	120	----
magnesium	7439-95-4	E440	2	mg/kg	500 mg/kg	107	80.0	120	----
manganese	7439-96-5	E440	0.05	mg/kg	2.5 mg/kg	104	80.0	120	----
molybdenum	7439-98-7	E440	0.02	mg/kg	2.5 mg/kg	110	80.0	120	----
nickel	7440-02-0	E440	0.2	mg/kg	5 mg/kg	101	80.0	120	----
phosphorus	7723-14-0	E440	10	mg/kg	100 mg/kg	114	80.0	120	----
potassium	7440-09-7	E440	20	mg/kg	500 mg/kg	104	80.0	120	----
rubidium	7440-17-7	E440	0.05	mg/kg	1 mg/kg	108	80.0	120	----
selenium	7782-49-2	E440	0.05	mg/kg	10 mg/kg	102	80.0	120	----
sodium	7440-23-5	E440	20	mg/kg	500 mg/kg	111	80.0	120	----
strontium	7440-24-6	E440	0.05	mg/kg	2.5 mg/kg	110	80.0	120	----
tellurium	13494-80-9	E440	0.02	mg/kg	1 mg/kg	106	80.0	120	----
thallium	7440-28-0	E440	0.002	mg/kg	10 mg/kg	103	80.0	120	----
tin	7440-31-5	E440	0.1	mg/kg	5 mg/kg	107	80.0	120	----
uranium	7440-61-1	E440	0.002	mg/kg	0.05 mg/kg	103	80.0	120	----
vanadium	7440-62-2	E440	0.1	mg/kg	5 mg/kg	106	80.0	120	----

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 419708) - continued									
zinc	7440-66-6	E440	0.5	mg/kg	5 mg/kg	99.1	80.0	120	----
zirconium	7440-67-7	E440	0.2	mg/kg	1 mg/kg	103	80.0	120	----
Metals (QCLot: 419709)									
titanium	7440-32-6	E440.Ti	0.25	mg/kg	2.5 mg/kg	107	80.0	120	----
Metals (QCLot: 419710)									
aluminum	7429-90-5	E472	5	mg/kg	20 mg/kg	106	80.0	120	----
antimony	7440-36-0	E472	0.01	mg/kg	10 mg/kg	102	80.0	120	----
arsenic	7440-38-2	E472	0.03	mg/kg	10 mg/kg	102	80.0	120	----
barium	7440-39-3	E472	0.05	mg/kg	2.5 mg/kg	101	80.0	120	----
beryllium	7440-41-7	E472	0.01	mg/kg	1 mg/kg	103	80.0	120	----
bismuth	7440-69-9	E472	0.01	mg/kg	10 mg/kg	100	80.0	120	----
boron	7440-42-8	E472	1	mg/kg	10 mg/kg	95.3	80.0	120	----
cadmium	7440-43-9	E472	0.01	mg/kg	1 mg/kg	99.9	80.0	120	----
calcium	7440-70-2	E472	20	mg/kg	500 mg/kg	96.9	80.0	120	----
cesium	7440-46-2	E472	0.005	mg/kg	0.5 mg/kg	106	80.0	120	----
chromium	7440-47-3	E472	0.2	mg/kg	2.5 mg/kg	104	80.0	120	----
cobalt	7440-48-4	E472	0.02	mg/kg	2.5 mg/kg	103	80.0	120	----
copper	7440-50-8	E472	0.2	mg/kg	2.5 mg/kg	101	80.0	120	----
iron	7439-89-6	E472	5	mg/kg	10 mg/kg	102	80.0	120	----
lead	7439-92-1	E472	0.05	mg/kg	5 mg/kg	101	80.0	120	----
lithium	7439-93-2	E472	0.5	mg/kg	2.5 mg/kg	102	80.0	120	----
magnesium	7439-95-4	E472	2	mg/kg	500 mg/kg	101	80.0	120	----
manganese	7439-96-5	E472	0.05	mg/kg	2.5 mg/kg	106	80.0	120	----
molybdenum	7439-98-7	E472	0.04	mg/kg	2.5 mg/kg	109	80.0	120	----
nickel	7440-02-0	E472	0.2	mg/kg	5 mg/kg	100	80.0	120	----
phosphorus	7723-14-0	E472	10	mg/kg	100 mg/kg	110	80.0	120	----
potassium	7440-09-7	E472	20	mg/kg	500 mg/kg	103	80.0	120	----
rubidium	7440-17-7	E472	0.05	mg/kg	1 mg/kg	108	80.0	120	----
selenium	7782-49-2	E472	0.1	mg/kg	10 mg/kg	92.4	80.0	120	----
sodium	7440-23-5	E472	20	mg/kg	500 mg/kg	110	80.0	120	----
strontium	7440-24-6	E472	0.1	mg/kg	2.5 mg/kg	105	80.0	120	----
tellurium	13494-80-9	E472	0.02	mg/kg	1 mg/kg	99.6	80.0	120	----
thallium	7440-28-0	E472	0.002	mg/kg	10 mg/kg	99.2	80.0	120	----
tin	7440-31-5	E472	0.1	mg/kg	5 mg/kg	103	80.0	120	----
uranium	7440-61-1	E472	0.002	mg/kg	0.05 mg/kg	102	80.0	120	----
vanadium	7440-62-2	E472	0.1	mg/kg	5 mg/kg	107	80.0	120	----
zinc	7440-66-6	E472	1	mg/kg	5 mg/kg	98.2	80.0	120	----

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 419710) - continued									
zirconium	7440-67-7	E472	0.2	mg/kg	1 mg/kg	104	80.0	120	----
Metals (QCLot: 419711)									
titanium	7440-32-6	E472.Ti	0.5	mg/kg	2.5 mg/kg	103	80.0	120	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix: **Biota**

					Reference Material (RM) Report				
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	RM Target Concentration	Recovery (%) RM	Recovery Limits (%) Low	High	Qualifier
Metals (QCLot: 401542)									
QC-401542-003	RM	aluminum	7429-90-5	E472A	11.2 mg/kg wwt	98.1	70.0	130	----
QC-401542-003	RM	arsenic	7440-38-2	E472A	34.6 mg/kg wwt	104	70.0	130	----
QC-401542-003	RM	bismuth	7440-69-9	E472A	0.0247 mg/kg wwt	90.8	60.0	140	----
QC-401542-003	RM	cadmium	7440-43-9	E472A	14.5 mg/kg wwt	101	70.0	130	----
QC-401542-003	RM	calcium	7440-70-2	E472A	550 mg/kg wwt	110	70.0	130	----
QC-401542-003	RM	cesium	7440-46-2	E472A	0.0712 mg/kg wwt	108	70.0	130	----
QC-401542-003	RM	chromium	7440-47-3	E472A	1.96 mg/kg wwt	98.8	70.0	130	----
QC-401542-003	RM	cobalt	7440-48-4	E472A	0.267 mg/kg wwt	98.2	70.0	130	----
QC-401542-003	RM	copper	7440-50-8	E472A	35 mg/kg wwt	102	70.0	130	----
QC-401542-003	RM	iron	7439-89-6	E472A	1070 mg/kg wwt	104	70.0	130	----
QC-401542-003	RM	lead	7439-92-1	E472A	0.162 mg/kg wwt	# 134	70.0	130	MES
QC-401542-003	RM	magnesium	7439-95-4	E472A	940 mg/kg wwt	105	70.0	130	----
QC-401542-003	RM	manganese	7439-96-5	E472A	8.91 mg/kg wwt	104	70.0	130	----
QC-401542-003	RM	molybdenum	7439-98-7	E472A	1.41 mg/kg wwt	105	70.0	130	----
QC-401542-003	RM	nickel	7440-02-0	E472A	1.57 mg/kg wwt	93.9	70.0	130	----
QC-401542-003	RM	phosphorus	7723-14-0	E472A	11500 mg/kg wwt	108	70.0	130	----
QC-401542-003	RM	potassium	7440-09-7	E472A	14400 mg/kg wwt	106	70.0	130	----
QC-401542-003	RM	rubidium	7440-17-7	E472A	5.11 mg/kg wwt	105	70.0	130	----
QC-401542-003	RM	selenium	7782-49-2	E472A	8 mg/kg wwt	101	70.0	130	----
QC-401542-003	RM	sodium	7440-23-5	E472A	10673 mg/kg wwt	109	70.0	130	----
QC-401542-003	RM	strontium	7440-24-6	E472A	3.92 mg/kg wwt	110	70.0	130	----
QC-401542-003	RM	thallium	7440-28-0	E472A	0.013 mg/kg wwt	92.0	70.0	130	----
QC-401542-003	RM	uranium	7440-61-1	E472A	0.0786 mg/kg wwt	106	70.0	130	----
QC-401542-003	RM	vanadium	7440-62-2	E472A	0.51 mg/kg wwt	102	70.0	130	----
QC-401542-003	RM	zinc	7440-66-6	E472A	105.3 mg/kg wwt	100	70.0	130	----
Metals (QCLot: 401732)									
QC-401732-003	RM	aluminum	7429-90-5	E440A	11.2 mg/kg wwt	84.9	70.0	130	----

Sub-Matrix: **Biota**

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report: RM Target Concentration	Recovery (%) RM	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Metals (QCLot: 401732) - continued									
QC-401732-003	RM	arsenic	7440-38-2	E440A	34.6 mg/kg wwt	99.9	70.0	130	----
QC-401732-003	RM	bismuth	7440-69-9	E440A	0.0247 mg/kg wwt	101	60.0	140	----
QC-401732-003	RM	cadmium	7440-43-9	E440A	14.5 mg/kg wwt	97.2	70.0	130	----
QC-401732-003	RM	calcium	7440-70-2	E440A	550 mg/kg wwt	100	70.0	130	----
QC-401732-003	RM	cesium	7440-46-2	E440A	0.0712 mg/kg wwt	108	70.0	130	----
QC-401732-003	RM	chromium	7440-47-3	E440A	1.96 mg/kg wwt	106	70.0	130	----
QC-401732-003	RM	cobalt	7440-48-4	E440A	0.267 mg/kg wwt	97.4	70.0	130	----
QC-401732-003	RM	copper	7440-50-8	E440A	35 mg/kg wwt	101	70.0	130	----
QC-401732-003	RM	iron	7439-89-6	E440A	1070 mg/kg wwt	102	70.0	130	----
QC-401732-003	RM	lead	7439-92-1	E440A	0.162 mg/kg wwt	93.6	70.0	130	----
QC-401732-003	RM	magnesium	7439-95-4	E440A	940 mg/kg wwt	102	70.0	130	----
QC-401732-003	RM	manganese	7439-96-5	E440A	8.91 mg/kg wwt	101	70.0	130	----
QC-401732-003	RM	molybdenum	7439-98-7	E440A	1.41 mg/kg wwt	106	70.0	130	----
QC-401732-003	RM	nickel	7440-02-0	E440A	1.57 mg/kg wwt	94.9	70.0	130	----
QC-401732-003	RM	phosphorus	7723-14-0	E440A	11500 mg/kg wwt	106	70.0	130	----
QC-401732-003	RM	potassium	7440-09-7	E440A	14400 mg/kg wwt	105	70.0	130	----
QC-401732-003	RM	rubidium	7440-17-7	E440A	5.11 mg/kg wwt	102	70.0	130	----
QC-401732-003	RM	selenium	7782-49-2	E440A	8 mg/kg wwt	99.6	70.0	130	----
QC-401732-003	RM	sodium	7440-23-5	E440A	10673 mg/kg wwt	107	70.0	130	----
QC-401732-003	RM	strontium	7440-24-6	E440A	3.92 mg/kg wwt	101	70.0	130	----
QC-401732-003	RM	thallium	7440-28-0	E440A	0.013 mg/kg wwt	89.0	70.0	130	----
QC-401732-003	RM	uranium	7440-61-1	E440A	0.0786 mg/kg wwt	104	70.0	130	----
QC-401732-003	RM	vanadium	7440-62-2	E440A	0.51 mg/kg wwt	98.1	70.0	130	----
QC-401732-003	RM	zinc	7440-66-6	E440A	105.3 mg/kg wwt	99.4	70.0	130	----
Metals (QCLot: 419708)									
QC-419708-003	RM	aluminum	7429-90-5	E440	11.2 mg/kg	84.9	70.0	130	----
QC-419708-003	RM	arsenic	7440-38-2	E440	34.6 mg/kg	99.9	70.0	130	----
QC-419708-003	RM	bismuth	7440-69-9	E440	0.0247 mg/kg	101	60.0	140	----
QC-419708-003	RM	cadmium	7440-43-9	E440	14.5 mg/kg	97.2	70.0	130	----
QC-419708-003	RM	calcium	7440-70-2	E440	550 mg/kg	100	70.0	130	----
QC-419708-003	RM	cesium	7440-46-2	E440	0.0712 mg/kg	108	70.0	130	----

Sub-Matrix: **Biota**

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	RM Target Concentration	Recovery (%) RM	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Metals (QCLot: 419708) - continued									
QC-419708-003	RM	chromium	7440-47-3	E440	1.96 mg/kg	106	70.0	130	----
QC-419708-003	RM	cobalt	7440-48-4	E440	0.267 mg/kg	97.4	70.0	130	----
QC-419708-003	RM	copper	7440-50-8	E440	35 mg/kg	101	70.0	130	----
QC-419708-003	RM	iron	7439-89-6	E440	1070 mg/kg	102	70.0	130	----
QC-419708-003	RM	lead	7439-92-1	E440	0.162 mg/kg	93.6	70.0	130	----
QC-419708-003	RM	magnesium	7439-95-4	E440	940 mg/kg	102	70.0	130	----
QC-419708-003	RM	manganese	7439-96-5	E440	8.91 mg/kg	101	70.0	130	----
QC-419708-003	RM	molybdenum	7439-98-7	E440	1.41 mg/kg	106	70.0	130	----
QC-419708-003	RM	nickel	7440-02-0	E440	1.57 mg/kg	94.9	70.0	130	----
QC-419708-003	RM	phosphorus	7723-14-0	E440	11500 mg/kg	106	70.0	130	----
QC-419708-003	RM	potassium	7440-09-7	E440	14400 mg/kg	105	70.0	130	----
QC-419708-003	RM	rubidium	7440-17-7	E440	5.11 mg/kg	102	70.0	130	----
QC-419708-003	RM	selenium	7782-49-2	E440	8 mg/kg	99.6	70.0	130	----
QC-419708-003	RM	sodium	7440-23-5	E440	10673 mg/kg	107	70.0	130	----
QC-419708-003	RM	strontium	7440-24-6	E440	3.92 mg/kg	101	70.0	130	----
QC-419708-003	RM	thallium	7440-28-0	E440	0.013 mg/kg	89.0	70.0	130	----
QC-419708-003	RM	uranium	7440-61-1	E440	0.0786 mg/kg	104	70.0	130	----
QC-419708-003	RM	vanadium	7440-62-2	E440	0.51 mg/kg	98.1	70.0	130	----
QC-419708-003	RM	zinc	7440-66-6	E440	105.3 mg/kg	99.4	70.0	130	----
Metals (QCLot: 419710)									
QC-419710-003	RM	aluminum	7429-90-5	E472	11.2 mg/kg	98.1	70.0	130	----
QC-419710-003	RM	arsenic	7440-38-2	E472	34.6 mg/kg	104	70.0	130	----
QC-419710-003	RM	bismuth	7440-69-9	E472	0.0247 mg/kg	90.8	60.0	140	----
QC-419710-003	RM	cadmium	7440-43-9	E472	14.5 mg/kg	101	70.0	130	----
QC-419710-003	RM	calcium	7440-70-2	E472	550 mg/kg	110	70.0	130	----
QC-419710-003	RM	cesium	7440-46-2	E472	0.0712 mg/kg	108	70.0	130	----
QC-419710-003	RM	chromium	7440-47-3	E472	1.96 mg/kg	98.8	70.0	130	----
QC-419710-003	RM	cobalt	7440-48-4	E472	0.267 mg/kg	98.2	70.0	130	----
QC-419710-003	RM	copper	7440-50-8	E472	35 mg/kg	102	70.0	130	----
QC-419710-003	RM	iron	7439-89-6	E472	1070 mg/kg	104	70.0	130	----
QC-419710-003	RM	lead	7439-92-1	E472	0.162 mg/kg	# 134	70.0	130	MES
QC-419710-003	RM	magnesium	7439-95-4	E472	940 mg/kg	105	70.0	130	----

Sub-Matrix: **Biota**

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	RM Target Concentration	Recovery (%) RM	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Metals (QCLot: 419710) - continued									
QC-419710-003	RM	manganese	7439-96-5	E472	8.91 mg/kg	104	70.0	130	----
QC-419710-003	RM	molybdenum	7439-98-7	E472	1.41 mg/kg	105	70.0	130	----
QC-419710-003	RM	nickel	7440-02-0	E472	1.57 mg/kg	93.9	70.0	130	----
QC-419710-003	RM	phosphorus	7723-14-0	E472	11500 mg/kg	108	70.0	130	----
QC-419710-003	RM	potassium	7440-09-7	E472	14400 mg/kg	106	70.0	130	----
QC-419710-003	RM	rubidium	7440-17-7	E472	5.11 mg/kg	105	70.0	130	----
QC-419710-003	RM	selenium	7782-49-2	E472	8 mg/kg	101	70.0	130	----
QC-419710-003	RM	sodium	7440-23-5	E472	10673 mg/kg	109	70.0	130	----
QC-419710-003	RM	strontium	7440-24-6	E472	3.92 mg/kg	110	70.0	130	----
QC-419710-003	RM	thallium	7440-28-0	E472	0.013 mg/kg	92.0	70.0	130	----
QC-419710-003	RM	uranium	7440-61-1	E472	0.0786 mg/kg	106	70.0	130	----
QC-419710-003	RM	vanadium	7440-62-2	E472	0.51 mg/kg	102	70.0	130	----
QC-419710-003	RM	zinc	7440-66-6	E472	105.3 mg/kg	100	70.0	130	----

Qualifiers

Qualifier	*Description*
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).*

Teck

COC ID:	December EVO LAEMP 2021	TURNAROUND TIME:	

PROJECT/CLIENT INFO				LABORATORY			
Facility Name / Job#	REP			Lab Name	ALS Calgary		
Project Manager	Allie Ferguson			Lab Contact	Lyudmyla Shvets		
Email	[illegible]			Email	lyudmyla.shvets@alsglobal.com		
Address	421 Pine Avenue			Address	2559 29 Street NE		
City	Sparwood	Province	BC	City	Calgary	Province	AB
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada
Phone Number	250-425-8202			Phone Number	1 403 407 1794		

Excel	PDF	EDD

SAMPLE DETAILS / ANALYSIS REQUESTED

	Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	Metals in Tissue by CRC ICPMS (Wet)
1	RG_ERCKDT_BRYO-01_2021-12-15	RG_ERCKDT	Tissue (see notes)	No	12/15/2021	12:00	G	1	X
2	RG_ERCKDT_BRYO-02_2021-12-15	RG_ERCKDT	""	No	12/15/2021	12:00	G	1	X
3	RG_ERCKDT_BRYO-03_2021-12-15	RG_ERCKDT	""	No	12/15/2021	12:00	G	1	X
4	RG_ERCKDT_BRYO-04_2021-12-15	RG_ERCKDT	""	No	12/15/2021	12:00	G	1	X
5	RG_ERCKDT_PERI-02_2021-12-15	RG_ERCKDT	""	No	12/15/2021	12:00	G	1	X
6	RG_ERCKDT_PERI-03_2021-12-15	RG_ERCKDT	""	No	12/15/2021	12:00	G	1	X
7	RG_ERCKDT_PERI-04_2021-12-15	RG_ERCKDT	""	No	12/15/2021	12:00	G	1	x
8	RG_ERCK_BRYO-01_2021-12-15	RG_ERCK	""	No	12/14/2021	9:45	G	1	x
9	RG_ERCK_PERI-02_2021-12-15	RG_ERCK	""	No	12/14/2021	9:45	G	1	x

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

ALS PO 750546
Tissue samples are wet periphyton or moss that has been frozen.

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	
Tyler Mehler/Minnow	December 16, 2021		12/17 8:45

NB OF BOTTLES RETURNED/DESCRIPTION

Regular (default)	x	Sampler's Name	Tyler Mehler	Mobile #	587-597-1612
Priority (2-3 business days) - 50% surcharge					
Emergency (1 Business Day) - 100% surcharge		Sampler's Signature	WTM	Date/Time	December 16, 2021
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

2°

Environmental Division
Calgary
Work Order Reference
CG2106913

Telephone : +1 403 407 1800

Teck

COC ID:	December EVO LAEMP 2021	TURNAROUND TIME:	

PROJECT/CLIENT INFO

Facility Name / Job#	REP		
Project Manager	Allie Ferguson		
Email	[illegible]		
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

SAMPLE DETAILS / ANALYSIS REQUESTED

	Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	Metals in Tissue by CRC ICPMS (Wet)
10	EV_EC_FLOW2_BRYO-01_2021-12-15	EV_EC_FLOW2	Tissue (see notes)	No	12/15/2021	14:00	G	1	X
21	EV_EC_FLOW2_BRYO-02_2021-12-15	EV_EC_FLOW2	""	No	12/15/2021	14:00	G	1	X
32	EV_EC_FLOW2_BRYO-03_2021-12-15	EV_EC_FLOW2	""	No	12/15/2021	14:00	G	1	X
43	EV_EC_FLOW2_BRYO-04_2021-12-15	EV_EC_FLOW2	""	No	12/15/2021	14:00	G	1	X
54	EV_EC_FLOW2_BRYO-05_2021-12-15	EV_EC_FLOW2	""	No	12/15/2021	14:00	G	1	X
65	RG_ERCKUT_BRYO-01_2021-12-15	RG_ERCKUT	""	No	12/15/2021	13:00	G	1	X
76	RG_ERCKUT_BRYO-02_2021-12-15	RG_ERCKUT	""	No	12/15/2021	13:00	G	1	x
87	RG_ERCKUT_BRYO-03_2021-12-15	RG_ERCKUT	""	No	12/15/2021	13:00	G	1	x
98	RG_ERCKUT_PERI-02_2021-12-15	RG_ERCKUT	""	No	12/15/2021	13:00	G	1	x
109	RG_ERCKUT_PERI-03_2021-12-15	RG_ERCKUT	""	No	12/15/2021	13:00	G	1	x

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

ALS PO 750546
Tissue samples are wet periphyton or moss that has been frozen.

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Tyler Mehler/Minnow	December 16, 2021	[signature]	12/17 8:45

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	Tyler Mehler	Mobile #	587-597-1612
Sampler's Signature	WTM	Date/Time	December 16, 2021

2°

APPENDIX I

RELOCATION OF EV_ECOUT
(MEMO)

minnow environmental inc.
A Trinity Consultants Company
204-1006 Fort Street
Victoria, British Columbia
V8V 3K4
Tel: (250) 595-1627
Fax: (250) 595-1625

Confidential Technical Memo

Date: June 29, 2022

To: Mike Pope and Nick Manklow (Teck Coal Limited)

From: W. Tyler Mehler and Jennifer Ings (Minnow Environmental Inc.)

RE: Justification for the Relocation of E321814 (EV_ECOUT) outlined in Table 4C4 in Appendix 4 of Permit 107517 (December 1, 2021) , in Erickson Creek

Background

Minnow was notified on November 16th, 2021 that Teck Coal Limited (Teck) was considering the relocation of the permitted monitoring station E321814 (EV_ECOUT). This station is monitored in accordance with Table 4C4 in Appendix 4 of Permit 107517 (December 1, 2021) and is associated with the Elkview Operation (EVO) Local Aquatic Effects Monitoring Program (LAEMP) biological monitoring area, RG_ERCKDT. Specifically, water quality collected at EV_ECOUT is used in the interpretation of biological monitoring results collected at RG_ERCKDT. The content of this memo details the justification of this relocation from the original EV_ECOUT location to a new location (referred to as 'Transect A') and how this relocation affects biological monitoring and interpretation of biological data in this area for the EVO LAEMP.

Teck's basis for this relocation stems from observed variability in water quality monitoring data at the current EV_ECOUT location, which is in close proximity (10 meters) to where the EVO Saturated Rock Fill (SRF) Phase 2 (P2) effluent connects with Erickson Creek. Effluent from the P2 SRF is discharged into Erickson Creek channel via a pipe, energy dissipation box, and riprap channel on the right bank that is immediately adjacent to the spillway from the infiltration gallery that holds Erickson Creek water for treatment upstream. This infiltration gallery is designed to allow non-treated Erickson Creek water to overflow the weir during SRF bypass and during periods of high flow (i.e. when flow volume is greater than the maximum volume captured by the SRF intake). Variability in water chemistry measured at EV_ECOUT in conjunction with observational field evidence, suggests incomplete mixing of EVO SRF P2 effluent and residual non-treated Erickson Creek water has occurred at the EV_ECOUT monitoring location (Figure 1).

To assess mixing levels of EVO SRF P2 effluent and non-treated Erickson Creek water within the vicinity of EV_ECOUT, Teck initiated a field investigation on August 18, 2021, during a period when the EVO SRF P2 was operating, wherein water was sampled for nitrate in Erickson Creek along four transects to determine if the nitrate levels were consistent across the creek (i.e. bank to bank). Nitrate was selected as the analyte of interest as a large relative differential exists between the non-treated Erickson Creek water (approximately 17 mg/L) and the EVO SRF P2 Effluent (approximately 1 mg/L). The first transect location was at the current EV_ECOUT station location, with three additional locations selected downstream of this point (Transect A, Transect B, and Transect C; Table 1). Water sampling and nitrate analysis was conducted by the Teck internal lab at the EVO SRF. It was hypothesized that a more homogenesis representation of water nitrate concentrations over the transverse of the creek would exist further downstream of the current EV_ECOUT location as the effluent and non-treated Erickson Creek water would have additional mixing time. Results from this field investigation support that hypothesis and are shown in Table 1 below.

Table 1: Nitrate Field Investigation at Erickson Creek

Transect Location	Approximate Downstream Distance from the EVO SRF P2 Outfall (m)	Right Downstream Bank	Creek Centerline	Left Downstream Bank
EV_ECOUT	10	2.36	3.30	5.66
“Transect A”	60	4.06	4.06	4.05
“Transect B”	90	4.04	4.11	4.04
“Transect C”	120	4.03	3.98	4.05

Note: Nitrate is expressed as mg N/L.

The results from this field investigation as well as field observations noted during previous water quality monitoring events indicate incomplete mixing of EVO SRF P2 effluent and non-treated Erickson Creek water at the current EV_ECOUT location. As such, EV_ECOUT is not a suitable monitoring location for measuring fully mixed water quality conditions, especially during periods where Erickson Creek water is high (i.e. water that EVO SRF P2 facility is unable to capture). Transect A (as well as transects B and C which are further downstream) showed uniform nitrate concentrations over the entire transect. As such, Transect A (which is the closest to the old location) is being proposed as the new EV_ECOUT location. This area is easy to access and is approximately 60 m downstream of the current EV_ECOUT location. Additionally, no other visible surface water inputs to Erickson Creek are evident between the two locations. This was confirmed by evaluating concurrent water quality samples from both locations on May 30 and June 2, 2022 during a period when the SRF was non-operational. All aqueous constituent concentrations at EV_ECOUT and Transect A (Table 2) were, with few exceptions, within 10% of one another suggesting that no additional inputs are present between the two areas. Of those that were different, such as total manganese and total aluminum, higher concentrations were present at Transect A (likely due to a residual presence from previous SRF discharge) providing a more conservative representation of conditions downstream of the SRF outfall.

Teck notified ENV of the proposed change on August 30, 2021 as well as worked with the EVO LAEMP team (i.e. Minnow) to determine the potential impacts of EV_ECOUT relocation on biological monitoring and data interpretation associated with the EVO LAEMP. The EVO LAEMP team conducted a site visit and determined that two of the three riffles (or biological stations) used for biological monitoring at RG_ERCKDT were downstream of the proposed new location, with only one station (Kick and Sweep Benthic Invertebrate Community [K&S BIC] Station 3; Figure 2) remaining upstream (which is in close proximity to the current EV_ECOUT location).

Minnow recommends moving K&S BIC Station 3 to ensure all benthic invertebrate sampling is being collected in stations exposed to fully mixed water. It is important for comparability among samples that all replicates are collected in a section of the creek with homogeneous water quality with no additional inputs (e.g., tributaries, treatment discharges, significant hydrological features) between stations (Chessman 1995). A new sampling station representative of the RG_ERCKDT biological monitoring area that receives fully mixed water will be located in a subsequent riffle downstream of Riffle 3 (i.e. K&S BIC Station 1; Figure 2). The exact station location will be dependent on habitat and access conditions. The new biological station will be established during the next sampling event. Overall, it is expected that the new EV_ECOUT location and the new RG_ERCKDT biological station will provide consistent and reliable data reflective of conditions within Erickson Creek.

Sincerely,

Minnow Environmental Inc.

W. Tyler Mehler, Ph.D.

Aquatic Scientist

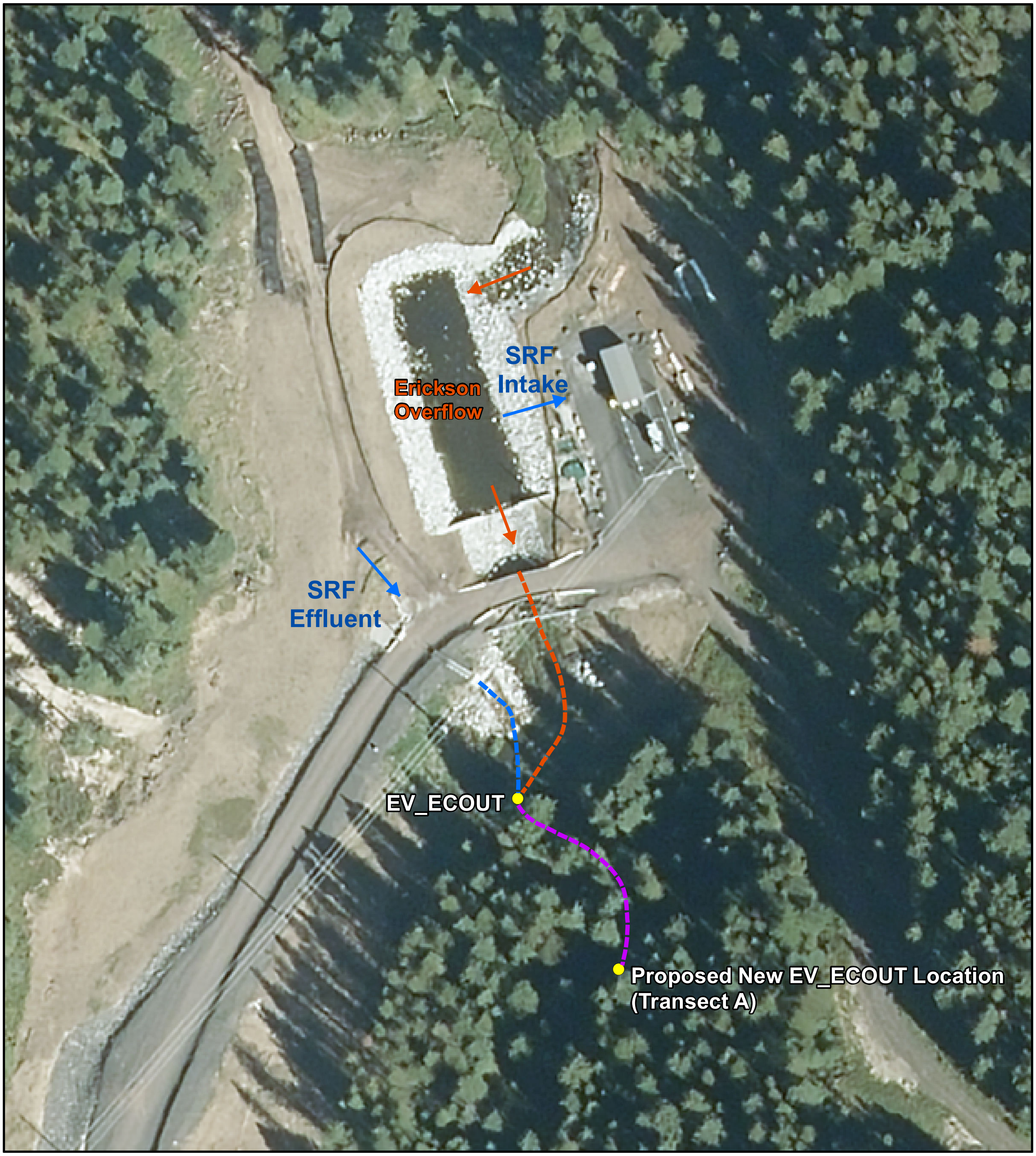
Jennifer Ings, Ph.D., R.P.Bio,

Senior Aquatic Scientist

References

Chessman, Bruce C. "Rapid assessment of rivers using macroinvertebrates: a procedure based on habitat-specific sampling, family level identification and a biotic index." Australian Journal of Ecology 20.1 (1995): 122-129.

FIGURES



LEGEND

Sampling Location

EVO SRF P2 Influent and Effluent Schematic: Proposed New Location for EV_ECOUT

0 5 10 20 Meters

N W E S

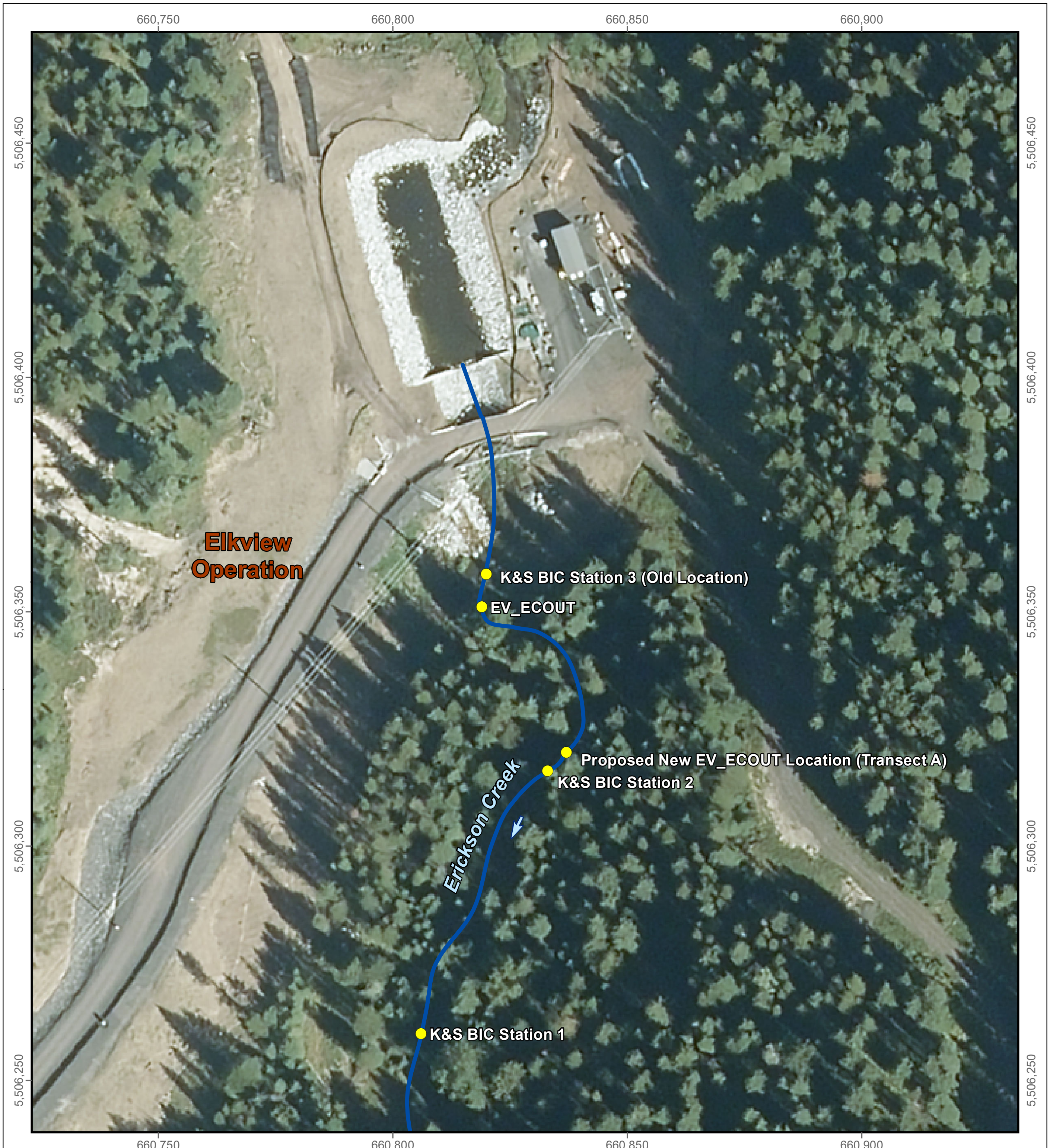
Projection: North American Datum 1983 UTM Zone 11

Date: February 2022
Project 217202.0009

minnow environmental inc.

Figure 1

Document Path: C:\Users\MLaPalme\Trinity Consultants, Inc\Teck - 217202.0009 - Teck 2021 EVO LAEMP\D - GIS\Memo - Feb 2022\21-09 Figure 1 Visual of SRF Outfall.mxd



LEGEND

Sampling Location

Biological Monitoring Stations Associated with RG_ERCKDT

0 20 40 80 Meters

Projection: North American Datum 1983 UTM Zone 11
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. Notes: K&S BIC = Kick and Sweep Benthic Invertebrate Community Sampling. An exact location of the new K&S BIC station (downstream of K&S BIC Station 1) will be established during the next sampling event.

Date: February 2022
Project 217202.0009

minnow environmental inc.
A Trinity Consultants Company

Figure 2

Document Path: C:\Users\MLaPalme\Trinity Consultants, Inc\Teck - 217202.0009 - Teck 2021 EVO LAEMP\D - GIS\Memo - Feb 2022\21-09 Figure 2 Monitoring Areas for EVO_ECOUT.mxd

TABLE

TABLE 1 - IN TEXT

Table 2: Percent Difference in Parameter Values between Transect A and EV_ECOUT

Parameter	Units	30-May-22			2-Jun-22		
		Transect A	EV_ECOUT	% Difference	Transect A	EV_ECOUT	% Difference
Field Temperature	deg c	-	5.2	-	5.6	5.5	1.82%
Field pH	ph units	-	7.49	-	7.72	7.53	2.52%
Lab pH	ph units	7.97	8.00	0.375%	8.16	8.13	0.369%
Acidity (as CaCO3)	mg/l	4.9	< 2.0	145%	7.5	9.0	16.7%
Alkalinity Bicarbonate (as CaCO3)	mg/l	443	444	0.225%	421	422	0.237%
Alkalinity Carbonate (as CaCO3)	mg/l	< 1.0	< 1.0	0%	< 1.0	< 1.0	0%
Alkalinity Hydroxide (as CaCO3)	mg/l	< 1.0	< 1.0	0%	< 1.0	< 1.0	0%
Alkalinity Total (as CaCO3)	mg/l	443	444	0.225%	421	422	0.237%
Specific Conductance	us/cm	-	2034	-	2033	2034	0%
Lab Conductivity	us/cm	1970	1960	0.51%	1920	1920	0%
Bicarbonate	mg/l	540	542	0.369%	514	514	0%
Biochemical Oxygen Demand	mg/l	< 2.0	< 2.0	0%	< 2.0	< 2.0	0%
Carbonate (as CaCO3)	mg/l	< 1.0	< 1.0	0%	< 1.0	< 1.0	0%
Chemical Oxygen Demand	mg/l	< 10	< 10	0%	< 10	< 10	0%
Dissolved Oxygen (in-situ)	mg/l	-	11.27	-	10.55	10.46	0.86%
Dissolved Organic Carbon	mg/l	0.82	0.60	36.7%	< 0.50	0.60	16.7%
Total Organic Carbon	mg/l	0.66	0.66	0%	< 0.50	0.58	13.8%
Total or Dissolved Hardness	mg/l	1230	1250	1.60%	1170	1160	0.86%
Hydroxide	mg/l	< 1.0	< 1.0	0%	< 1.0	< 1.0	0%
Cation - Anion Balance	%	5.36	3.82	40.3%	6.72	8.27	18.7%
Ion Balance	%	89.8	92.6	3.02%	87.4	84.7	3.19%
Major Anion Sum	meq/l	27.5	27.2	1.10%	27.0	27.5	1.82%
Major Cation Sum	meq/l	24.7	25.2	1.98%	23.6	23.3	1.29%
Total Dissolved Solids	mg/l	1380	1380	0%	1590	1490	6.71%
Total Suspended Solids	mg/l	2.0	2.6	23.1%	1.3	7.5	82.7%
Field Turbidity	ntu	-	0.35	-	0.55	0.73	24.7%
Lab Turbidity	ntu	0.24	0.12	100.0%	< 0.10	< 0.10	0%
Nitrate	mg/l	17.2	17.0	1.18%	17.9	18.3	2.19%
Nitrite	mg/l	< 0.0050	< 0.0050	0%	< 0.0050	< 0.0050	0%
Ammonia (as N)	mg/l	< 0.0050	< 0.0050	0%	< 0.0050	< 0.0050	0%
Total Kjeldahl Nitrogen	mg/l	< 0.050	0.355	85.9%	< 0.050	< 0.050	0%
Orthophosphate	mg/l	0.0215	0.0221	2.71%	0.0202	0.0198	2.02%
ORP (in-situ)	mv	-	156.2	-	163.9	166.6	1.62%
ORP (lab)	mv	399	446	10.5%	264	279	5.38%
Phosphorus	mg/l	0.0192	0.0281	31.7%	0.0237	0.0223	6.28%
Sulphate	mg/l	827	817	1.22%	825	843	2.14%
Sulphide	mg/l	< 0.0015	< 0.0015	0%	< 0.0015	< 0.0015	0%
Bromide	mg/l	< 0.250	< 0.250	0%	< 0.250	< 0.250	0%
Chloride	mg/l	5.79	5.72	1.22%	6.06	6.22	2.57%
Fluoride	mg/l	< 0.100	< 0.100	0%	0.107	0.110	2.73%
Total							
Aluminum	mg/l	0.0045	< 0.0030	50.0%	0.0042	< 0.0030	40.0%
Antimony	mg/l	0.00019	0.00019	0%	0.00022	0.00021	4.76%
Arsenic	mg/l	0.00022	0.00022	0%	0.00027	0.00025	8.00%
Barium	mg/l	0.0631	0.0628	0.478%	0.0597	0.0610	2.13%
Beryllium	ug/l	< 0.020	< 0.020	0%	< 0.020	< 0.020	0%
Bismuth	mg/l	< 0.000050	< 0.000050	0%	< 0.000050	< 0.000050	0%
Boron	mg/l	0.013	0.013	0%	0.013	0.012	8.33%
Cadmium	ug/l	0.0848	0.0832	1.92%	0.0914	0.0920	0.65%
Calcium	mg/l	300	289	3.81%	251	249	0.80%
Chromium	mg/l	0.00025	0.00025	0%	0.00023	0.00021	9.52%
Cobalt	ug/l	< 0.10	< 0.10	0%	0.12	< 0.10	20.0%
Copper	mg/l	< 0.00050	< 0.00050	0%	< 0.00050	< 0.00050	0%
Iron	mg/l	< 0.010	< 0.010	0%	0.019	< 0.010	90.0%
Lead	mg/l	< 0.000050	< 0.000050	0%	< 0.000050	< 0.000050	0%
Lithium	mg/l	0.0271	0.0272	0.368%	0.0269	0.0265	1.51%
Magnesium	mg/l	187	183	2.19%	156	158	1.27%
Manganese	mg/l	0.00070	0.00020	250%	0.00165	0.00017	871%
Mercury	ug/l	< 0.00050	< 0.00050	0%	< 0.00050	< 0.00050	0%
Molybdenum	mg/l	0.00102	0.00102	0%	0.00103	0.00109	5.50%
Nickel	mg/l	0.00102	0.00090	13.3%	0.00100	0.00089	12.4%
Potassium	mg/l	2.64	2.63	0.380%	2.52	2.55	1.18%
Selenium	ug/l	163	169	3.55%	171	171	0%
Silicon	mg/l	3.81	3.78	0.79%	3.70	3.73	0.80%
Silver	mg/l	0.000016	0.000032	50.0%	< 0.000010	< 0.000010	0%
Sodium	mg/l	3.02	3.03	0.330%	3.30	3.19	3.45%
Sulphur	mg/l	298	299	0.334%	275	281	2.14%
Strontium	mg/l	0.234	0.240	2.50%	0.226	0.224	0.89%
Thallium	mg/l	< 0.000010	< 0.000010	0%	< 0.000010	< 0.000010	0%
Tin	mg/l	0.00025	< 0.00010	150%	< 0.00010	< 0.00010	0%
Titanium	mg/l	< 0.00030	< 0.00030	0%	< 0.00030	< 0.00030	0%
Uranium	mg/l	0.00837	0.00840	0.357%	0.00869	0.00866	0.346%
Vanadium	mg/l	< 0.00050	< 0.00050	0%	< 0.00050	< 0.00050	0%
Zinc	mg/l	0.0030	< 0.0030	0%	< 0.0030	0.0041	26.8%
Dissolved							
Aluminum	mg/l	< 0.0020	< 0.0020	0%	0.0014	0.0015	6.67%
Antimony	mg/l	< 0.00020	< 0.00020	0%	0.00021	0.00021	0%
Arsenic	mg/l	< 0.00020	0.00020	0%	0.00023	0.00022	4.55%
Barium	mg/l	0.0589	0.0625	5.76%	0.0607	0.0659	7.89%
Beryllium	ug/l	< 0.040	< 0.040	0%	< 0.020	< 0.020	0%
Bismuth	mg/l	< 0.000100	< 0.000100	0%	< 0.000050	< 0.000050	0%
Boron	mg/l	< 0.020	< 0.020	0%	0.012	0.012	0%
Cadmium	ug/l	0.0803	0.0878	8.54%	0.0826	0.0788	4.82%
Calcium	mg/l	249	248	0.403%	253	256	1.17%
Chromium	mg/l	< 0.00020	0.00026	23.1%	0.00017	0.00020	15.0%
Cobalt	ug/l	< 0.20	< 0.20	0%	< 0.10	< 0.10	0%
Copper	mg/l	< 0.00040	< 0.00040	0%	< 0.00020	< 0.00020	0%
Iron	mg/l	< 0.020	< 0.020	0%	< 0.010	< 0.010	0%
Lead	mg/l	< 0.000100	< 0.000100	0%	< 0.000050	< 0.000050	0%
Lithium	mg/l	0.0246	0.0254	3.15%	0.0277	0.0254	9.06%
Magnesium	mg/l	147	154	4.55%	131	126	3.97%
Manganese	mg/l	< 0.00020	< 0.00020	0%	0.00018	< 0.00010	80.0%
Mercury	mg/l	0.0000143	0.0000154	7.14%	0.000133	0.0000174	664%
Molybdenum	mg/l	0.00105	0.00109	3.67%	0.00108	0.00112	3.57%
Nickel	mg/l	< 0.00100	< 0.00100	0%	0.00062	0.00063	1.59%
Potassium	mg/l	2.55	2.67	4.49%	2.58	2.61	1.15%
Selenium	ug/l	165	166	0.60%	169	171	1.17%
Silicon	mg/l	3.73	3.80	1.84%	3.52	3.35	5.07%
Silver	mg/l	< 0.000020	< 0.000020	0%	< 0.000010	< 0.000010	0%
Sodium	mg/l	2.97	3.07	3.26%	3.20	2.99	7.02%
Sulphur	mg/l	269	276	2.54%	273	273	0%
Strontium	mg/l	0.221	0.221	0%	0.223	0.226	1.33%
Thallium	mg/l	< 0.000020	< 0.000020	0%	< 0.000010	< 0.000010	0%
Tin	mg/l	< 0.00020	< 0.00020	0%	< 0.00010	< 0.00010	0%
Titanium	mg/l	< 0.00060	< 0.00060	0%	< 0.00030	< 0.00030	0%
Uranium	mg/l	0.00840	0.00836	0.478%	0.00831	0.00802	3.62%
Vanadium	mg/l	< 0.00100	< 0.00100	0%	< 0.00050	< 0.00050	0%
Zinc	mg/l	0.0025	0.0027	7.41%	0.0025	0.0023	8.70%

Note: "-" indicates no data available or no applicable. % Difference = (EV-ECOUT - Transect A)/EV-ECOUT*100.

APPENDIX J

PAIRING OF F2_ECIN AND RG_ERCKUT STATIONS (MEMO)

Confidential Technical Memo

Date: June 29, 2022

To: Mike Pope and Nick Manklow, Teck Coal Ltd

From: W. Tyler Mehler and Jennifer Ings, Minnow Environmental Inc.

RE: Statistical Comparison of Water Quality Between RG_ERCKUT and F2_ECIN for Elkview Operations Local Aquatic Effects Monitoring Program

Background

On October 15th, 2021, the British Columbia Ministry of Environment and Climate Change Strategy (BCMOECC) approved the "Study Design for the 2021 to 2023 Elkview Operations (EVO) Local Aquatic Effects Monitoring Program" (the Study Design; BCMOECC 2021). One of the conditions of the approval required monthly water quality monitoring at biological monitoring station RG_ERCKUT in Erickson Creek upstream of the EVO Saturated Rockfill (SRF) intake structure, which was not associated with a routine water quality monitoring station in the study design. On December 7th, 2021, Teck Coal Limited (Teck) submitted a request to BCMOECC to revise the approval for the study design on the basis that the routine water quality station F2_ECIN (water collected from the Erickson Creek intake) is representative of RG_ERCKUT water quality. Water from F2_ECIN is collected directly from the pipeline which transports Erickson Creek water from the infiltration gallery to the SRF (Figure 1). The infiltration gallery is roughly 60 meters downstream of the biological station RG_ERCKUT. Following a review of advice from the Environmental Monitoring Committee (EMC), the Ktunaxa Nation Council (KNC), and Teck's responses to the EMC, the revised Study Design approval was issued by BCMOECC on March 4th, 2022, but required, as one of its conditions, a statistical comparison of water quality between RG_ERCKUT and F2_ECIN to determine if F2_ECIN is a suitable surrogate for monthly water quality monitoring at RG_ERCKUT (BCMOECC 2022). The focus of this memo is to present the findings of the statistical analysis comparing water quality between RG_ERCKUT and F2_ECIN from 2019 to 2022 in response to the approval condition issued by BCMOECC.

Data Analysis

Statistical analyses were conducted to determine whether water chemistry constituents collected at RG_ERCKUT and F2_ECIN were significantly different for the years of 2019 to 2022. Differences in concentrations between the two areas were calculated using two approaches: 1) using the difference in monthly mean concentrations between the stations for months with overlapping data, and 2) matching sampling events at RG_ERCKUT with data from F2_ECIN collected on the closest day and taking a difference in the concentrations between the stations. When concentrations from both stations were at the laboratory reporting limit (LRL) for a water quality constituent, no difference was calculated for that month or event. In both analyses, the vector of differences were then tested against zero (i.e., no difference) using a Student's t-test, with $\alpha = 0.05$. When the differences were not normally distributed, a non-parametric Wilcoxon signed-rank test was used. A magnitude of difference (MOD) between the stations was reported for constituents that were significantly different and was calculated as:

$$MOD = \frac{\left(MCT_{F2\_ECIN} - MCT_{RG\_ERCKUT}\right)}{MCT_{RG\_ERCKUT}} \times 100\%$$

where *MCT* is the measure of central tendency (i.e., means over the whole period). All calculated means used the Kaplan-Meier (K-M) method to account for values at the LRL and statistical comparisons were conducted in R (R Core Team 2021).

Results and Conclusion

Water quality differed significantly between RG_ERCKUT and F2_ECIN for 2 of 36 water quality constituents when comparing RG_ERCKUT and F2_ECIN monthly means (hardness and total ammonia; Table 1), and for 5 of 36 constituents, including several key mine-related constituents, when samples matched by sampling date were compared between the two areas (hardness, total phosphorus, total nickel, selenite, and dissolved cadmium; Table 2). Of the constituents that significantly differed, concentrations of total ammonia, total nickel, and selenite were significantly higher at F2_ECIN relative to RG_ERCKUT suggesting that F2_ECIN may be conservative relative to conditions at RG_ERCKUT for these constituents (Table 1 and 2). Hardness (both analyses), total phosphorus, and dissolved cadmium were significantly lower at F2_ECIN than RG_ERCKUT but the magnitude of difference was relatively low (3.6 to 11%) except for total phosphorus (59%; Table 2).

Overall, results of the statistical analysis comparing water quality at RG_ERCKUT and F2_ECIN revealed very few significant differences in water quality constituents between these areas using two different data analysis approaches. For constituents that differed, where concentration at F2_ECIN was higher, this could provide a conservative representation of conditions at RG_ERCKUT. Where the concentration was lower at F2_ECIN, the difference in nearly all cases was relatively small. Collectively, this suggests that the F2_ECIN routine water quality sampling location is reflective of water quality conditions at RG_ERCKUT and would act as a suitable surrogate for water quality sampling at RG_ERCKUT for the 2021 to 2023 EVO LAEMP.

Sincerely,

Minnow Environmental Inc.

W. Tyler Mehler, Ph.D.

Aquatic Scientist

Jennifer Ings, Ph.D., R.P.Bio,

Senior Aquatic Scientist

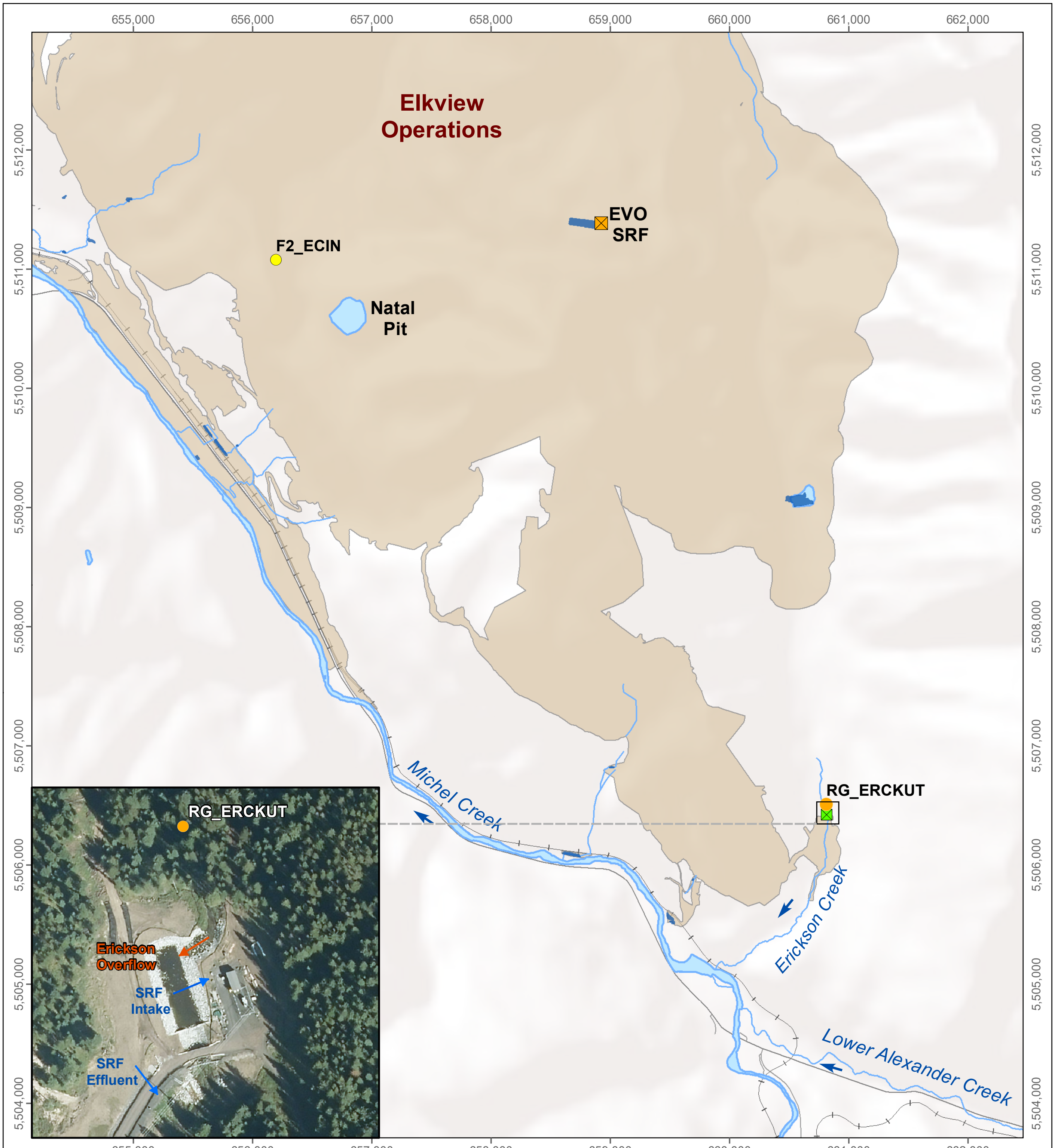
References

BCMOECC (British Columbia Ministry of Environment and Climate Change Strategy). 2021. Re: Approval of the EVO LAEMP 2021-2023 Study Design. October 15th, 2021.

BCMOECC. 2022. Re: Approval of the EVO LAEMP 2021-2023 Study Design Revised. March 4th, 2022.

R Core Team (2021). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/.

FIGURE



LEGEND

- Water Quality Station
- Biological Monitoring Station
- Elkview Operations Saturated Rock Fill (EVO SRF)
- Intake/Outfall Location
- Settling Pond
- Tailings Pond
- Teck Coal Mine Operations

Location of Biological Monitoring Station RG_ERCKUT and Water Quality Station F2_ECIN, Elkview Operations

0 0.75 1.5 3 km

N W E S

Projection: North American Datum 1983 UTM Zone 11

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Figure 1

Document Path: C:\Users\MLaPalme\Trinity Consultants, Inc\Teck - 217202.0009 - Teck 2021 EVO LAEMP\D - GIS\Memo May 2022\21-09 Figure 1 Location of Biological Monitoring Station RG_ERUCKT and Water Quality Station F2_ECIN.mxd

TABLES

Table 1: **Statistical Comparison of Water Quality Between FC_ECIN and RG_ERCKUT, 2020 to 2022**

Analyte	n	P-value	P-value	MOD[a]
Dissolved Organic Carbon	7	Wilcoxon Test	0.375	ns
Temperature, Field	5	Wilcoxon Test	0.062	ns
pH, Field	5	T-Test	0.884	ns
Dissolved Oxygen, Field	5	T-Test	0.125	ns
Acidity (as CaCO3)	7	T-Test	0.984	ns
Alkalinity, Total (as CaCO3)	7	T-Test	0.226	ns
Conductivity	7	T-Test	0.359	ns
Chloride (Cl)	7	T-Test	0.944	ns
Fluoride	6	T-Test	0.283	ns
Hardness - Dissolved (as CaCO3)	6	Wilcoxon Test	0.031	-6.0
Nitrate (as N)	7	T-Test	0.085	ns
Nitrite (as N)	5	T-Test	0.717	ns
Ammonia, Total (as N)	4	T-Test	0.003	48
Phosphorus (P)-Total	7	Wilcoxon Test	0.078	ns
Sulphate	7	Wilcoxon Test	0.469	ns
Total Dissolved Solids	7	T-Test	0.214	ns
Antimony (Sb)-Total	7	Wilcoxon Test	0.834	ns
Arsenic (As)-Total	7	T-Test	0.375	ns
Barium (Ba)-Total	7	T-Test	0.506	ns
Boron (B)-Total	7	T-Test	0.278	ns
Chromium (Cr)-Total	7	T-Test	0.098	ns
Iron (Fe)-Total	4	T-Test	0.269	ns
Lead (Pb)-Total	3	T-Test	0.122	ns
Lithium (Li)-Total	7	T-Test	0.911	ns
Manganese (Mn)-Total	7	T-Test	0.560	ns
Molybdenum (Mo)-Total	7	Wilcoxon Test	1.000	ns
Nickel (Ni)-Total	7	T-Test	0.094	ns
Selenium (Se)-Total	7	Wilcoxon Test	0.109	ns
Uranium (U)-Total	7	T-Test	0.757	ns
Zinc (Zn)-Total	4	T-Test	0.134	ns
Se(IV) - Selenite	5	T-Test	0.055	ns
Se(VI) - Selenate	5	T-Test	0.067	ns
Aluminum (Al)-Dissolved	7	Wilcoxon Test	0.297	ns
Cadmium (Cd)-Dissolved	7	T-Test	0.112	ns
Copper (Cu)-Dissolved	6	T-Test	0.639	ns
Molybdenum (Mo)-Dissolved	7	T-Test	0.420	ns
Iron (Fe)-Dissolved	6	Wilcoxon Test	0.438	ns
Selenium (Se)-Dissolved	7	T-Test	0.452	ns

P-value < 0.05.

F2_ECIN significantly higher than RG_ERCKUT.

F2_ECIN significantly lower than RG_ERCKUT.

Notes: "ns" = not significant. Differences between F2_ECIN and ERCKUT were calculated and the result was tested against zero (i.e., no difference) using a t-test or a Wilcoxon test when differences were not normally distributed.

[a]Magnitude of Difference (MOD) = $(MCT_{F2\_ECIN} - MCT_{RG\_ERCKUT})/MCT_{RG\_ERCKUT}*100$. MCT = Kaplan-Meier (K-M) means over the whole period.

Table 2: Statistical Comparison of Water Quality Between F2_ECIN and RG_ERCKUT (Matched Sampling Date), 2020 to 2022

Analyte	n	P-value	P-value	MOD[a]
Dissolved Organic Carbon	7	T-Test	0.334	ns
Temperature, Field	5	Wilcoxon Test	0.062	ns
pH, Field	5	T-Test	0.541	ns
Dissolved Oxygen, Field	5	Wilcoxon Test	0.625	ns
Acidity (as CaCO3)	7	T-Test	0.189	ns
Alkalinity, Total (as CaCO3)	7	Wilcoxon Test	0.297	ns
Conductivity	7	T-Test	0.731	ns
Chloride (Cl)	7	T-Test	0.937	ns
Fluoride	4	T-Test	0.185	ns
Hardness - Dissolved (as CaCO3)	6	T-Test	0.038	-3.6
Nitrate (as N)	7	T-Test	0.903	ns
Ammonia, Total (as N)	3	T-Test	0.506	ns
Phosphorus (P)-Total	7	Wilcoxon Test	0.031	-59
Sulphate	7	Wilcoxon Test	0.204	ns
Total Dissolved Solids	7	T-Test	0.294	ns
Antimony (Sb)-Total	7	Wilcoxon Test	0.784	ns
Arsenic (As)-Total	7	T-Test	0.224	ns
Barium (Ba)-Total	7	T-Test	0.482	ns
Boron (B)-Total	7	Wilcoxon Test	0.371	ns
Chromium (Cr)-Total	7	T-Test	0.344	ns
Iron (Fe)-Total	3	Wilcoxon Test	0.500	ns
Lithium (Li)-Total	7	T-Test	0.766	ns
Manganese (Mn)-Total	7	T-Test	0.695	ns
Molybdenum (Mo)-Total	7	Wilcoxon Test	1.000	ns
Nickel (Ni)-Total	7	T-Test	0.036	8.1
Selenium (Se)-Total	7	T-Test	0.240	ns
Uranium (U)-Total	7	T-Test	0.501	ns
Zinc (Zn)-Total	3	Wilcoxon Test	0.250	ns
Se(IV) - Selenite	5	T-Test	0.022	41
Se(VI) - Selenate	5	T-Test	0.103	ns
Aluminum (Al)-Dissolved	6	T-Test	0.802	ns
Cadmium (Cd)-Dissolved	7	T-Test	0.038	-11
Copper (Cu)-Dissolved	3	T-Test	0.580	ns
Molybdenum (Mo)-Dissolved	7	Wilcoxon Test	0.834	ns
Selenium (Se)-Dissolved	7	T-Test	0.766	ns

P-value < 0.05.

F2_ECIN significantly higher than RG_ERCKUT.

F2_ECIN significantly lower than RG_ERCKUT.

Notes: "ns" = not significant. Sampling dates were matched between F2_ECIN and RG_ERCKUT. Differences between F2_ECIN and RG_ ERCKUT were then calculated and the result was tested against zero (i.e., no difference) using a t-test or a Wilcoxon test when differences were not normally distributed.

[a]Magnitude of Difference (MOD) = $(MCT_{F2\_ECIN} - MCT_{RG\_ERCKUT})/MCT_{RG\_ERCKUT}*100$. MCT = Kaplan-Meier (K-M) means over the whole period.