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Technical Report Overview

Report: 2020 Coal Mountain Mine Local Aquatic Effects Monitoring Program (LAEMP) Report

Overview: This report presents the 2020 results of the local aquatic effects monitoring program developed for Teck's Coal Mountain Operations. The report presents data and evaluates the magnitude and extent of influence of mine operations on water quality, calcite, and benthic invertebrate communities downstream of Coal Mountain Mine.

This report was prepared for Teck by Golder Associates Ltd. and Minnow Environmental Inc.

For More Information

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REPORT

2020 Coal Mountain Mine Local Aquatic Effects Monitoring Program (LAEMP) Report

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Distribution List

Electronic Copy - Teck Coal Limited - Coal Mountain Operations

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Executive Summary

Teck Coal Limited (Teck) owns the Coal Mountain Mine (CMm) in the Elk River watershed. CMm discharges mine-influenced water from sedimentation ponds into Corbin Creek, which flows into Michel Creek and then to the Elk River. This discharge is authorized by the British Columbia Ministry of Environment and Climate Change Strategy (ENV) through Permit 107517 pursuant to the *Environmental Management Act*.

Teck evaluates potential effects on aquatic life associated with operation of its mines via a regional aquatic effects monitoring program (RAEMP), which provides comprehensive routine monitoring and assessment of potential mine-related effects on the aquatic environment every three years. In addition, Teck conducts local aquatic effects monitoring programs (LAEMPs) to address uncertainties related to potential local-scale effects.

A LAEMP was initiated for CMm in 2018 “to assess the magnitude and extent of influence from CMm on water quality, calcite, and benthic invertebrate communities downstream of CMm, and to assess what factors are contributing to the observed effects” (per 25 August 2018 and 4 April 2019 amendments to Permit 107517). Additional sites were added to the RAEMP field program to support development of the CMm LAEMP study design. Sampling began at these additional sites in September 2018 and was repeated in September 2019 and 2020.

Two study questions are considered for the CMm LAEMP:

Study Question 1. What are the magnitude and spatial extent of influence from CMm on water quality, calcite, sediment quality, and benthic invertebrate communities in Michel Creek downstream of CMm, how are these conditions changing over time, and are the conditions expected?

Study Question 2. How do spatial and temporal patterns in the benthic invertebrate communities correspond to water quality, calcite, sediment quality, and other potential stressors, and what does this tell us about what factors are causing observed effects?

Study Question 1

The highest concentrations of mine-influenced water quality constituents were observed at the CORCK station in Corbin Creek, followed by the first station downstream of CMm on Michel Creek (MIDCO, 0.94 km downstream), with a declining gradient of concentrations further downstream. This was expected as Corbin Creek receives discharges of mine-influenced water before entering Michel Creek. Concentrations of most water quality constituents were similar between the reference stations and MIUCO, which is 0.82 km upstream of CORCK and 1.76 km upstream of MIDCO. Within Michel Creek downstream of CMm, concentrations of cobalt, and nickel returned to concentrations observed at MIUCO by MIDAG, which is 5.27 km downstream. Spatially, concentrations of sulphate, selenium, and nitrate remained elevated, compared to reference, at the furthest station downstream of CMm (MI5); however, only selenium was above a British Columbia Water Quality Guideline (BC WQG) at MI5.

Concentrations of sulphate, nitrate, total cobalt, total nickel, and total selenium were lower in 2020 compared to in 2018. The decrease from 2018 in these mine-related constituents downstream of CMm in Michel Creek was expected based on projections derived by SRK (, which projected a decrease between 2017 and 2019 based on changes in mine water management with the transition to Care and Maintenance. Overall, concentrations of sulphate, nitrate, and nickel were either lower than or similar to the SRK projections (with some infrequent exceptions) in 2020. Concentrations of total selenium and cobalt were either lower than or similar to projections for dissolved selenium and cobalt for all years.

Concentrations of sulphate, nitrate, total cobalt, total nickel, and total selenium were lower in 2020 compared to in 2018. The decrease from 2018 in these mine-related constituents downstream of CMm in Michel Creek was expected based on projections derived by SRK (SRK 2019), which projected a decrease between 2017 and 2019 based on changes in mine water management with the transition to Care and Maintenance. Overall, concentrations of sulphate, nitrate, and nickel were either lower than or similar to the SRK projections (with some infrequent exceptions) in 2020. Concentrations of total selenium and cobalt were either lower than or similar to projections for dissolved selenium and cobalt for all years.

Consistent with the 2015 to 2016 RAEMP results, sediment selenium and PAH concentrations were higher at mine-influenced stations in the CMm area compared to reference stations and were above the lower sediment quality guidelines at mine-influenced stations. Cadmium, manganese, nickel, selenium, and zinc concentrations were above the BC WSQGs and were higher at CORCK and MIDCO compared to downstream and reference stations. Sediment metals concentrations downstream of MIDCO were generally similar to reference stations, with the exception of selenium.

Calcite presence was high in Corbin Creek (calcite index >1) but generally low in Michel Creek (calcite index <1) in 2020. Calcite index values were not high enough for calcite to be an influencing factor in benthic invertebrate effects in Michel Creek (Minnow 2018b); however, may have been a factor in Corbin Creek. Calcite index values remained within the reference normal range in Michel Creek in 2020.

Benthic invertebrate community richness and abundance were similar among mine-influenced and reference stations and were within or above the site-specific and/or regional normal ranges in Michel Creek in 2020. Benthic invertebrate taxonomic richness was significantly greater at MIDCO and MIDAG in 2020 compared to previous years and was beyond the site-specific and/or regional normal ranges at most stations in Michel Creek. Ephemeroptera dominated at mine-influenced stations in Michel Creek, except at MIDCO, which was dominated by Diptera. The BIC at reference stations was also largely dominated by Ephemeroptera.

Significant changes to BIC were identified at CORCK in 2020 compared to reference stations and stations on Michel Creek, in the form of reduced taxonomic richness, overall abundance, abundance of the sensitive taxa Ephemeroptera, Plecoptera, Trichoptera (EPT), abundance of Ephemeroptera (E), % EPT, and % E. There were also changes in community composition (i.e., Diptera dominance) at CORCK compared to reference stations and stations on Michel Creek. However, richness and overall BIC abundance in Corbin Creek were within site-specific normal ranges in 2020, and statistical differences were within a magnitude of difference of less than two standard deviations (2 SD) indicating these differences are not biologically meaningful because the differences were within the typical range of variability observed in previous years. The reductions in sensitive taxa abundance and percentage of sensitive taxa relative to reference areas were greater than expected based solely on habitat variables.

The influence of CMm on the abundance of EPT taxa and Ephemeroptera decreased with distance from CMm in Michel Creek. While significantly lower abundances were noted in 2020 at MIDCO and CM_MC2 compared to reference stations and stations further downstream, the magnitudes of the differences were within 2 SD, indicating these differences are not biologically meaningful because the differences were within the typical range of variability observed in downstream and reference stations. Mean abundances of EPT and Ephemeroptera were within or above site-specific and regional normal ranges at all Michel Creek stations downstream of Corbin Creek in 2020.

Percent EPT and % E were significantly lower in Michel Creek downstream of CORCK and compared to reference stations. The extent of effect went as far as CM_MC2 for % EPT and MIDAG-S1 for % E. Values have been below the regional and/or site-specific normal ranges for % EPT and % E since 2012 at MIDCO. Percent EPT and % E increased in 2020 compared to 2019 and/or 2018 at MIDCO, but remained below the site-specific and regional normal ranges in 2020.

Benthic invertebrate tissue selenium concentrations were within the regional normal range at reference and mine-influenced stations in 2020 and were less than the lowest level 1 benchmark.

The findings from the Chronic Toxicity Monitoring Program (Golder 2017, 2019b, 2020, 2021) support the interpretation in Golder (2017) that nickel is likely responsible for the BIC changes. BIC effects from nickel in Michel Creek appear to be localized near CORCK and do not extend farther on Michel Creek than MIDAG-S1. Chronic toxicity monitoring results also indicate no adverse effects on fish.

Study Question 2

Habitat variables were largely similar between reference and mine-influenced stations and it was concluded that differences in habitat are unlikely to have caused the differences observed in % EPT and % E at the stations downstream of CMm in Michel Creek. It is also unlikely that calcite presence and concretion in Michel Creek was a factor in the lower proportions of EPT and Ephemeroptera taxa at MIDCO and CM_MC2, because calcite index values were low between 2012 and 2020 and within the reference normal range in Michel Creek. However, calcite presence may have been a factor at CORCK.

Comparisons across stations indicated correlations of % EPT and % E with aqueous concentrations of nickel. There were intercorrelations of nickel with other potential stressors (e.g., cobalt, selenium) and intercorrelations between aqueous concentrations, sediment concentrations, and tissue concentrations in benthic invertebrates. However, the only water quality constituent with concentrations in Michel Creek above invertebrate screening values was nickel. Concentrations were above the level 3 invertebrate screening value of 22 µg/L at CORCK and in Michel Creek downstream of CMm at MIDCO and CM_MC2.

Spatial and temporal patterns in BIC endpoints corresponded more closely with mine-influenced water quality than with sediment quality or calcite, supporting the interpretation that observed patterns in BIC are attributable to water quality. Spatial and temporal patterns in constituent concentrations greater than WQGs, benchmarks, or screening values support previous assessments completed through the Chronic Toxicity Monitoring Program (Golder 2017, 2019b, 2020d, 2021) which have implicated nickel as the likely cause of observed effects in BIC.

Conclusions

Spatial and temporal patterns in BIC endpoints corresponded more closely with mine-influenced water quality than with habitat, sediment quality, or calcite, suggesting that observed patterns in BIC are attributable to water quality. Spatial and temporal patterns in water quality constituents greater than WQGs or interim screening values support previous assessments that have implicated nickel as the likely cause of observed effects in BIC. This interpretation is also supported by analyses conducted by the regional chronic toxicity monitoring program.

It is recommended that analysis of BIT chemistry continue to evaluate BIT selenium concentrations and discontinue the evaluation of tissue metals concentrations, including cobalt and nickel. Because tissue and aqueous concentrations of nickel are highly correlated, evaluation of tissue chemistry provides no new information on spatial or temporal patterns. Furthermore, potential risk from nickel is most directly and reliably evaluated via aqueous concentrations and benchmarks.

There are no recommended changes to the field sampling program for the CMm LAEMP 2020 study design.

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Abbreviations and Units of Measure

Abbreviation	Definition
%	percent
<	less than
>	greater than
µS/cm	microsiemens per centimetre
cm	centimetre
°C	degree Celsius
g	gram
L/s	litres per second
m	metre
m/s	metres per second
min	minute
mg/L	milligrams per litre
mg-N/L	milligrams nitrogen per litre
mg/kg dw	milligram per kilogram dry weight
µg/kg dw	microgram per kilogram dry weight
µg/L	micrograms per litre
ADIT	Aquatic Data Integration Tool
AEMP	Aquatic Effects Monitoring Program
ALS	ALS Environmental
AMP	Water Quality Adaptive Management Plan for Teck Coal in the Elk Valley
ANOVA	Analysis of Variance
BC	British Columbia
BIC	Benthic Invertebrate Community
BIT	Benthic Invertebrate Tissue Chemistry
CABIN	Canadian Aquatic Biomonitoring Network
CCME	Canadian Council of Ministers of the Environment
C&M	Care and Maintenance
CMm	Coal Mountain mine
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CRM	Certified Reference Materials
DELT	Deformities, Erosion, Lesion, and Tumors
DQO	Data Quality Objective
E	Ephemeroptera
EA	Environmental Assessment

Abbreviation	Definition
ECCC	Environment and Climate Change Canada
EFN	Environmental Flow Needs
EMC	Elk Valley Environmental Monitoring Committee
ENV	British Columbia Ministry of Environment and Climate Change Strategy
EPT	Ephemeroptera, Plecoptera, and Trichoptera
EVO	Elkview Operations
EVWQP	Elk Valley Water Quality Plan
FRO	Fording River Operations
GHO	Greenhills Operations
Golder	Golder Associates Ltd.
GPS	Global Positioning System
IFN	Instream Flow Study
K	Condition Factor
LA-ICPMS	Laser Ablation with Inductively Coupled Plasma Mass Spectrometry
LAEMP	Local Aquatic Effects Monitoring Program
LCO	Line Creek Operations
MDS	Multidimensional Scaling
PAH	Polycyclic Aromatic Hydrocarbon
QA	Quality Assurance
QC	Quality Control
RAEMP	Regional Aquatic Effects Monitoring program
SARA	Species at Risk Act
SD	Standard Deviation
SPO	Site Performance Objective
SRK	SRK Consulting Inc.
TDS	Total Dissolved Solids
Teck	Teck Coal Limited
TN	Total Nitrogen
TP	Total Phosphorus
Trich	TrichAnalytics Inc.
TOC	Total Organic Carbon
UTM	Universal Transverse Mercator
WSQG	Working Sediment Quality Guidelines
WQG	Water Quality Guideline
YOY	Young-of-the-Year

1.0 INTRODUCTION

Golder Associates Ltd. (Golder) is pleased to provide Teck Coal Limited (Teck) with the following report on the 2020 local aquatic effects monitoring program (LAEMP) for Teck's Coal Mountain Mine (CMm, formerly Coal Mountain Operations [CMO]) in the Elk Valley. This study represents the second year of monitoring under the approved study design (Golder 2019, 2020a) to satisfy requirements under permits.

1.1 Background

Teck maintains and operates five steelmaking coal mines in the Elk River watershed: Fording River Operation (FRO), Greenhills Operation (GHO), Line Creek Operation (LCO), Elkview Operation (EVO), and CMm (Figure 1.1-1). Discharges from the mines are authorized by the British Columbia Ministry of Environment and Climate Change Strategy (ENV) through Permit 107517, issued under the provisions of the *Environmental Management Act*.

Permit 107517 requires that Teck evaluate potential effects on aquatic life associated with the mines via a regional aquatic effects monitoring program (RAEMP). The RAEMP (Minnow 2015, 2018a,b, 2020a) and its predecessor programs (Minnow et al. 2007, 2011, 2012, Minnow 2014) provide comprehensive routine monitoring and assessment of potential mine-related effects on the aquatic environment downstream from Teck's coal mines in the Elk Valley every three years.

In addition to regional monitoring, Teck conducts LAEMPs to address local-scale uncertainties associated with potential mine-related aquatic effects. The study questions addressed by the LAEMPs are unique to each program and distinct from those of the RAEMP. The ultimate objective of all LAEMPs is to reduce uncertainty and thereby support effective environmental management decisions. Investigations undertaken in the LAEMPs can also inform refinement of the RAEMP, for example by developing refined interpretive tools or identifying locations of interest for ongoing inclusion in RAEMP monitoring. As the LAEMP's study questions are answered and uncertainty is reduced, the intent is that the scope of the LAEMP will be progressively reduced. All LAEMPs are intended to eventually be discontinued.

The CMm LAEMP was initiated by Teck in response to findings from regional biological monitoring conducted between 2015 and 2017 (Minnow 2018 a,b), the routine chronic toxicity monitoring program (Golder 2018a), and an aquatic health assessment conducted to support planning for care and maintenance at CMm (Golder 2017). Specifically, the results of RAEMP monitoring between 2015 and 2017 indicated alteration of the benthic invertebrate community (BIC) in Corbin Creek and in Michel Creek immediately downstream of Corbin Creek relative to stations upstream in Michel Creek, local reference areas, and the regional normal range. Concurrently, the chronic toxicity monitoring program reported effects to the invertebrate test species *Hyalella azteca* and *Ceriodaphnia dubia* exposed to water collected from the compliance monitoring point in Michel Creek downstream of Corbin Creek. Follow-up testing attributed the observed chronic toxicity test responses to nickel (Nautilus Environmental 2018) and an evaluation of published toxicity data for nickel supported the interpretation that nickel could be the cause of observed changes to the BIC (Golder 2017).

The objective of the CMm LAEMP was specified in amendments to Permit 107517 that were issued by ENV on 25 August 2018 and 4 April 2019. Specifically, the CMm LAEMP was required to "assess the magnitude and extent of influence from CMm on water quality, calcite, and benthic invertebrate communities downstream of CMm, and to assess what factors are contributing to the observed effects". The 2019 CMm LAEMP study design (Golder 2019) was developed to address this permit requirement. Sampling began in September 2018 under a preliminary study design. Finalization of the study design was in completed in 2019, with updates in 2020 (Golder 2020a); sampling was conducted under the approved study design in September 2019 and 2020.

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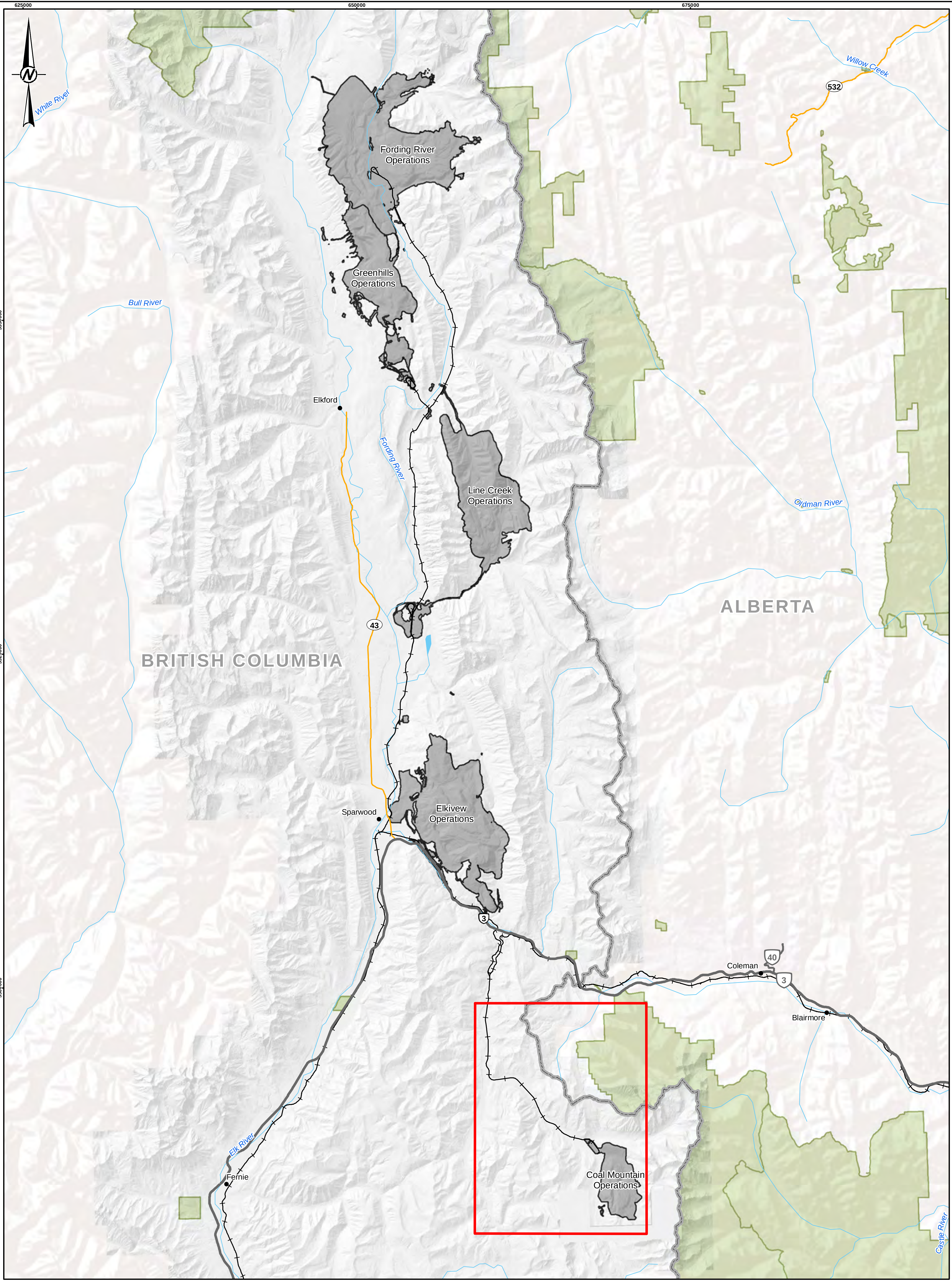

LEGEND

- CITY / TOWN / COMMUNITY
- PRIMARY HIGHWAY
- SECONDARY HIGHWAY
- RAILROAD
- WATERCOURSE
- BRITISH COLUMBIA-ALBERTA BOUNDARY
- COAL MINING OPERATION
- PARK / PROTECTED AREA
- PROJECT LOCATION
- WATERBODY

0 5 10

1:275,000 KILOMETRES

REFERENCE(S)

BASE DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
DATUM: NAD 83 PROJECTION: UTM ZONE 11

CLIENT
TECK COAL LIMITED

PROJECT
COAL MOUNTAIN OPERATION (CMO) LOCAL AQUATIC ENVIRONMENTAL MONITORING PROGRAM (LAEMP)

TITLE
CMO LAEMP PROJECT LOCATION

CONSULTANT

GOLDER

YYYY-MM-DD	2021-06-30
DESIGNED	KH
PREPARED	DR
REVIEWED	KH
APPROVED	RS

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1.2 Study Questions and Scope

The CMm LAEMP study questions were developed in consultation with the Elk Valley Environmental Monitoring Committee (EMC) to meet the objectives specified in the 25 August 2018 and 4 April 2019 amendments to Permit 107517. The study questions define the scope of the CMm LAEMP by explicitly defining the intended use of the data. The CMm LAEMP study questions are:

1) *What are the magnitude and spatial extent of influence from CMm on water quality, calcite, sediment quality, and benthic invertebrate communities in Michel Creek downstream of CMm, how are these conditions changing over time, and are the conditions expected?*

2) *How do spatial and temporal patterns in the benthic invertebrate communities correspond to water quality, calcite, sediment quality, and other potential stressors, and what does this tell us about what factors are causing observed effects?*

The study questions are intended to address uncertainties and information gaps identified by the EMC and the CMm care and maintenance aquatic health assessment (Golder 2017). The study questions address the nature, extent, and cause(s) of observed effects on biota in Michel Creek and are intended to inform decisions regarding water quality management at CMm.

In addition to addressing the study questions, this report integrates information from other relevant monitoring studies in the Michel Creek watershed to help characterize and understand potential effects of activities at CMm on fish and aquatic-dependent wildlife.

1.3 Linkages to Adaptive Management

As discussed in Section 1.1, the CMm LAEMP was initiated in response to findings of the RAEMP and other investigations that indicated unexpected biological conditions in Michel Creek. The decision to initiate a LAEMP was made under the response framework of the Water Quality Adaptive Management Plan for Teck Coal in the Elk Valley (hereafter, 'AMP' [Teck 2018a]). The AMP provides detailed information on the adaptive management framework, a series of Management Questions and associated Key Uncertainties, the response framework, continuous improvement procedures, linkages between the AMP and other Elk Valley Water Quality Plan (EVWQP) programs, and AMP reporting. The AMP was developed by Teck to support implementation of the EVWQP to achieve water quality and calcite targets, to protect human health and the environment (and where necessary, restore it), and to facilitate continual improvement of water quality management in the Elk Valley.

In addition to addressing the CMm LAEMP study questions on an annual basis, monitoring data from the CMm LAEMP will contribute to the full monitoring dataset assessed every three years within the RAEMP. Combined data from the RAEMP and the LAEMPs inform the AMP to address the following questions:

- AMP Management Question #2: Will aquatic ecosystem health be protected by meeting the long-term site performance objectives?
- AMP Management Question #5: Does monitoring indicate that mine-related changes in aquatic ecosystem conditions are consistent with expectations?

Draft biological triggers were developed in the 2018 AMP (Teck 2018a) under Management Question 5. Assessment of the biological triggers is provided in Appendix A; in brief, draft biological triggers were developed for three measurement endpoints:

- percent EPT (% EPT; Ephemeroptera, Plecoptera, and Trichoptera)
- benthic invertebrate tissue selenium (BIT Se)
- Westslope Cutthroat Trout muscle tissue selenium (WCT Se)

The third trigger does not apply directly to the CMm LAEMP, because fish tissue selenium is not included in the CMm LAEMP, but is considered as supporting information (Sections 2.8, 4.0 and 6.0).

The method of assessment for the biological triggers reflects refinements made in consultation with the EMC since the draft triggers were developed in the 2018 AMP (Teck 2018a). The 2020 CMm LAEMP represents the first time that biological triggers will be evaluated and reported for CMm. Through future iterative biological trigger evaluations, the process and/or biological triggers may adjust over time.

Following the adaptive management framework, data collected as part of the CMm LAEMP will also be used to inform:

- understanding of conditions in Michel Creek
- interpretation of information collected under routine chronic toxicity monitoring and other programs
- decisions on environmental management at CMm
- potential adjustments to the 2021 CMm LAEMP study design

1.4 Site Activities and Water Management at CMm

Mining activity at Coal Mountain began around 1908 with small underground mines and has continued intermittently for over a century. Open pit operations began in 1975 and mining progressed under various owners until Teck took ownership of CMm in 2008 (Teck 2017a). Coal Mountain ceased active mining and processing operations on 30 April 2019 and made the transition into a care and maintenance (C&M) phase on 1 May 2019. Reclamation efforts will increase through C&M and will be guided by the plans outlined in Coal Mountain's 2017 Closure Plan (Teck 2017b). Following C&M, closure (2028 to 2036) and post closure (2036 and beyond) activities will be carried out at CMm, which will include decommissioning of infrastructure, remediation, and revegetation, as appropriate.

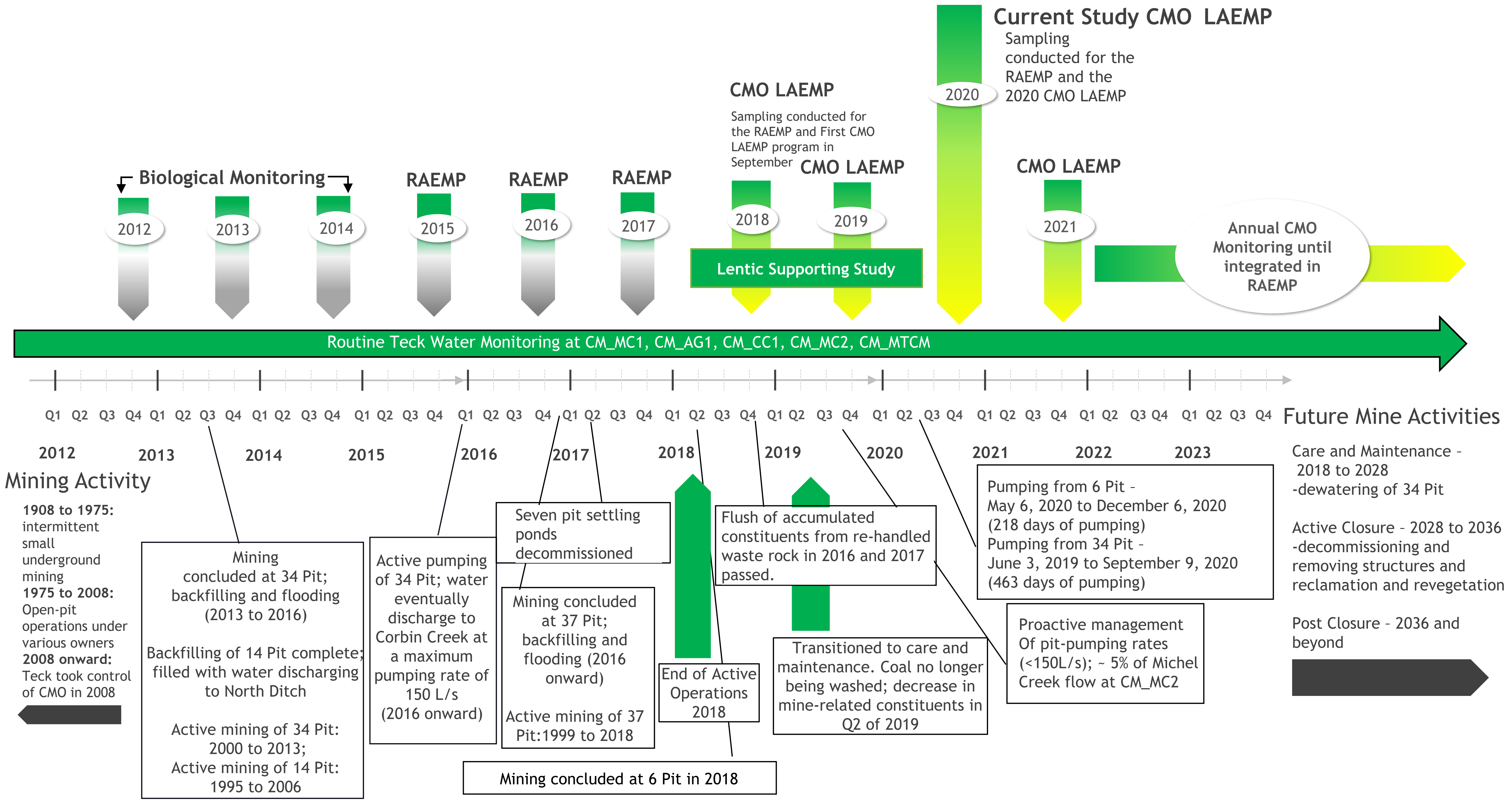
During operations between 2008 and 2019, CMm consisted of four pits: 6 Pit, 14 Pit, 34 Pit, and 37 Pit (Teck 2017a). Mining in 14 Pit concluded in 2006, 34 Pit in 2013, 37 Pit and 6 Pit in 2018. The 14 Pit, 34 Pit, and 37 Pit have been fully (14 Pit) and partially (34 Pit and 37 Pit) backfilled with waste rock and refuse. Water storage capacity of the pits have been maximized and pit pumping is required for geotechnical safety. Current pit dewatering practices at CMm direct water to backfilled and dormant pits or to established and permitted mining contact water collection systems, which eventually discharge to Corbin Creek. The Seven Pit Settling Pond system was successfully decommissioned in 2017.

The surface water management system at CMm is designed to capture all mine contact surface water. The water management system includes:

- a three-pond system for settling out total suspended solids (Corbin Creek Dam and the west and east Main Interceptor Sedimentation Ponds)
- clean water diversions to move clean water around mine disturbed areas
- North and West Ditches to convey contact water to the ponds
- rock drains utilized in creeks where there is spoiling of waste rock
- infiltration sumps used to collect additional runoff from other structures

Water quality is monitored at CMm as required under Permits 4750 and 107517 (i.e., maximum TSS concentration permitted in the discharge is 50 mg/L). The permits require water quality be maintained to meet these permit limits, and the water must not cause greater than 50% mortality in 96-hour rainbow trout (*Oncorhynchus mykiss*) single concentration toxicity tests (EPS 1/RM/13 2nd edition, December 2000) or greater than 50% mortality in 48-hour *Daphnia magna* single concentration toxicity tests (EPS 1/RM/14 2nd edition, December 2000).

Figure 1.4-1: Timeline of Mining, Water Management, and Monitoring in the CMO Area



Between 2016 and 2018, concentrations of several constituents were identified as increasing in water discharged from Corbin Dam at monitoring station CM_CCPD and at the Main Interceptor Sedimentation Ponds (CM_SPD) (Teck 2019). The constituents were associated with the flush of blasting residues (i.e., nitrate, ammonia and nitrite) and with metal leaching (i.e., sulphate, boron, calcium, cobalt, lithium, magnesium, manganese, molybdenum, nickel, potassium, selenium, sodium, and hardness).

Between 2018 and 2019, a decrease in mining-related constituents (i.e., nitrate, cobalt, sulphate, and total dissolved solids [TDS]) was measured at CM_CCPD and at CM_SPD, resulting in an improvement to water quality downstream of CMm in Corbin Creek and Michel Creek (Teck 2019). The decrease was in part attributed to completion of the flush of accumulated constituents resulting from re-handled waste rock in 2016 and 2017. It was suspected that re-handling of waste rock disturbed constituents that had accumulated in the rock and caused a flush of constituents downstream of CMm when the waste rock was being disturbed. In addition, coal was no longer being washed as CMm transitioned to C&M in May 2019; therefore, plant wash-down discharge to the North Ditch or Main Interceptor Sedimentation Ponds had ceased.

In 2019, pumping rates from 34 Pit were below maximum authorized rates (i.e., 150 L/s) and no pumping from 6 Pit occurred in 2019; 6 Pit filled in naturally in 2019 but did not decant. Water storage was maximized in 2019. In 2020, active dewatering of 34 Pit and 6 Pit occurred at rates below the maximum authorized rates. Pumping from 6 Pit began again on 6 May 2020 when 6 Pit reached its storage capacity and continued into 2021. Pumping from 34 Pit began on 3 June 2019 and continued until 9 September 2020.

Runoff from the local waste rock spoils, pit wall runoff, groundwater inflow and direct precipitation is received by 6 Pit. Outflows include evaporation and pumping. Teck's preferred water management strategy is to maintain 6 Pit empty of water, if safe to do so. Water is pumped from 6 Pit to the Corbin Creek rock drain and then flows to the Corbin Pond, Corbin Creek, and eventually Michel Creek. Water quality in 6 Pit has historically had higher concentrations of sodium and chloride than are observed in other water on site (SRK 2021).

Excess water from 37 Pit and runoff from local waste rock spoils, pit wall runoff, runoff from waste rock backfill within 34 Pit, groundwater inflow, and direct precipitation are received by 34 Pit. Outflows from 34 Pit include evaporation and active pumping to maintain the water level below the natural decant level. Water from 34 Pit is pumped to a sump downstream of the 14 Pit horizontal drain discharge, eventually flowing to the North Ditch and reporting to Michel Creek. Pumping of 34 Pit occurs at a rate synchronized to seasonal flow in Michel Creek at monitoring location CM_MC2, targeting a pump rate of approximately 5% of CM_MC2 flow up to the maximum allowable rate (i.e., 150 L/s) during higher-flow months (April to November). An evaluation of cobalt data from 2016 to 2018 indicated that cobalt concentration was highest in Michel Creek when 34 Pit made up a greater proportion of flow at CM_MC2 (Teck 2019). This condition occurs at the end of freshet when pumping remains high and in-stream flows are low.

In 2020, there were no exceedances of compliance limits at CMm's compliance point, CM_MC2. The source discharge analysis for order constituents revealed a long-term increasing trend for sulphate in Corbin Creek (CM_CC1) (Teck 2020). There were cobalt results above the British Columbia Water Quality Guideline (BC WQG) at CM_MC2 and upstream in Corbin Creek at CM_CC1. There were four nitrite results above the BC WQG at CM_CC1, but concentrations of nitrite as N at CM_CC1 in 2020 were similar to or lower than previous years. For sulphate, cobalt, and TDS, evidence of long-term increasing trends in the receiving environment at CM_MC2 are associated with increasing trends in discharges from the Corbin Sediment Pond (CM_CCPD) and from the Main Sediment Pond (CM_SPD). In 2019, concentrations of many constituents were lower than in 2018 at CM_MC2. In 2020, this reduction was still apparent for some constituents.

Consistent with the AMP response framework, Teck took steps to manage the release of mining-related constituents to Michel Creek. Teck updated the Coal Mountain Operations Water and Load Balance Model and conducted a detailed evaluation of data from 2016 to 2018 to optimize the pumping plans for 34 Pit and 6 Pit. The thresholds set out in these optimized plans were designed to help Teck meet permit limits at CM_MC2 and meet the aquatic effects benchmarks in Michel and Corbin creeks. Proactive pit pumping management since 2019 has had an overall positive effect on Teck's ability to manage the release of mining-related constituents to Corbin Creek.

The decrease in constituent concentrations in 2019 was attributable, in part, to CMm transitioning to care and maintenance in May 2019 and the end of the flush of accumulated constituents that was a result of re-handled waste rock in 2016 and 2017. The 2019 decrease was also attributable to proactive pit pumping management of 34 Pit and the cessation of pumping from 6 Pit. However, by early 2020 6 Pit had reached its maximum storage capacity and thus had to be discharged. Pumping from 6 Pit began in May 2020 and continued throughout the year. This the primary cause of the observed increase in concentrations of some constituents at CM _CCPD in 2020 compared to 2019.

In addition to the influence of past and current activities at CMm on Michel Creek, there are other anthropogenic influences that cannot clearly be accounted for, including potential influence from the railway loadout, potential groundwater movement of constituents to Michel Creek, and Tent Mountain sediment pond discharges.[1] These potential influences have been taken into consideration when interpreting the data; however, they are believed to represent minor uncertainties in the interpretation of CMm influence. Despite these uncertainties, results to date suggest that the greatest influence on water quality in Michel Creek has been mining activities.

1.5 Conceptual Site Model

A conceptual site model for the CMm LAEMP is shown in Figure 1.5-1, providing an illustrative depiction of the relationships between activities at CMm and the ways in which those activities might alter the environment and affect biological receptors. The conceptual model illustrates potential stressors, pathways, and receptors for potential effects of CMm on water quality and aquatic biota in Michel Creek. Figure 1.4-1 also summarizes existing and planned monitoring under the CMm LAEMP and the RAEMP to evaluate potential effects to aquatic biota.

The CMm LAEMP evaluates pathways related to the study questions by monitoring the following:

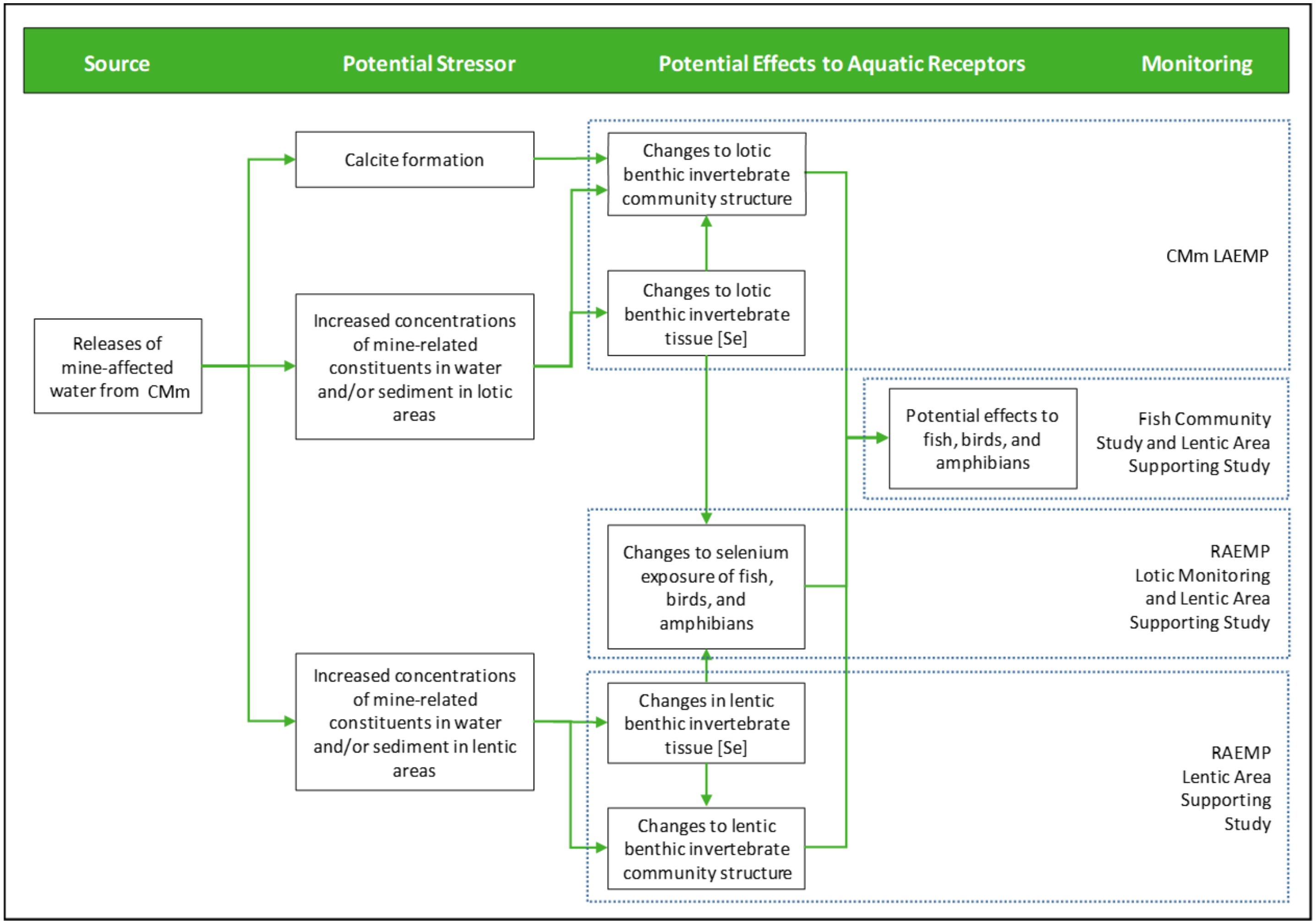
- **Supporting Environmental Variables:** to provide information on water quality, calcite, sediment quality, and physical habitat characteristics to aid in interpretation of biological data.
- **Benthic Invertebrate Community (BIC):** to characterize potential effects of CMm on the BIC resulting from changes in water and sediment quality or other mine-related stressors.
- **Benthic Invertebrate Tissue Chemistry (BIT):** to provide a measure of selenium exposure to aquatic biota over time, relative to historical conditions, relative to reference areas, and relative to benchmarks for potential effects.

[1] The Tent Mountain sediment pond discharges at certain times of the year into Michel Creek near MIDAG.

Although the conceptual model depicted in Figure 1.5-1 includes pathways for exposure of benthic invertebrates to both water and sediment, the interpretation of data for the CMm LAEMP focuses on the aqueous exposure pathway. Work completed under the RAEMP (Minnow 2020a) and the lotic sediment toxicity program has highlighted uncertainty around the relevance of lotic sediment quality to the BIC. Importantly, BIC samples are collected from riffle habitats that are highly erosional and contain very little to no surficial fines. The dominant taxa in these areas (EPT) tend to be associated with the hard gravel and cobble substrates that predominate in erosional areas. Depositional areas are small and uncommon on Michel Creek, and sediment samples for sediment quality analysis, although collected within the same general reaches as the BIC samples, are located in low-energy areas along the margins of the creek, in back eddies, or in small side channels that do not represent the habitat where the BIC were collected. Thus, there is no significant operable pathway for exposure of the sampled BIC to the measured sediment quality.

The conceptual model depicted in Figure 1.5-1 includes a pathway for potential effects of tissue selenium on the BIC because selenium is widely understood to be a bioaccumulative substance and the most reliable basis for evaluating potential effects is via bioaccumulated concentrations. In contrast, the conceptual model does not include tissue-based effects pathways for other constituents, including nickel. Like all metals, nickel is bioconcentrated to some extent from water, but it is not considered to be a bioaccumulative substance. More importantly, the mechanisms of toxic action of nickel relate to exposure to external aqueous nickel ion, not bioaccumulated concentrations (Brix et al. 2016). Therefore, the most reliable basis for evaluating potential effects of nickel is aqueous concentrations. This topic is discussed in more detail in Section 3.6.

Figure 1.5-1: Coal Mountain Mine Local Aquatic Effects Monitoring Program Conceptual Site Model



Note: CMm = Coal Mountain Mine; LAEMP = local aquatic effects monitoring program; RAEMP = regional aquatic effects monitoring program; [Se] = selenium concentration

2.0 METHODS

Biological monitoring areas included in the CMm LAEMP and corresponding water quality monitoring stations are listed in Tables 2.1-1 and 2.1-2 and shown on Figure 2.1-1. Monitoring areas were selected to delineate the spatial extent of observed effects to physical and biological conditions and to provide a basis for evaluating potential future changes, including those related to water quality mitigation. Areas monitored in previous years were retained to provide temporal consistency. Stations were added on Michel Creek downstream of Andy Good Creek (MIDAG) and upstream of Leach Creek (MIULE) to help delineate how far downstream from Corbin Creek effects are observed. Reference locations on Andy Good Creek (AGCK) and Leach Creek (LE1) were included, in addition to MI25 on Michel Creek upstream of mine operations, to characterize local reference conditions.

Components monitored under the CMm LAEMP in 2020 were:

- water quality
- calcite index
- sediment quality
- BIC
- BIT Se

These components, along with the supporting physical habitat variables, were used to answer the two CMm LAEMP study questions (Section 1.2). The spatial distribution of the stations along Michel Creek supported the determination of spatial extent of downstream influence from CMm on the monitoring components (Study Question #1). Reference stations enabled the characterization of local reference conditions and the magnitude of mine-related changes to monitoring components (Study Question #1). Historical data from the RAEMP and previous studies within the CMm area were used to assess how conditions have changed over time (Study Question #1). The CMm water and load balance report (SRK 2016) and update (SRK 2019) were used to assess whether water quality conditions were expected (Study Question #1). The aquatic health assessment (Golder 2017) was used to assess if the effects to the BIC were expected based on the water quality conditions.

In 2020, supplemental sampling stations CM_CM2, MIDAG-S1, and MIDAG-S2 between MIDCO and MIDAG were studied as part of the Nickel Benchmark Study. These additional stations were studied to improve characterization and delineation of nickel concentrations and BIC effects in Michel Creek. Sampling was conducted in co-ordination with the CMm LAEMP field program for efficiency, but this sampling is not intended to be a permanent change or addition to the CMm LAEMP study design.

Supporting environmental information (i.e., water quality, calcite, sediment quality, and physical habitat characteristics) gathered for Study Question #1 was considered alongside the BIC data to answer how spatial and temporal patterns correspond to the BIC data and to suggest which factors may be causing observed effects in the BIC (Study Question #2).

Sampling was conducted by Minnow Environmental Inc. (Minnow) in September 2020 following the 2019 CMm LAEMP Study Design (Golder 2019), with minor updates in 2020 (Golder 2020a). Sample collection, laboratory analysis, and data analysis methods for each component are consistent with methods developed for the RAEMP (Minnow 2018b, 2020) and are presented in Sections 2.2 to 2.6. To be consistent with previous monitoring and RAEMP methods, the BIC sampling was conducted in September.

Table 2.1-1: Monitoring Locations and Replication of Sampling Components for the 2020 Coal Mountain Mine in the Local Aquatic Effects Monitoring Program

Watercourse	Biological Monitoring Areas	Teck Water Monitoring Code[(a)]	Location Description	Distance Downstream of Corbin Creek Confluence (km)	UTM Coordinates		Replication of Sampling Components				
							Water Chemistry	Calcite Index	Sediment Chemistry	Benthic Invertebrate	
					Easting	Northing				Community	Tissue Chemistry
Michel Creek	MI25[(b)]	CM_MC1	reference location, u/s of CMm	-6.3	668226	5482795	1	3	3	3	3
Andy Good Creek	AGCK[(c)]	CM_AG1	reference location, outside of CMm influence	-	667551	5488669	1	3	3	3	3
Leach Creek	LE1[(c)]	-	reference location, u/s of Michel Creek confluence	-	659512	5493527	1	3	3	3	3
Michel Creek	MIUCO[(b)]	-	u/s of Corbin Creek confluence	-0.82	668203	5486653	1	3	5	3	3
Corbin Creek	CORCK[(b)]	CM_CC1	Corbin Creek u/s of Michel Creek confluence	-	668563	5487395	1	3	5	3	3
Michel Creek	MIDCO[(b)]	-	d/s of Corbin Creek confluence	+0.94	667757	5487611	1	5	5	5	5
Michel Creek	MIDAG[(b)]	-	d/s of Corbin Creek and Andy Good Creek confluences	+5.27	665212	5489264	1	3	5	3	3
Michel Creek	MIULE[(c)]	-	d/s of Corbin Creek and Andy Good Creek confluences but u/s of Leach Creek confluence	+13.84	660503	5493048	1	3	5	3	3
Michel Creek	MI5[(b)]	-	d/s of Leach Creek confluence	+18.25	659497	5496573	1	3	5	3	3

a) Teck Water Monitoring stations that are in the proximity of the biological monitoring areas are listed; UTM coordinates represent coordinates for the biological monitoring areas not the water monitoring stations.

b) Sampling conducted for and reported under the RAEMP. Relevant data also reported and interpreted under the CMm LAEMP.

c) CMm LAEMP station. Station will be included as RAEMP study station in the next cycle – 2021 to 2023 Design Plan (Minnow 2020b).

u/s = upstream; d/s = downstream; CMm = Coal Mountain Mine.

Table 2.1-2: Monitoring Locations and Replication of Sampling Components for the Nickel Benchmark Study

Watercourse	Biological Monitoring Areas	Teck Water Monitoring Code[(a)]	Location Description	Distance Downstream of Corbin Creek Confluence (km)	UTM Coordinates		Replication of Sampling Components				
							Water Chemistry	Calcite Index	Sediment Chemistry	Benthic Invertebrate	
					Easting	Northing				Community	Tissue Chemistry
Michel Creek	CM_MC2	CM_MC2[(b)]	u/s of Andy Good Creek confluence and d/s of MIDCO	+1.80	667252	5488134	1	3	5	3	3
Michel Creek	MIDAG-S1	-	d/s of Andy Good Creek confluence and u/s of MIDAG	+3.05	666479	5488344	1	3	5	3	3
Michel Creek	MIDAG-S2	-	d/s of Andy Good Creek confluence, in the vicinity of Trent Creek and u/s of MIDAG	+4.47	665776	5488812	1	3	5	3	3

a) Teck Water Monitoring stations that are in the proximity of the biological monitoring areas are listed; UTM coordinates represent coordinates for the biological monitoring areas not the water monitoring stations.

b) Compliance Point.

u/s = upstream; d/s = downstream; CMm = Coal Mountain Mine.

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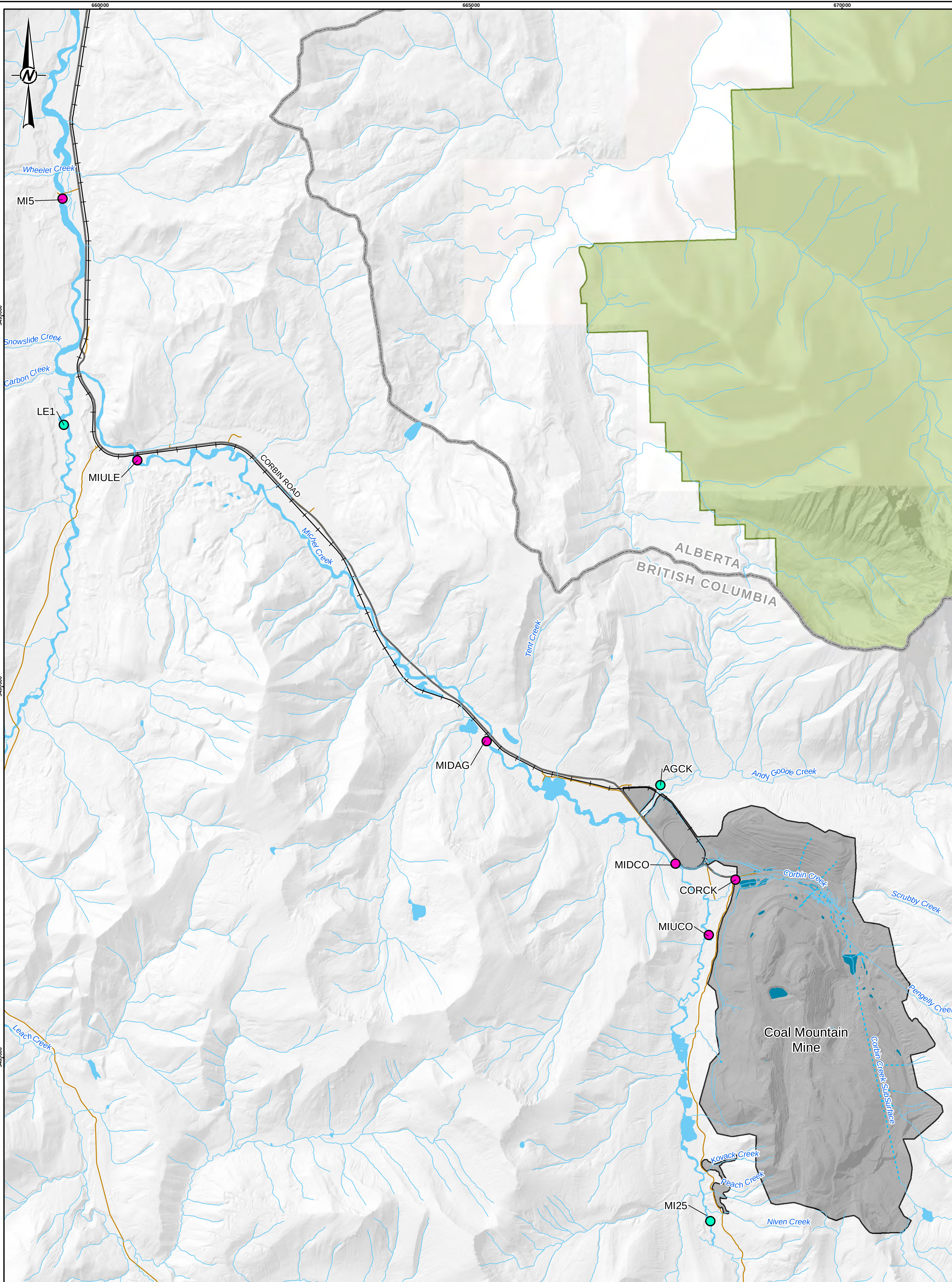

LEGEND

- MINE-EXPOSED STATION
- REFERENCE STATION
- ROAD - PAVED
- RAILROAD
- SURFACE FLOW WATERCOURSE
- SUBSURFACE FLOW WATERCOURSE
- BRITISH COLUMBIA-ALBERTA BOUNDARY
- CMM C-84 PERMIT BOUNDARY
- PARK / PROTECTED AREA
- WASTE WATER/SEDIMENT POND
- WATERBODY

0 1 2

1:50,000 KILOMETRES

REFERENCE(S)

BASE DATA OBTAINED TECK COAL LIMITED AND FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
DATUM: NAD 83 PROJECTION: UTM ZONE 11

CLIENT
TECK COAL LIMITED

PROJECT
COAL MOUNTAIN MINE LOCAL AQUATIC EFFECTS MONITORING PROGRAM

TITLE
MONITORING LOCATIONS FOR THE COAL MOUNTAIN MINE LOCAL AQUATIC EFFECTS MONITORING PROGRAM

CONSULTANT

GOLDER

YYYY-MM-DD	2021-06-30
DESIGNED	KH
PREPARED	DR
REVIEWED	KH
APPROVED	RS

PROJECT NO.	CONTROL	REV.	FIGURE
20449345	M_WQ_002	0	2.1-1

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25mm

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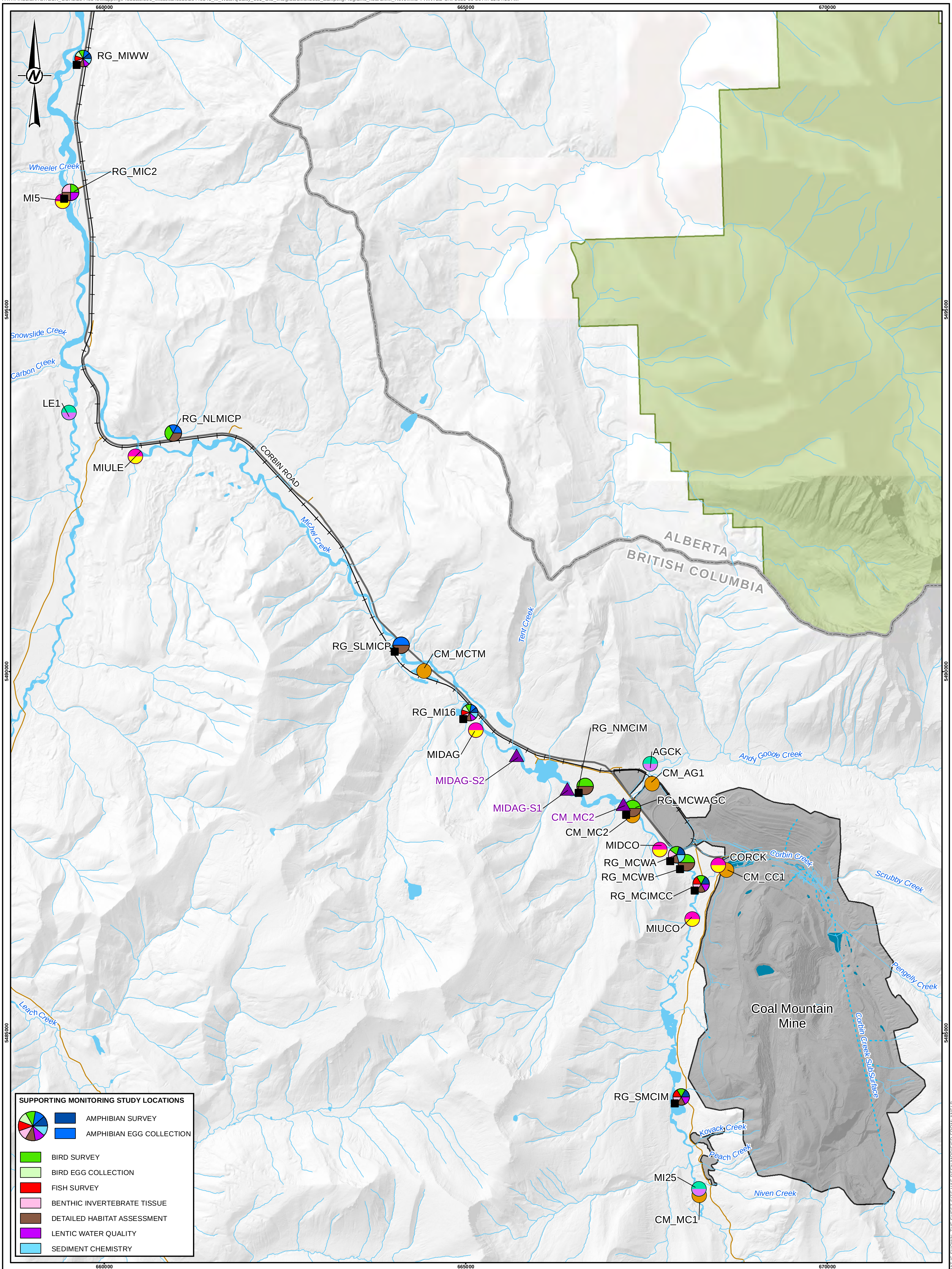

REFERENCE(S)
BASE DATA OBTAINED TECK COAL LIMITED AND FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
DATUM: NAD 83 PROJECTION: UTM ZONE 11

CLIENT
TECK COAL LIMITED

PROJECT
COAL MOUNTAIN MINE LOCAL AQUATIC EFFECTS MONITORING PROGRAM

TITLE
INTEGRATED MONITORING LOCATIONS FOR SAMPLING PROGRAMS NEAR THE COAL MOUNTAIN MINE

CONSULTANT
GOLDER

YYYY-MM-DD	2021-06-30
DESIGNED	KH
PREPARED	DR
REVIEWED	KH
APPROVED	RS

PROJECT NO.	CONTROL	REV.	FIGURE
20449345	M_WQ_001	0	2.1-2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B
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2.1 Water Quality

Water quality is routinely monitored by Teck at stations within the CMm LAEMP as required by Permit 107517 to support management decisions (Table 2.1-2; Figure 2.1-1). Data are reported annually and incorporated into the annual CMm LAEMP where appropriate. Water quality samples are also collected in lentic areas as part of the RAEMP and at benthic invertebrate sampling stations to support the biological data as part of the CMm LAEMP. Detailed methods for sampling and laboratory analysis of water quality samples are described in Section 7.0 of the RAEMP (Minnow 2018b) and are provided in brief below.

2.1.1 Sample Collection

In 2020, water quality samples were collected from mine-influenced and reference areas during biological monitoring, following the 2019 CMm LAEMP study design (Golder 2019, 2020a). One sample was collected from each area in September 2020. Following RAEMP methods, water samples were collected far enough upstream or downstream of tributaries or discharges to avoid areas of incomplete lateral or vertical mixing and upstream from bridges or other structures to avoid potential associated contamination.

Temperature, pH, dissolved oxygen, and specific conductivity were measured at each sampling area using a calibrated water quality meter. Water chemistry samples were collected by wading into a mid-channel area, moving from downstream to upstream, to avoid disturbing the substrate. Clean sample bottles provided by the laboratory were filled to minimize the amount of air in the container, consistent with the *British Columbia Field Sampling Manual* (BC ENV 2013). Water samples for analysis of dissolved organic carbon and dissolved metals were field filtered with a 0.45 µm membrane and preserved according to laboratory specifications. Samples were kept cool until being shipped to a qualified laboratory for analysis.

2.1.2 Laboratory Analysis

Samples were shipped to ALS Environmental (ALS; Burnaby BC) for analysis of the analytes listed in Permit 107517. Analytical methods were consistent with the *British Columbia Environmental Laboratory Manual* (BC ENV 2020).

2.1.3 Data Analysis

Water quality data collected in 2020 were screened against BC water quality guidelines (WQGs) for protection of freshwater aquatic life (BC ENV 2019, 2021). In the absence of BC WQGs, guidelines were adopted from Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines (CCME 1999), Environment and Climate Change Canada (ECCC) Predicted No-effect Concentrations (PNECs; ECCC 2018), or ECCC draft Federal Environmental Quality Guidelines (FEQGs; ECCC 2017). Water quality at MIDCO was screened against Permit 107517 Compliance Limits for selenium, nitrate and sulphate, and Site Performance Objectives (SPO) for cadmium, as specified in Permit 107517. Water quality at all stations was screened against EVWQP benchmarks for selenium, nitrate, sulphate, and cadmium. Where guidelines or benchmarks were not available, or concentrations were higher than an available guideline or benchmark, interim screening values were considered and adopted where applicable; nickel and cobalt were screened against interim screening values, as these constituents were previously identified as potential contributors to effects in Corbin and Michel creeks (Golder 2017), and TDS was screened against interim screening values because no guideline or benchmark was available. Table 2.2-1 provides the EVWQP benchmarks and screening values included in the CMm LAEMP water quality screening, with supporting rationale provided in Appendix E.

Table 2.2-1: EVWQP Benchmarks and Interim Screening Values

Receptor and Constituent	Unit	Benchmark or Screening Value[a]		
		Level 1	Level 2	Level 3
Invertebrates				
Sulphate	mg/L	625	729	1,315
Nitrate[b]	mg/L as N	$=10^{(1.0003x(Log(hardness))-b)}$		
		b = 1.82	*b* = 1.60	*b* = 0.98
Dissolved Cadmium	µg/L	$=(10^{(0.83*Log(hardness)-b)}$		
		b = 2.53	*b* = 2.24	*b* = 1.28
Total Cobalt	µg/L	$= exp^{(0.414x(ln(hardness)) – b)}$		
		b = 0.99	*b* = 0.3	*b* = -0.29
Total Nickel	µg/L	5.3	15	22
Total Selenium	µg/L	104	500	-
Total Dissolved Solids	mg/L	1,000	1,750	3,000
Fish				
Sulphate	mg/L	499	674	1,173
Nitrate	mg/L as N	$=10^{(1.0003x(Log(hardness))-b)}$		
		b = 1.35	*b* = 1.22	*b* = 0.87
Dissolved Cadmium	µg/L	$=10^{(0.83*Log(hardness)-b)}$		
		b = 2.02	*b* = 1.37	*b* = 1.31
Total Cobalt	µg/L	$= exp^{(0.414x(ln(hardness)) – b)}$		
		b = -3.92	-	-
Total Nickel	µg/L	$10^{(log(b)- 0.763\times(log(103)-log(hardness)) - 0.073x(Log(0.5)-Log(DOC))+0.242x(7.4-pH))}$		
		b = 88	*b* = 134	*b* = 278
Total Selenium	µg/L	19	74	-
Total Dissolved Solids	mg/L	1,000	2,000	3,000
Amphibians				
Sulphate	mg/L	481	822	1,545
Nitrate	mg/L as N	$=10^{(1.0003)x(Log(hardness))-b}$		
		b = 1.04	*b* = -0.05	*b* = -0.65
Dissolved Cadmium	µg/L	$=10^{(0.83xLog(hardness)-b)}$		
		b = -0.914	-	-
Juvenile Birds				
Total Selenium	µg/L	203	-	-
Bird Reproduction				
Total Selenium	µg/L	394	-	-

a) Values for sulphate, nitrate, cadmium and selenium are EVWQP benchmarks; values for cobalt, nickel and TDS are interim screening values.

b) Nitrate screening values are for Elk River.

"-" = not derived; exp = exponent. EVWQP = Elk Valley Water Quality Plan.

Water quality data collected under Permit 107517 from 2018 to 2020, and data collected from 2012 to 2020 for the RAEMP and its predecessor programs (Minnow et al. 2007, 2011, 2012, Minnow 2014, 2015, 2018a, 2020a) and samples collected from the Nickel Benchmark Study stations (CM_MC2, MIDAG-S1, and MIDAD-S2) were plotted for comparison between reference and mine-influenced sites and to visualize spatial patterns. Additional water quality data collected by Teck during monthly or weekly routine monitoring at CORCK (water quality monitoring location CM_CC1), MIDCO (compliance point CM_MC2), and MI25 (water quality monitoring location CM_MC1) were plotted for visual assessment of temporal trends and comparison to the 2013 to 2020 SRK projected concentrations (SRK 2019). These projections were used to determine if the water quality conditions in 2020 were expected.

2.2 Calcite Index

Methods for monitoring calcite are described in Section 9.0 of the RAEMP (Minnow 2018b) and summarized in brief below. Methods for characterizing calcite are consistent with those used to monitor calcite as part of the regional calcite monitoring program (Lotic and Teck 2016), but data for the CMm LAEMP are collected at a localized scale in riffle habitat only, relevant to the biological sampling area.

2.2.1 Sample Collection

Calcite was measured at areas where benthic invertebrate samples were collected in 2020. Three measurements of calcite were collected from each mine-influenced and reference area, except at MIDCO where five measurements were collected.

Calcite was measured in association with BIC sampling, which involved measurement of 100 “pebbles” in the vicinity of each BIC replicate (Environment Canada 2012). The same methods for identifying calcite and recording the measurement were applied as for the regional calcite monitoring program (Lotic and Teck 2016). The calcite monitoring under the RAEMP and LAEMPs is conducted in riffle habitats within approximately 10 m of where each invertebrate community replicate sample is collected, whereas the regional calcite monitoring program involves calcite measurement in 100 m long areas that include glide and cascade habitats.

For calcite characterization, the presence (score = 1) or absence (score = 0) of calcite was recorded for each of the 100 particles. Degree of concretion was assessed by determining if the particle could be removed with negligible resistance (not concreted; score = 0), noticeable resistance but removable (partially concreted; score = 1), or immovable (fully concreted; score = 2). The calcite index was calculated as the sum of the calcite presence score (number of particles with calcite divided by the number of particles counted) and calcite concretion score (sum of particle concretion scores divided by the number of particles counted).

2.2.2 Data Analysis

Calcite data were considered for spatial trends by comparing the reference and mine-influenced areas and plotting them relative to previous results and the reference area normal range (i.e., 0 to 1) defined in the RAEMP (Minnow 2018b).

2.3 Sediment Quality

Methods for sampling and laboratory analysis of sediment samples are described in Sections 10.0 of the RAEMP (Minnow 2018b) and are summarized in brief below.

2.3.1 Sample Collection

Sediment samples were collected from mine-influenced and reference areas where BIC samples were collected in 2020. Five samples were collected from each mine-influenced area and three samples were collected from each reference area.

Sediment samples were collected using a spoon to collect deposits of sand and/or fines amongst the cobbles. When no such deposits were found, but there was evidence of fine deposits on rock surfaces, then the sediments were gently brushed off the rocks into sample containers. Supporting information (Section 2.4) were also recorded. Sediment samples were stored in a cooler with ice or ice packs and then transferred to a refrigerator at the end of the day.

2.3.2 Laboratory Analysis

Samples were shipped to ALS for analysis of moisture content, particle size, pH, total organic carbon (TOC), and metals (<2 mm fractions). The laboratory homogenized each sediment sample before analysis according to standard laboratory protocols. Analysis methods were consistent with the *British Columbia Environmental Laboratory Manual* (BC MOE 2016).

2.3.3 Data Analysis

Sediment quality data were compared to BC working sediment quality guidelines (WSQG) for the protection of freshwater aquatic life (BC ENV 2017), reference area concentrations, and sediment quality previously observed in the same areas. In addition, sediment quality data were plotted for visual examination of spatial and temporal variability. Data from 2018 to 2020 were plotted for all constituents for which a WSQG was available and visually assessed for temporal changes.

2.4 Physical Habitat Characteristics

Physical habitat characteristics can influence aquatic biota (Rosenberg and Resh 1992); therefore, supporting data were collected concurrent to the sediment and benthic invertebrate sampling programs to describe the sampling areas. The characteristics documented included physical water characteristics (i.e., water depth, temperature, velocity, pH, dissolved oxygen, and specific conductivity), substrate composition, colour, texture, and presence of aquatic vegetation and total organic carbon (TOC) content.

2.5 Benthic Invertebrate Community

Potential mine-related effects on BIC were evaluated by comparing BIC endpoints at mine-influenced stations to reference stations and to the regional normal ranges. Methods for sampling and laboratory analysis of BIC samples are described in Section 3.2 of the RAEMP (Minnow 2018b) and are summarized in brief below.

2.5.1 Sample Collection

Three BIC samples were collected from each mine-influenced and reference area except for MIDCO, the compliance station, where five samples were collected. Each sample was collected from a separate riffle at each stream area or from 50 m apart if the sampling area was one long riffle. Supporting habitat information was collected concurrent with benthic sampling, including calcite presence and substrate concretion scores (Section 2.3) and stream habitat characteristics (Section 2.5).

Collection methods were consistent with the *CABIN Field Manual: Wadeable Streams* (Environment Canada 2012). A 400-µm mesh kick net was used to collect a time-integrated sample. The reach sampled was traversed from bank to bank in an upstream direction for a collection time of three minutes. The kick net was held downstream of the sampler while the substrate in the top 5 to 10 cm was disturbed and rocks were overturned to dislodge invertebrates clinging to interstitial spaces and allow them to drift into the kick net. The collected material was transferred to labelled containers and preserved with 10% phosphate-buffered formalin.

2.5.2 Laboratory Analysis

BIC samples were sent to Cordillera Consulting, Summerland, BC for sorting and taxonomic identification. Organisms were identified to the lowest practical level of taxonomy (typically genus or species) using up-to-date taxonomic keys. Analysis methods were consistent with the *CABIN Laboratory Methods: Processing, Taxonomy, and Quality Control of Benthic Macroinvertebrate Samples* (Environment Canada 2014). Sorting efficiency and sub-sampling accuracy and precision were quantified using methods specified by Environment Canada (2014).

2.5.3 Data Analysis

The BIC endpoints that were evaluated at mine-influenced and reference stations were consistent with those used in the RAEMP: abundance (i.e., the number of organisms per 3 min kick); richness; Ephemeroptera-Plecoptera-Trichoptera (EPT) abundance and proportion (% EPT); and Ephemeroptera abundance and proportion (% E).

EPT taxa are particularly sensitive to poor water quality conditions in rivers and streams (Rosenberg and Resh 1993) and active anthropogenic activities near rivers can affect the abundance and diversity of EPT (Dudgeon 1984). Often the presence of EPT taxa in a river or stream indicates that it is within the tolerance limit for a number of environmental factors (e.g., water temperature, dissolved oxygen, nutrients, toxic chemicals and metals (Dudgeon 1984). Ephemeroptera (mayflies) are also good bioindicators of freshwater quality because they are only able to survive in rivers or streams that have good water quality (Chapman 1996). Therefore, EPT taxa and Ephemeroptera taxa were used as biological indicators in determining water quality in Michel Creek.

BIC endpoints were plotted for visual examination of spatial and temporal variability[2]. Mine-influenced stations were compared to reference stations, the regional and site-specific normal ranges (Section 2.5.3.1), and to historical data presented in the RAEMP and it's predecessor programs between 2012 to 2017 (Minnow et al. 2007, 2011, 2012, Minnow 2014,2015, 2018a, 2020a). Statistical analyses were also conducted on the BIC endpoints to compare mine-influenced stations to reference stations and to delineate spatial extent of effects (Section 2.5.3.2.1). Temporal changes were also evaluated, comparing 2020 data to previous years data to evaluate how BIC endpoints have changed over time (Section 2.5.3.2.2).

The relationship of % EPT and% E with aqueous nickel and cobalt concentrations was examined to further evaluate potential cause(s) of lower proportions of % EPT and % E. These constituents were chosen for follow-up comparisons because of results from early chronic toxicity testing that implicated nickel as the likely cause of BIC changes and identified a potential for cobalt to also contribute if concentrations increased (Golder 2017). In addition, the relationships between % EPT,% E and, percent fines, sand, gravel, cobble, and boulder, which were used as a habitat indicators, was examined to see if habitat differences could be related to spatial differences in % EPT and% E downstream of CMm. As discussed in Section 1.5, there is no operable pathway for effects of sediment chemistry on EPT in the sampled erosional habitats of Michel Creek and it is not assessed further herein.

[2] The non-parametric ordination method of multidimensional scaling (MDS) was used to analyze the data in the 2019 CMm LAEMP report (Golder 2020b) following an EMC recommendation during the April 2020 EMC engagement meeting. However, after review of the 2019 CMm LAEMP, the EMC commented on the usefulness (or lack thereof) of MDS in answering the study question, which subsequently resulted in the decision to remove the analysis from the 2020 CMm LAEMP.

2.5.3.1 Regional and Site-Specific Normal Ranges

The BIC data collected as part of the CMm LAEMP were compared to the regional and site-specific normal ranges for each community endpoint. Regional normal ranges were developed for the RAEMP using pooled reference area data from 2012 to 2019 (Table 2.5-1; Minnow 2020a). Prediction intervals were calculated as 95th percentiles, and the upper and lower prediction intervals from each replicate sample were used, when applicable. Site-specific normal ranges, which are calculated annually and specific to that years data, were calculated using linear mixed-effects models to relate benthic invertebrate community endpoints as described in Appendix J of the RAEMP (Minnow 2020a).

Table 2.5-1: Benthic Invertebrate Community Regional Normal Ranges

Variable	Unit	Regional Normal Range	
		Lower Limit	Upper Limit
Benthic invertebrate taxonomic richness (lowest practical level)	no. of taxa per sample	25	48
Benthic invertebrate abundance	no. of organisms per sample (per 3 min kick)	1,812	26,922
Percent Ephemeroptera, Plecoptera, Trichoptera	%	50	98
Ephemeroptera, Plecoptera, Trichoptera abundance	no. of organisms per sample (per 3 min kick)	909	26,270
Percent Ephemeroptera	%	21	82
Ephemeroptera Abundance	no. of organisms per sample (per 3 min kick)	387	21,949

Source: 2017 to 2019 RAEMP (Minnow 2020a).

2.5.3.2 Univariate Statistical Analysis

Statistical analyses of BIC endpoints followed a similar approach to that described in the RAEMP (Minnow 2018b, Section 3.2.6), with the exception that planned linear orthogonal contrasts were used to assess differences among stations and years in place of Tukey's Honestly Significant Difference test. Statistical analyses were conducted in R version 4.0 (R Core Team 2021).

2.5.3.2.1 Spatial Evaluation

Spatial differences in BIC endpoints were evaluated among stations using an analysis of variance (ANOVA), with planned linear orthogonal contrasts to test whether effects exhibited linear spatial gradients; p-values ≤ 0.05 were considered significant.

For each endpoint, an overall ANOVA model was fit to the 2020 data as:

$$Y = Station + \epsilon \qquad \text{Equation 2.5-1}$$

where: Y = response variable; *Station* = a fixed factor for area; and ϵ = the error term.

Differences in BIC endpoints were then evaluated among stations using planned linear orthogonal contrasts per Hoke et al. (1990). Each mine-influenced station was compared to stations downstream and to the reference stations. For example, planned contrasts for MIDCO compared MIDCO to stations downstream and to the reference stations, but excluded MIUCO and CORCK from the comparisons because they are located upstream (Table 2.5-2). The best transformation for each endpoint (i.e., untransformed or ln[x+1]) was chosen as the transformation for which a Shapiro-Wilk's test on the residuals gave the highest *P*-value.

The magnitude of the difference was calculated for each planned linear orthogonal contrast as the number of standard deviations (SD) from the contrast mean using the following equation:

Magnitude (SD) = (Station Mean – Contrast Mean) / Contrast SD Equation 2.5-2

where: SD = standard deviation; Contrast Mean = mean of the downstream and reference stations included in the contrast; Contrast SD = standard deviation of the downstream and reference stations included in the contrast.

The ecological significance of a statistical difference was assessed by determining if, for a particular endpoint, a station was within a magnitude of difference of 2SD from downstream and reference stations (i.e., the contrast). This approach defines ecological significance in terms of the normal range of variability observed in the downstream and reference communities. If a statistical significance is observed between a station and its contrast, but is within a magnitude of difference of 2SDs, the statistical significance is not considered biologically meaningful or ecologically significant because the results for that endpoint are still within the typical range of variability.

Table 2.5-2: Spatial Planned Linear Orthogonal Contrasts for Benthic Invertebrate Community Endpoints

Station	CI	MIUCO	CORCK	MIDCO	CM_MC2	MIDAG-S1	MIDAG-S2	MIDAG	MIULE	MI5
MIUCO	EXP	11	0	0	0	0	0	0	0	0
CORCK	EXP	-1	10	0	0	0	0	0	0	0
MIDCO	EXP	-1	-1	9	0	0	0	0	0	0
MC2	EXP	-1	-1	-1	8	0	0	0	0	0
MIDAG-S1	EXP	-1	-1	-1	-1	7	0	0	0	0
MIDAG-S2	EXP	-1	-1	-1	-1	-1	6	0	0	0
MIDAG	EXP	-1	-1	-1	-1	-1	-1	5	0	0
MIULE	EXP	-1	-1	-1	-1	-1	-1	-1	4	0
MI5	EXP	-1	-1	-1	-1	-1	-1	-1	-1	3
AGCK	REF	-1	-1	-1	-1	-1	-1	-1	-1	-1
MI25	REF	-1	-1	-1	-1	-1	-1	-1	-1	-1
LE1	REF	-1	-1	-1	-1	-1	-1	-1	-1	-1

CI = control or impact; EXP = mine-influenced stations; REF = reference station.

2.5.3.2.2 Temporal Evaluation

Temporal changes in BIC endpoints were evaluated for data collected between 2012 and 2020. For each station, BIC endpoints were compared among years using ANOVA with planned linear orthogonal contrasts to test whether effects exhibited linear gradients over time; p-values ≤ 0.05 were considered significant.

For each endpoint, an overall ANOVA model was fit to the data as:

$$Y = Year + \epsilon \quad \text{Equation 2.5-3}$$

where: Y = response variable; *Year* = a fixed factor for year; and ϵ = the error term.

Differences in BIC endpoints were evaluated among years for each station using planned linear orthogonal contrasts per Hoke et al. (1990). To evaluate the presence of a gradient response over time, BIC endpoints for each of the stations were compared to prior years. For example, planned contrasts for 2019 compared 2019 to 2012 to 2018, but excluded 2020 (Table 2.5-3). The best transformation for each endpoint (i.e., untransformed or ln[x+1]) was chosen as the transformation for which a Shapiro-Wilk's test on the residuals gave the highest *P*-value. The magnitude of the difference was calculated for each planned linear orthogonal contrast as the number of SD from the contrast mean following Equation 2.5-2, except Station Mean was replaced by the Year Mean in the equation.

The ecological significance of a statistical difference was assessed by determining if, for a particular endpoint, a year was within a magnitude of difference of 2SD from previous years (i.e., the contrast). This approach defines ecological significance in terms of the normal range of variability observed in each year. If a statistical significance is observed between a year and its contrast, but is within a magnitude of difference of 2SDs, the statistical significance is not considered biologically meaningful or ecologically significant because the results for that endpoint are still within the typical range of variability.

Table 2.5-3: Planned Linear Orthogonal Contrasts for Benthic Invertebrate Community Endpoint Temporal Comparisons

Year	2020	2019	2018	2017	2016	2015	2014	2013
2020	8	0	0	0	0	0	0	0
2019	-1	7	0	0	0	0	0	0
2018	-1	-1	6	0	0	0	0	0
2017	-1	-1	-1	5	0	0	0	0
2016	-1	-1	-1	-1	4	0	0	0
2015	-1	-1	-1	-1	-1	3	0	0
2014	-1	-1	-1	-1	-1	-1	2	0
2013	-1	-1	-1	-1	-1	-1	-1	1
2012	-1	-1	-1	-1	-1	-1	-1	-1

2.6 Benthic Invertebrate Tissue

Methods for sampling and laboratory analysis of benthic invertebrate tissue are described in Section 3.4 of the RAEMP (Minnow 2020b) and summarized in brief below.

2.6.1 Sample Collection

Benthic invertebrate tissue samples were collected as taxonomic composites from mine-influenced and reference areas where benthic invertebrate community samples were collected. Five samples were collected from MIDCO, while three samples were collected from all other areas.

Benthic invertebrate tissue samples were collected using a kick net as described for BIC samples (Section 2.5). Representative taxa were combined, and invertebrates were picked free of debris in the field until at least 2 grams of wet tissue was obtained. Invertebrate tissue samples were kept cool until shipment to the analytical laboratory.

2.6.2 Laboratory Analysis

Samples were shipped to TrichAnalytics Inc. (Trich), Saanichton, BC for analysis of metals by laser ablation with inductively coupled plasma mass spectrometry (LA-ICP-MS). Trich is accredited by the Canadian Association for Laboratory Accreditation for metals analysis in biological samples. Results were reported on a dry weight (dw) basis along with moisture content.

2.6.2.1 Method Validation

Teck began using Trich for tissue analysis in 2020 for analysis of fish tissue and benthic invertebrate samples due to the capacity of LA-ICP-MS to handle small mass samples (i.e., <20 mg dry weight). The method was previously validated for the analysis of selenium in fish tissue by Golder (2020c) but did not evaluate Trich for the analysis of nickel due to concentrations near or below the detection limit in the fish tissue samples. Nickel is a constituent of concern at CMm, therefore, a method validation study was conducted to support the use of Trich for analysis of nickel in benthic invertebrate tissue for the CMm LAEMP. This validation consisted of a comparison between data generated by Trich and by ALS using a standard method (ICP-MS) for the analysis of BIC and certified reference material (CRM). The methods and results are summarized in brief below, and the data are presented in Appendix B.

The analysis was conducted in two parts: (1) comparison of benthic tissue results between ALS and Trich, and (2) evaluation of protein-based CRMs for nickel. For the comparison of benthic tissue results, 12 benthic tissue samples were split between Trich and ALS for metals analysis. Trich received 5 replicate samples per station, then dehydrated and homogenized each replicate into a dry powder, and then conducted their analysis on a pellet formed from the dry powder. Trich submitted the remaining powder of the first replicate for each station to ALS. The relative percent difference (RPD) between split samples was calculated and compared against a data quality objective (DQO) of 40%, per the BC ENV Laboratory Manual (BC ENV 2020). RPDs were only calculated if one or both results were greater than five times the detection limit. For the evaluation of protein-based CRMs, Trich and ALS each analyzed two CRMs: TORT-3 (lobster) and BCR-414 (plankton) for nickel. Trich analyzed five reps of each CRM and ALS analyzed two reps of each CRM. Accuracy relative to the certified nickel concentrations was calculated and evaluated against a DQO of 70% to 130%, per the BC ENV Laboratory Manual (BC ENV 2020).

The RPD precision results for all stations and percent accuracy of CRMs are summarized in Appendix B. The RPD between Trich and ALS ranged from <1% to 81% for nickel, 2% to 59% for cobalt, and <1% to 38% for selenium. Percent accuracy of the CRMs were within the DQO of 70% to 130% and were comparable between ALS and Trich. A potential bias between the laboratories was observed in that all samples where the DQO of 40% was exceeded, Trich reported lower concentrations than ALS except for aluminum, barium, and potassium where the opposite pattern was observed. The absence of this bias from the CRM results suggests that the bias may have been related to the sample preparation procedures. An additional study would be required to examine the cause or causes of this bias.

Overall, the BIC tissue chemistry analysis methods used by Trich and by ALS are considered valid for use in CMm LAEMP based on the CRM results. However, because the source of bias between the two laboratories is unknown, discretion should be applied when comparing Trich and ALS data. In the case of the CMm LAEMP, this may limit the ability to compare 2020 data analyzed by Trich to previous years data analyzed by ALS.

2.6.3 Data Analysis

Benthic invertebrate selenium concentrations were compared to available EVWQP benchmarks (Teck 2014) and BC tissue guidelines (BC ENV 2019). As discussed in Section 1.5, the evaluation of tissue chemistry focused on selenium. Recommendations to discontinue the evaluation of tissue nickel and cobalt concentrations are provided in Section 3.6.

Benthic invertebrate tissue data for cobalt, nickel, and selenium were plotted relative to previous results and for selenium to the reference area normal range defined in the RAEMP (Minnow 2018b) to evaluate spatial and temporal variability.

2.7 Quality Assurance and Quality Control

Quality assurance (QA) and quality control (QC) methods were consistent with methods developed for the RAEMP (Minnow 2018b, Section 11.0). Because CMm LAEMP data were collected by Minnow as part of data collection for the RAEMP, QA/QC procedures and samples for the RAEMP relate to the CMm LAEMP as well. Detailed QA/QC procedures and results are presented in the RAEMP on a three-year cycle (i.e., 2022). A summary of the QA/QC results relevant to the 2020 CMm LAEMP are provided in Appendix C and analytical reports are provided in Appendix D. Review of the QA/QC results for 2020 indicated that the data quality objectives were met, and that the data are appropriate for the purposes of this assessment (Appendix C).

2.8 Related Aquatic Programs

Teck conducts additional programs to monitor, evaluate, and/or manage the aquatic effects of mining operations within the CMm area. The results of studies of fish and aquatic-dependent wildlife in the Michel Creek watershed are summarized herein to contribute to the data evaluation and interpretation (Section 4.0). The relevant studies incorporated into the CMm LAEMP interpretation are:

- RAEMP – regional lotic aquatic effects monitoring results. Finalized results and interpretation for the second comprehensive RAEMP cycle (2017 to 2019; Minnow 2020a) were available for incorporation into the 2021 CMm LAEMP and were used to evaluate selenium exposure and potential effects to fish. Water quality results associated with the 2015 to 2019 cycles of the RAEMP were incorporated into Section 3.1.

- Chronic toxicity program – the program reviews data quality to confirm that results meet acceptability criteria, standardizes the data to help discern toxicological responses, and compares responses in tests to that in reference waters not influenced by mining. Results from the 2020 chronic toxicity program (Golder 2021) were available for incorporation into the 2021 CMm LAEMP and were used to evaluate nickel toxicity in BIC.
- Lentic Area Supporting Study – regional lentic aquatic effects results. This study was initiated in 2018 to support the RAEMP and provides information regarding use of lentic areas by fish and aquatic-dependent wildlife and evaluates amphibian use, amphibian egg tissue chemistry, bird use, bird egg tissue chemistry, fish use, fish abundance, and fish tissue chemistry, benthic invertebrate tissue chemistry, habitat features, water quality, and sediment chemistry. Several lentic areas along Michel Creek and in reference areas are included in the Lentic Area Supporting Study; applicable results of the Lentic Area Supporting Study were incorporated into the 2021 CMm LAEMP.
- Nutrient Study –The Nutrient Study identifies the aqueous nutrient most likely to be limiting biological productivity, and estimates the trophic (productivity) classification at each monitoring station in the Elk River, Fording River, Michel Creek, and associated tributaries, based on water samples collected between 2013 and 2019. Results of the Nutrient Study were incorporated into the 2021 CMm LAEMP.
- Nickel Benchmark Study – supplemental sampling between MIDCO and MIDAG was added to improve characterization of nickel concentrations and BIC effects in Michel Creek immediately downstream of CMm. The objective of the study was to describe field-based responses to nickel exposure to test how well these responses align with laboratory-based toxicity data used to derive benchmarks. The Nickel Benchmark Study is still in progress, finalized results and interpretation will be available for incorporation into the 2021 CMm LAEMP.
- Environmental Flow Needs (EFN) Study - An EFN study for Corbin Creek occurred in 2019 (Teck 2018b). The EFN study included reconnaissance electrofishing to assess distribution of fish species and life stages, spring spawning surveys, fish abundance and biomass measurements, Fisheries Habitat Assessment Procedure mapping and an instream flow study.

The CMm LAEMP integrates information from these studies to better characterize and understand potential effects of CMm on fish and aquatic-dependent wildlife in the Michel Creek watershed. Summaries of relevant results from these reports are provided in Section 4.0, while methods are presented within the specific monitoring reports.

3.0 RESULTS

3.1 Water Quality

Water quality screening and spatial and temporal trends (including comparisons to projections [SRK 2019]) are summarized in Sections 3.1.1 to 3.1.3. Supplementary plots and tabulated data are provided in Appendices E and F.

3.1.1 Data Screening

Water quality data that were collected concurrently with biological monitoring in September 2020 were screened against BC WQGs, Permit 107517 Compliance Limits and SPOs, benchmarks, and interim screening values. The screening data are provided in Appendix E, Table E-1. Constituents with concentrations greater than one or more of these values are summarized in Table 3.1-1 and described in brief below:

- Total nickel concentrations were above the level 3 invertebrate interim screening value (22 µg/L) at CORCK, and at MIDCO, the first station in Michel Creek downstream of the Corbin Creek confluence. Downstream of MIDCO, nickel concentrations were above the level 1 invertebrate screening value (5.3 µg/L) at MIDAG. The furthest downstream stations, MIULE and MI5, were below the interim screening values. The potential impact of these concentrations on the benthic invertebrate community is discussed further in Section 3.5.
- Sulphate, nitrate, and total selenium were below the Permit 107517 Compliance Limits and dissolved cadmium was below the Permit 107517 SPO at the biological station immediately upstream from CMm compliance point (MIDCO).
- Sulphate concentrations were above the level 2 fish and invertebrate benchmarks and the BC WQGs at CORCK. Sulphate was above BC WQGs at MIDCO but below the benchmarks. Because sulphate concentrations in Michel Creek were below the EVWQP benchmarks derived for the Elk Valley, they are not expected to negatively impact the benthic invertebrate community.
- At CORCK only, TDS, nitrate, and total cobalt were above the long-term chronic BC WQGs and a level 1 EVWQP benchmark. Concentrations were below applicable guidelines and screening values in Michel Creek. These constituents (i.e., TDS, nitrate, and total cobalt) are not expected to negatively impact the benthic invertebrate community in Michel Creek.
- Total selenium was above the long-term chronic BC WQGs at CORCK but below EVWQP benchmarks at CORCK and stations on Michel Creek. Because selenium concentrations in Michel Creek were below the EVWQP benchmarks derived for the Elk Valley, they are not expected to negatively impact the benthic invertebrate community.
- Fluoride was above the interim CCME WQG (0.12 mg/L) at CORCK and all downstream Michel Creek stations (i.e., not including MIUCO), and MI5 (the furthest downstream station). Fluoride concentrations in Andy Good Creek, a reference creek, also exceeded the interim guideline and concentrations at AGCK were greater than at CORCK. None of these concentrations exceeded the chronic effects benchmark of 1.9 mg/L that was derived by MacPherson et al. (2014) to be conservatively protective of aquatic life. The interim guideline for fluoride was derived from the lowest acceptable adverse effect level reported: a 144-h LC50 of 11.5 mg/L for the caddisfly *Hydropsyche bronta* (CCME 2001). Because this toxicity value was an acute lethality endpoint, CCME (2001) applied a safety factor of 0.01. Given this context, and exceedances in Andy Good Creek, it is unlikely that fluoride represents a source of mine-influence (Study Question #1) or that fluoride concentrations will negatively impact benthic invertebrate communities (Study Question #2).

Table 3.1-1: Summary of Water Quality Screening Exceedances at Stations Downstream of CMm, September 2020

Constituent	Permit 107517 Compliance Limit[(a)]	BC Long-term Chronic Water Quality Guideline[(b)]	Elk Valley Water Quality Plan Benchmarks and Screening Values[(c)]						Concentration					
			Invertebrates			Fish		Amphibians	AGCK	CORCK	MIDCO	MIDAG	MIULE	MI5
			Level 1	Level 2	Level 3	Level 1	Level 2	Level 1						
Total Dissolved Solids (mg/L)	-	-	1,000	-	-	1,000	-	-	-	1,370	-	-	-	-
Fluoride (mg/L)	-	0.12[d]	-	-	-	-	-	-	**0.31**	**0.22**	**0.16**	**0.16**	**0.14**	-
Sulphate (mg/L)	500	309 to 429[(e,f)]	625	729	-	499	674	481	-	**752**	**474**	-	-	-
Nitrate (mg-N/L)	5	3	-	-	-	-	-	-	-	**4.9**	-	-	-	-
Total Cobalt (µg/L)	-	4	2.6 to 4.4[(g)]	-	-	-	-	-	-	**5.5**	-	-	-	-
Total Nickel (µg/L)	-	104 to 150[(e)]	5.3	15	22	-	-	-	-	64	31	6.2	-	-
Total Selenium (µg/L)	19	2	104	500	-	19	74	-	-	**18**	**11**	**5.6**	**4.0**	**2.7**

Notes: Stations are ordered from upstream to downstream. This table summarizes constituents and stations that have concentrations greater than a guideline, screening value, or benchmark. Appendix E presents the remaining constituents, stations, guidelines, screening values, and benchmarks.

a) Permit 107517 Compliance limits for sulphate, nitrate, and selenium have been compared only to MIDCO which is the biological station immediately upstream of CM_MC2.

b) Data were screened against BC Working and Approved Water Quality Guidelines (BC ENV 2019, 2021).

c) Values for sulphate, nitrate, and selenium are benchmarks (Teck 2014) and values for remaining constituents are screening values.

d) Guideline is adopted from the Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines (CCME 1999).

e) Guideline is hardness dependent.

f) For some samples, water hardness was greater than 250 mg/L. No BC ENV water quality guideline was established for sulphate at hardness greater than 250 mg/L; however, the observed data were screened against the guideline for very hard water (i.e., 429 mg/L) for comparative purposes.

g) Total cobalt screening value is hardness dependent and applicable within a range 52 to 396 mg/L $CaCO_3$ hardness, above or below which the minimum or maximum of this range is used.

Bolded values exceed the BC Long-term WQG (BC ENV 2021).

Shaded values exceed an EVWQP benchmark or interim screening value.

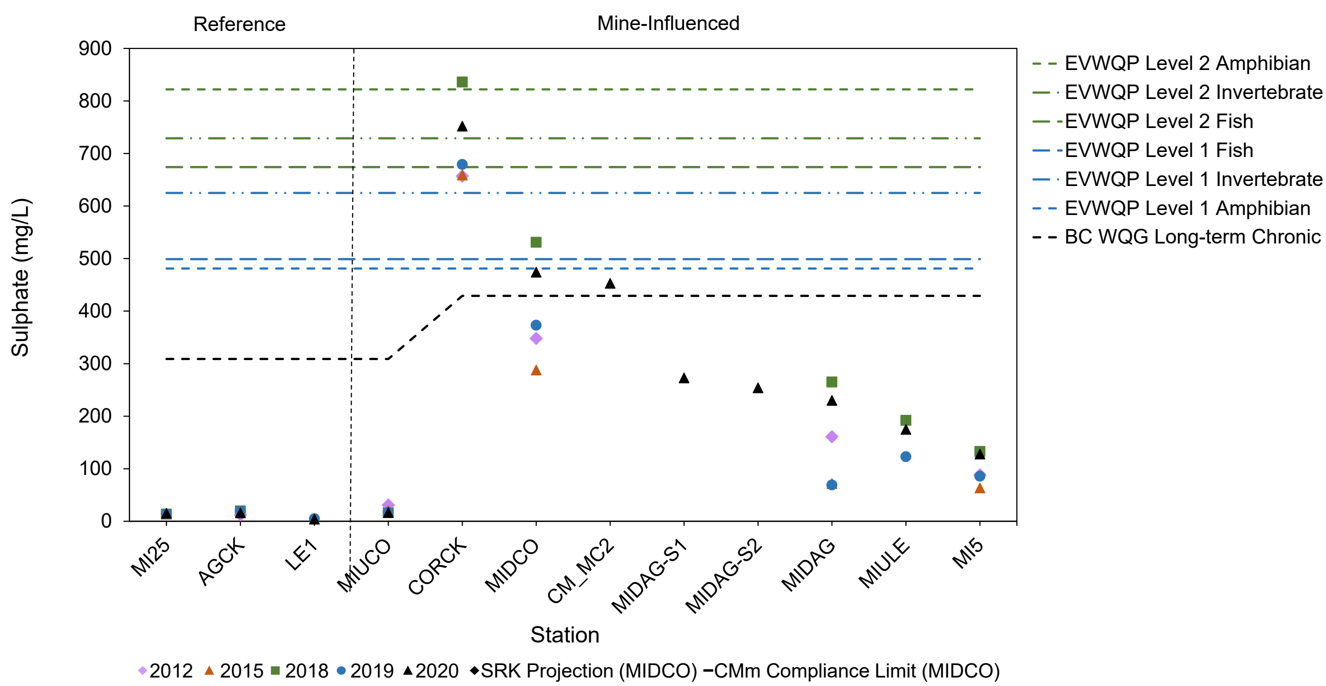
"-" = no data available or EVWQP benchmark was not exceeded; mg-N/L = milligrams nitrogen per litre.

3.1.2 Spatial Trends

Water quality data collected concurrently with the biological monitoring in September 2012, 2015, 2018, 2019, and 2020, and the Nickel Benchmark Study stations (i.e., CM_MC2, MIDAG-S1, MIDAG-S2) from 2020 were plotted to visually assess spatial patterns. Constituents identified in the screening step (Section 3.1.1) are presented in Figures 3.1-1 to 3.1-6, while plots for all other monitored constituents are provided in Appendix F.

The prevailing spatial pattern was that concentrations of mine-influenced constituents were highest at CORCK, with a gradient of declining concentrations downstream of CMm in Michel Creek (Figures 3.1-1 to 3.1-6). Concentrations at MIUCO were similar to those observed at the reference stations MI25, AGCK, and LE1. Comparable spatial patterns were observed for other metals (i.e., antimony, boron, cadmium, lithium, molybdenum, strontium, and uranium), major ions (i.e., calcium, potassium, sodium, and magnesium), and related constituents (i.e., TDS, specific conductivity, hardness, alkalinity; Appendix F).

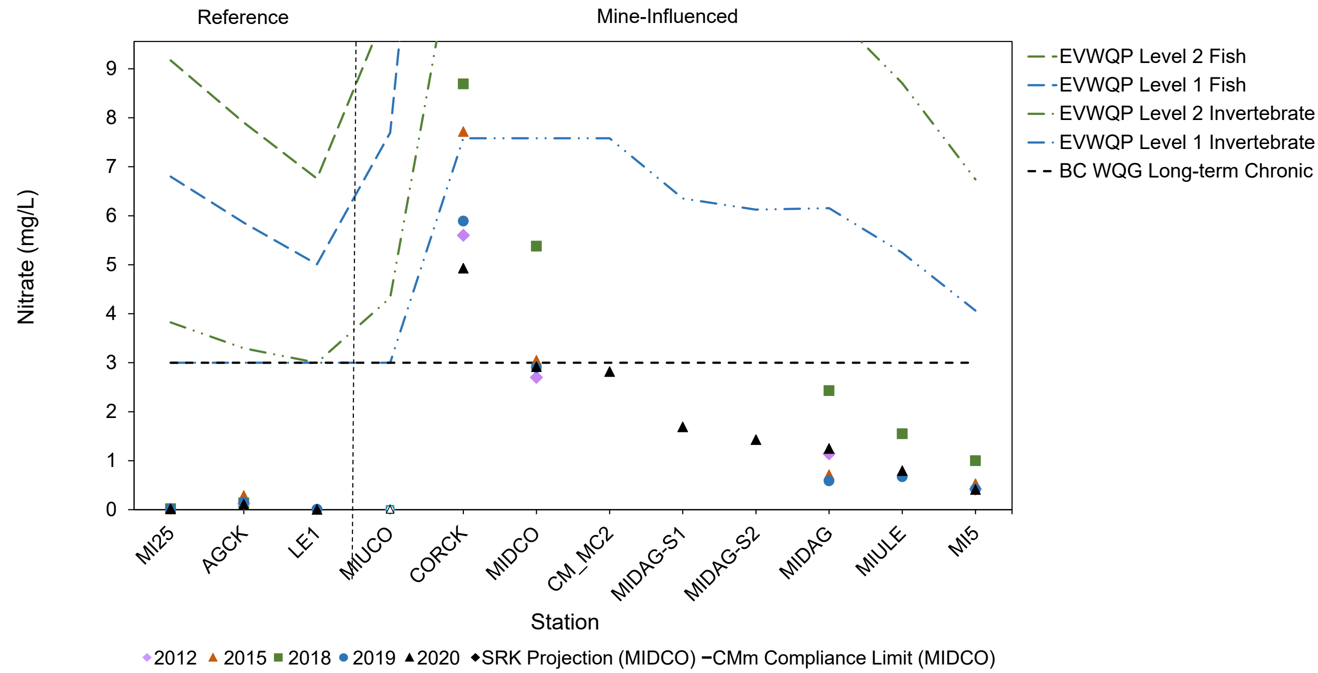
Figure 3.1-1: Spatial and Temporal Variation in Sulphate Concentrations Collected in the CMm LAEMP Study Area in September 2012 to 2020



Notes: Sulphate WQG guideline is hardness-dependent and calculated based on hardness observed in 2020. SRK projection is for 2020 (SRK 2019).

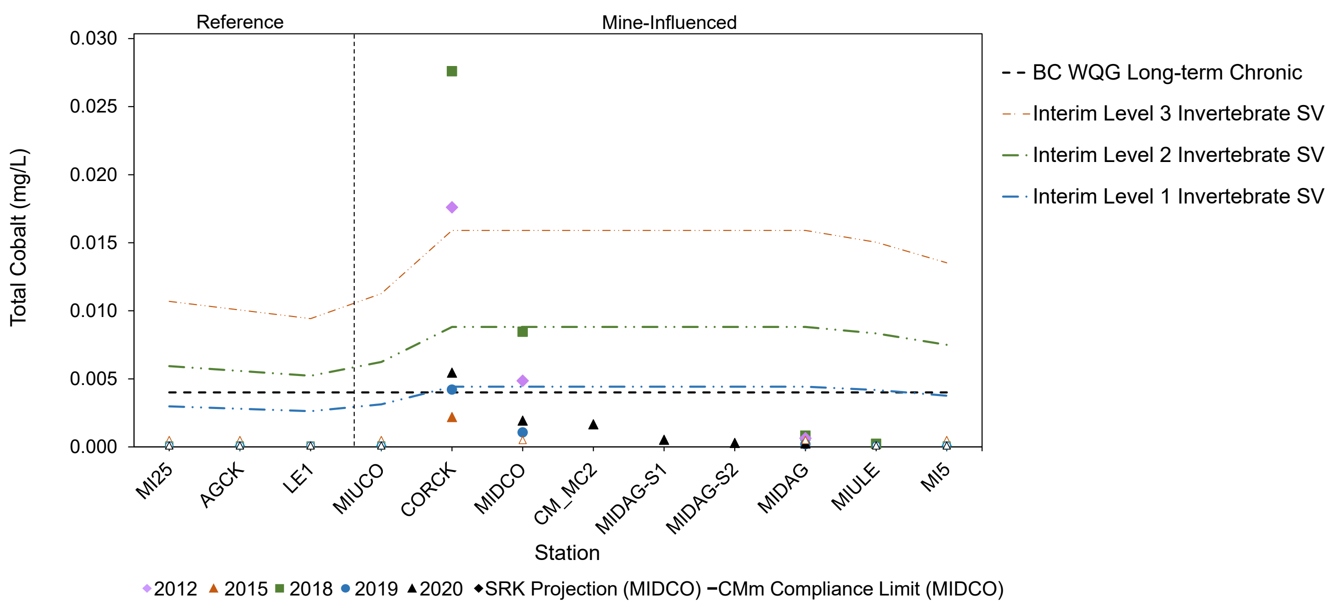
CMm = Coal Mountain Mine; WQG = water quality guideline.

Figure 3.1-2: Spatial and Temporal Variation in Nitrate Concentrations Collected in the CMm LAEMP Study Area in September 2012 to 2020



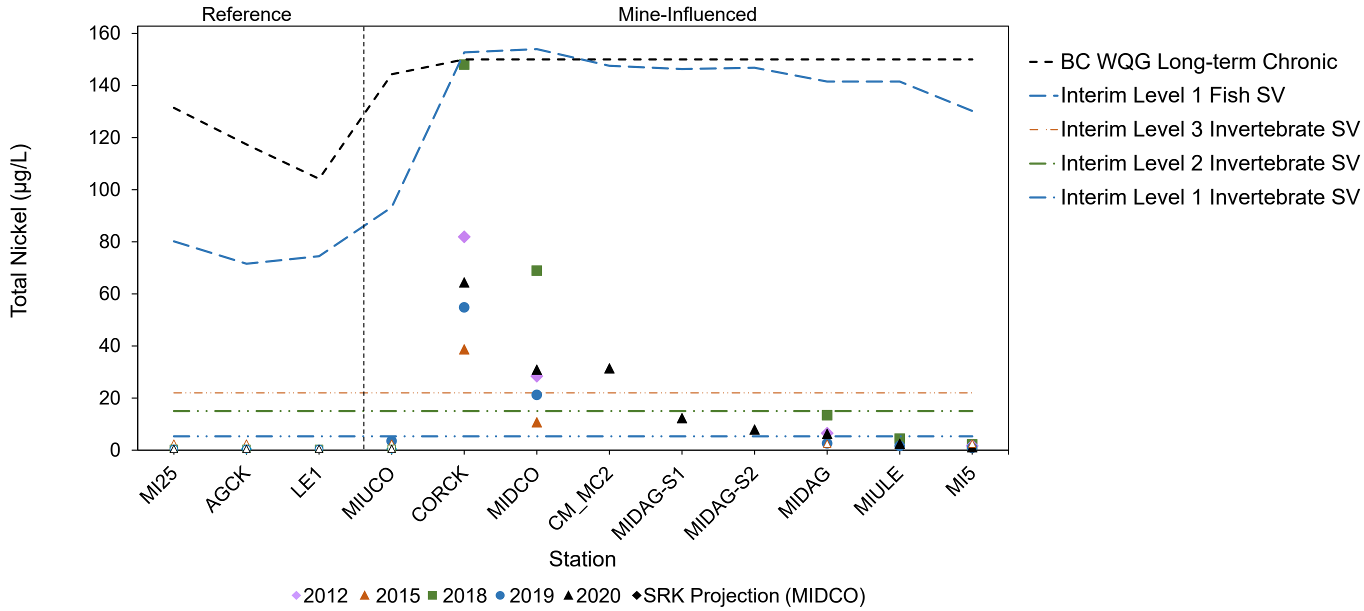
Notes: Lowest level 1 benchmark is hardness-dependent and calculated based on hardness observed in 2020. SRK projection is for 2020 (SRK 2019). Open symbols indicate non-detects.
CMm = Coal Mountain Mine; mg/L = milligrams per litre; WQG = water quality guideline.

Figure 3.1-4: Spatial and Temporal Variation in Total Cobalt Concentrations Collected in the CMm LAEMP Study Area in September 2012 to 2020



Notes: BC WQG short-term (0.11 mg/L) not shown due to scale. Interim screening value is hardness-dependent and calculated based on hardness observed in 2020. SRK projection is for 2020 (SRK 2019). Open symbols indicate non-detects.
CMm = Coal Mountain Mine; WQG = water quality guideline; SV = screening value.

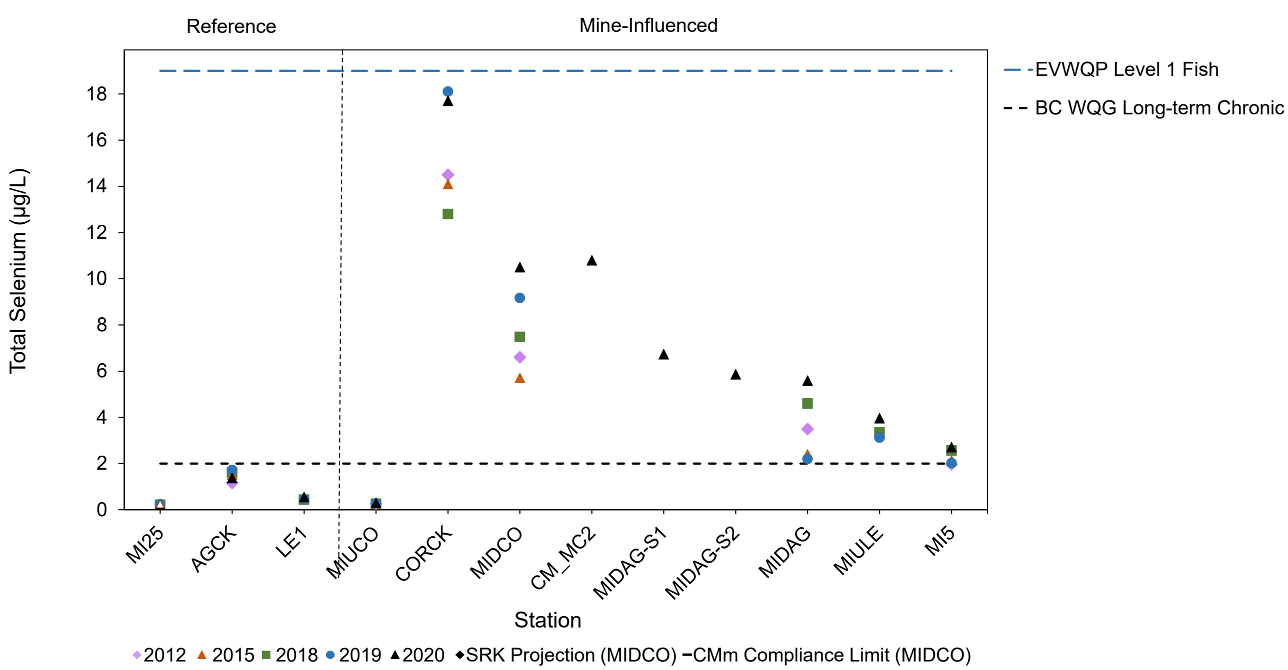
Figure 3.1-5: Spatial and Temporal Variation in Total Nickel Concentrations Collected in the CMm LAEMP Study Area in September 2012 to 2020



Notes: Nickel WQG is hardness-dependent and calculated based on 2020 hardness. SRK projection is for 2020 (SRK 2019). Open symbols indicate non-detects.

CMm= Coal Mountain Mine; WQG = water quality guideline; SV = screening value.

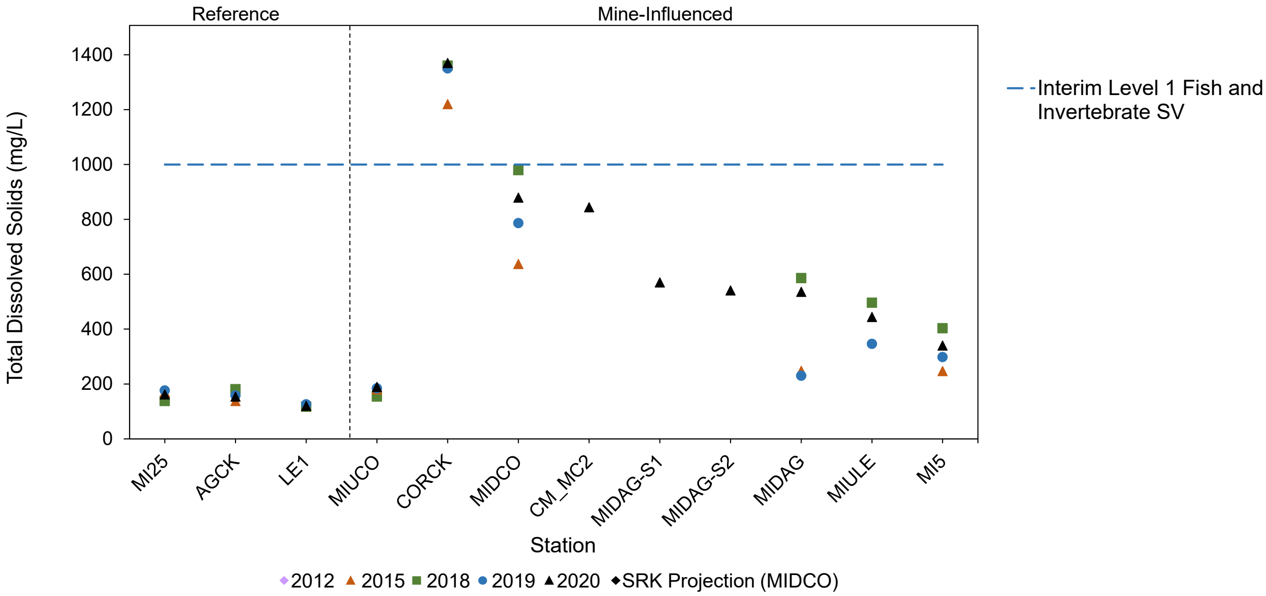
Figure 3.1-6: Spatial and Temporal Variation in Total Selenium Concentrations Collected in the CMm LAEMP Study Area in September 2012 to 2020



Notes: SRK projection is for 2020 (SRK 2019). Open symbols indicate non-detects.

CMm = Coal Mountain Mine; WQG = water quality guideline.

Figure 3.1-6: Spatial and Temporal Variation in Total Dissolved Solids Concentrations Collected in the CMm LAEMP Study Area in September 2012 to 2020



Notes: SRK projection is for 2020 (SRK 2019).

CMm = Coal Mountain Mine; WQG = water quality guideline; SV = screening value.

3.1.3 Comparison to Projections and Temporal Trends

Available water quality data from permitted Teck surface water monitoring for all seasons between 2012 and 2020 were plotted for MI25 (CM_MC1; reference station), MIDCO (CM_MC2; compliance point), and CORCK (CM_CC1) and visually assessed for temporal trends. Constituents identified in the screening step (Section 3.1.1) or constituents that were greater in 2020 compared to previous years are presented in Figures 3.1-7 to 3.1-12. Plots for all other monitored constituents are provided in Appendix F.

A common trend was observed across several constituents in which concentrations increased between 2012 and 2018, and then decreased through 2019 and 2020. Constituents identified in the screening step (i.e., selenium, sulphate, nitrate, nickel, cobalt, and TDS; Section 3.1.1), exhibited this trend, with temporal peaks in 2017 or 2018. Between 2018 and 2020, concentrations decreased but to varying extents among constituents. Selenium, sulphate, and TDS decreased after 2018 and appeared relatively consistent through to 2020. Nitrate exhibited a consistent decrease between 2018 and 2020. Nickel and cobalt decreased in 2019, and then increased again in 2020 to levels approaching those observed in 2018. Dissolved sodium also decreased in 2019 and then increased in 2020; however, it increased to levels above those observed in 2018 (Figure 3.1-12); likely as a result of the re-initiation of pumping water which is high in sodium from 6 Pit in 2020 (Section 1.4). Key trends in the temporal comparison of these constituents to projected concentrations (SRK 2019) are:

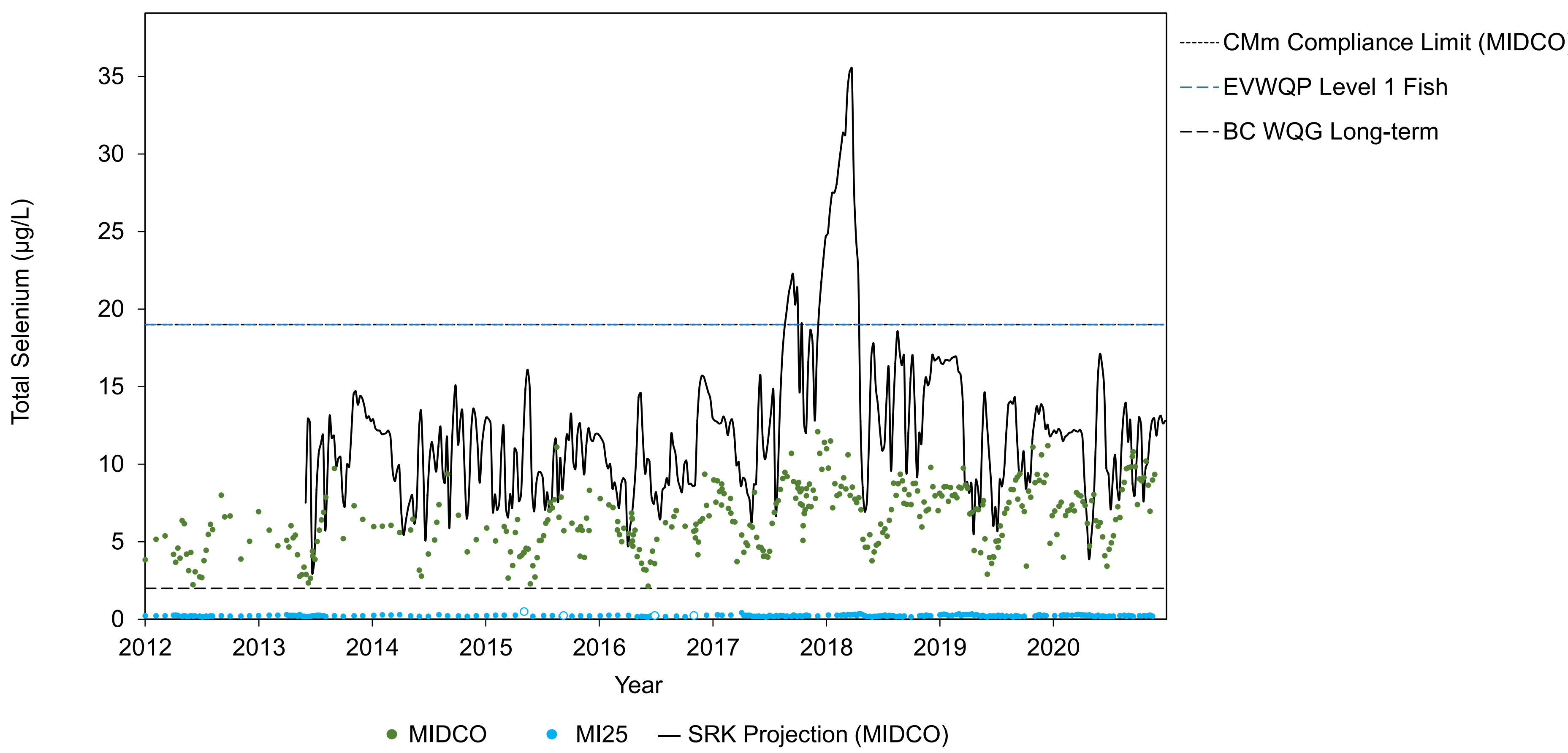
- Concentrations of total selenium (Figure 3.1-6) were either lower than or similar to projections for dissolved selenium for all years. Concentrations of selenium were below the EVWQP benchmarks at MIDCO but there were occurrences between 2012 and 2020 when concentrations were greater than the level 1 fish benchmark at CORCK.

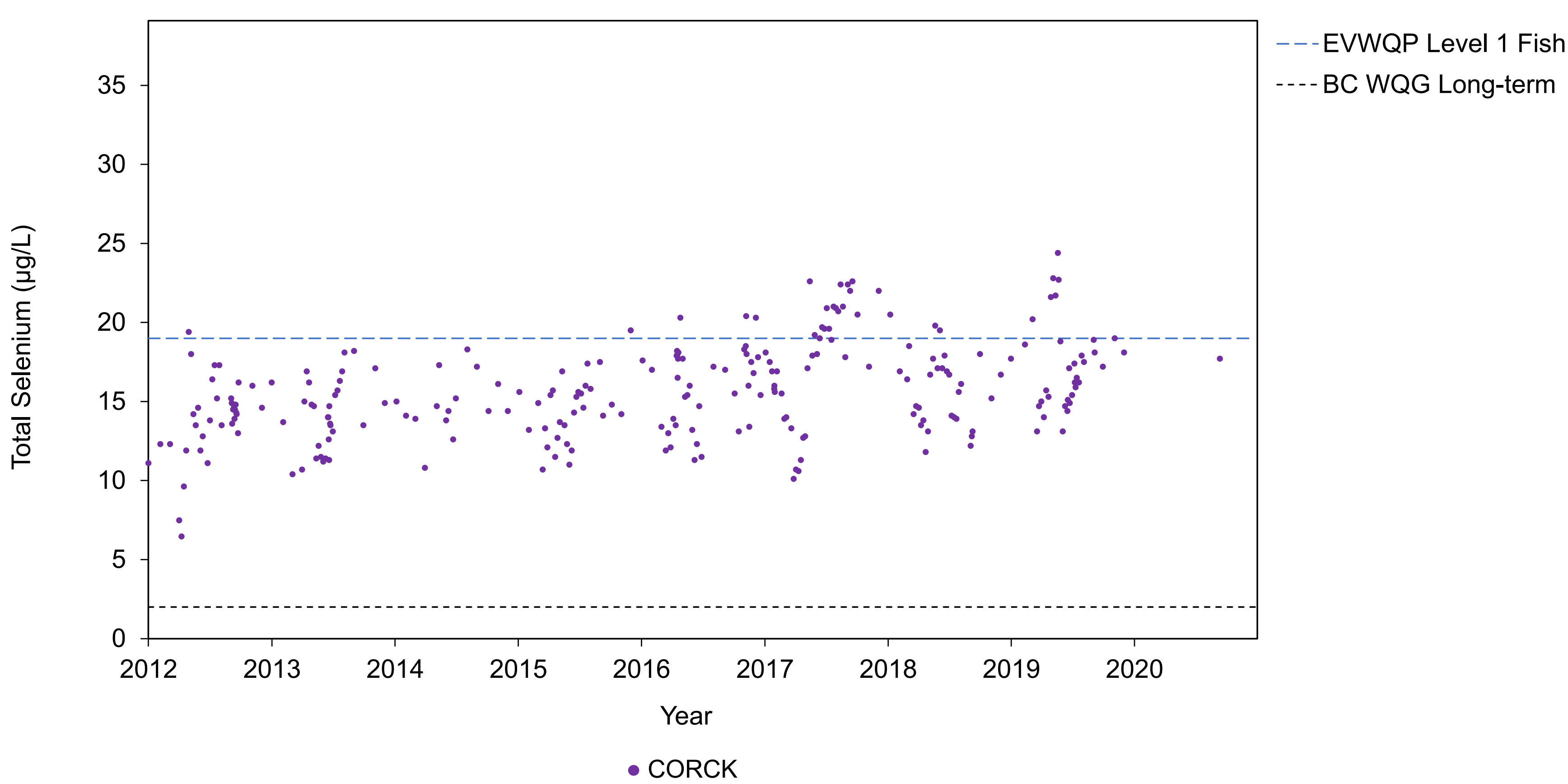
- Concentrations of sulphate, nitrate, and nickel (Figures 3.1-7 to 3.1-9) were either lower than or similar to projections, with occasional excursions beyond the projections in some years (i.e., between 2018 and 2020, concentrations of these analytes were periodically higher than projected):
  - In 2020, sulphate was higher than projected in 12 out of 50 samples. Concentrations of sulphate (Figure 3.1-7) were greater than the level 1 fish benchmarks at MIDCO on two occurrences in 2018, and two occurrences in 2020. Concentrations of sulphate were frequently greater than the lowest level 1 benchmarks (fish and amphibians) at CORCK between 2012 and 2020 and were frequently greater than the level 2 invertebrate and fish benchmarks between 2016 and 2020.
  - In 2020, nitrate was higher than projected in 3 out of 50 samples. Concentrations of nitrate were intermittently (i.e., <20% samples per year) above the Permit 107517 Compliance Limit for MIDCO in 2016, 2017, and 2018 but were below the limit in 2019 and 2020 (Figure 3.1-8). Concentrations were more frequently above than below the BC WQG (long-term) at MIDCO between 2016 and 2018, with intermittent occurrences above the BC WQG in 2019 and 2020. CORCK was consistently (i.e., >20% of samples per year) above the BC WQG between 2012 and 2020.
  - In 2020, total nickel was lower than projected for dissolved nickel in all but one sample. Concentrations of nickel were consistently above the level 1 invertebrate screening value at MIDCO between 2012 and 2020, with frequent occurrences above the level 2 and level 3 invertebrate screening values between 2016 and 2020 (Figure 3.1-9). Concentrations were consistently above the level 3 invertebrate screening value at CORCK except for a few samples between 2012 and 2016 that exceeded only the level 1 or level 2 screening value.
- Concentrations of total cobalt were either lower than or similar to projections for dissolved cobalt for all years, with one exception in 2017. Concentrations of cobalt (Figure 3.1-10) were occasionally greater than the level 1 invertebrate screening value at MIDCO in 2012, 2016, 2017, 2018, and 2020. Concentrations at CORCK were greater than the level 1 invertebrate screening value in most samples in 2012 and between 2016 and 2020, and were above the level 3 screening value intermittently in 2012, 2016, 2017, 2018 and 2020.
- TDS increased between 2012 and 2020 at MIDCO and CORCK (Figure 3.1-11). Concentrations were below EVWQP benchmarks at MIDCO except one measurement in 2017. The majority (i.e., >80% of samples per year) of TDS measurements at CORCK between 2016 and 2020 were above the level 1 invertebrate screening value, representing an increase compared to the 2012 to 2015 period.
- Concentrations of sodium were frequently above but close to projections from 2013 to 2019, after which the majority of measurements were greater than projected in 2020. No BC WQG or screening value currently exists for sodium; however, sodium has low toxicity relative to other ions such as potassium, chloride, and magnesium (Mount et al. 1997). Acute 48-hour LC_{50} values for a sensitive test organism, *C. dubia,* exposed to different ion combinations ranged from 735 mg/L sodium chloride (Hoke et al. 1992) to 1,956 mg/L (Mount et al. 1997). Reference toxicant tests conducted by Golder (2018b) demonstrated that acute or chronic effects to *C. dubia*, did not occur below 1,200 mg/L sodium chloride. Further, sodium chloride toxicity is understood to be driven by the chloride anion. Given that concentrations of sodium were below 100 mg/L at MIDCO and CORCK, effects on the receiving environment are not expected to occur due to observed concentrations of sodium.

Temporal trends and comparisons to projections for all other constituents are provided in Appendix F. Key trends are as follows:

- The trend observed for nickel and cobalt in which concentrations in 2020 were between those in 2018 and 2019 was also observed in total antimony, total boron, and nitrite (Appendix F), although concentrations were below relevant guidelines. An increase in 2017 or 2018 followed by a consistent decrease to 2020 was seen in total molybdenum, total manganese, and total uranium. The remaining constituents appeared consistent or were not detected across years.
- Constituents intermittently above projections were total aluminum, total cadmium, total chromium, total lead, dissolved calcium, dissolved magnesium, hardness, and alkalinity (Appendix F).
- Constituents with the majority of samples per year above projections for the dissolved fraction include total barium and total uranium (Appendix F). Concentrations of barium and uranium were below long-term chronic BC WQGs in 2020 and appear to have decreased in 2020 compared to previous years.

Figure 3.1-6: Total Selenium Concentrations at MIDCO and MI25 (top panel), and CORCK (bottom panel), 2012 to 2021



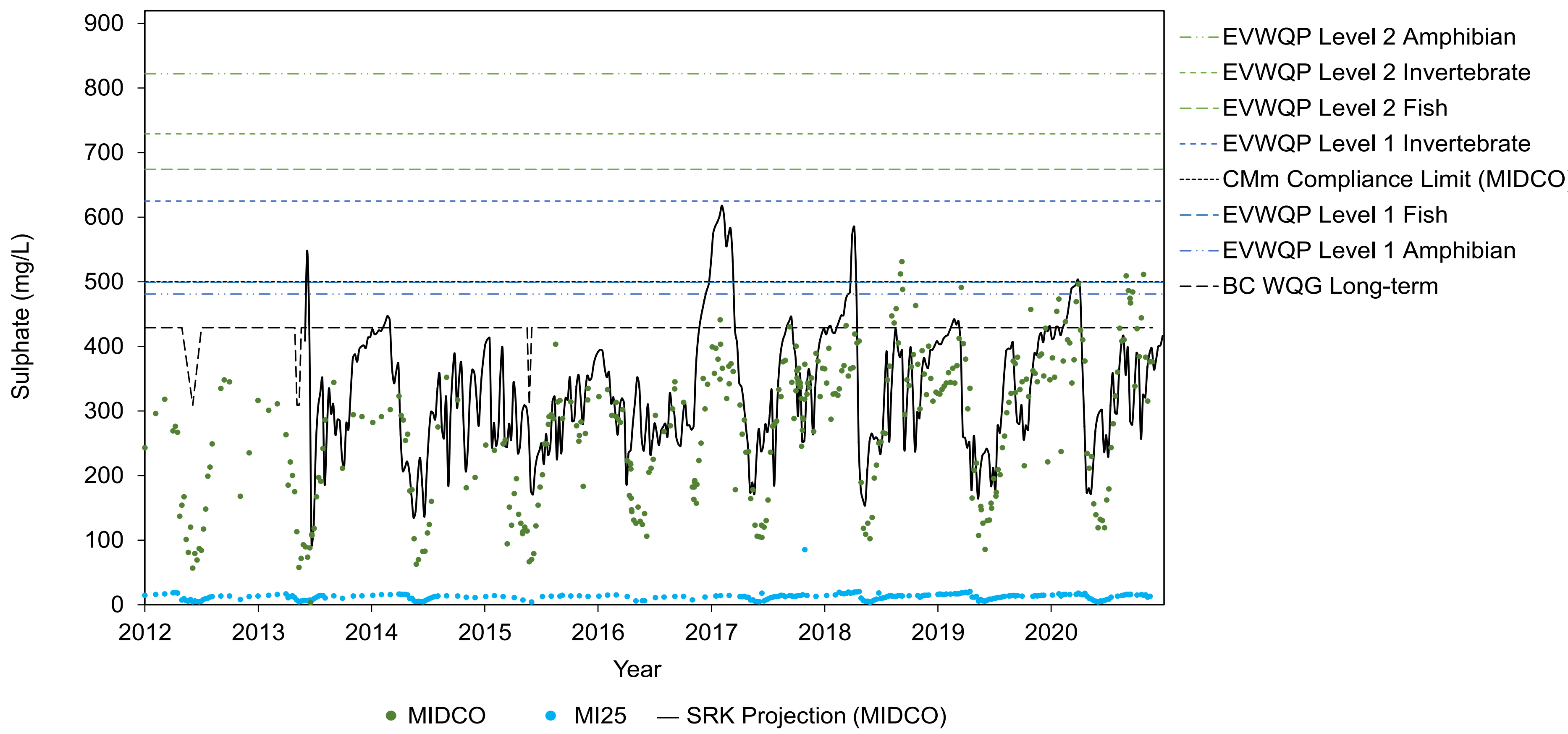


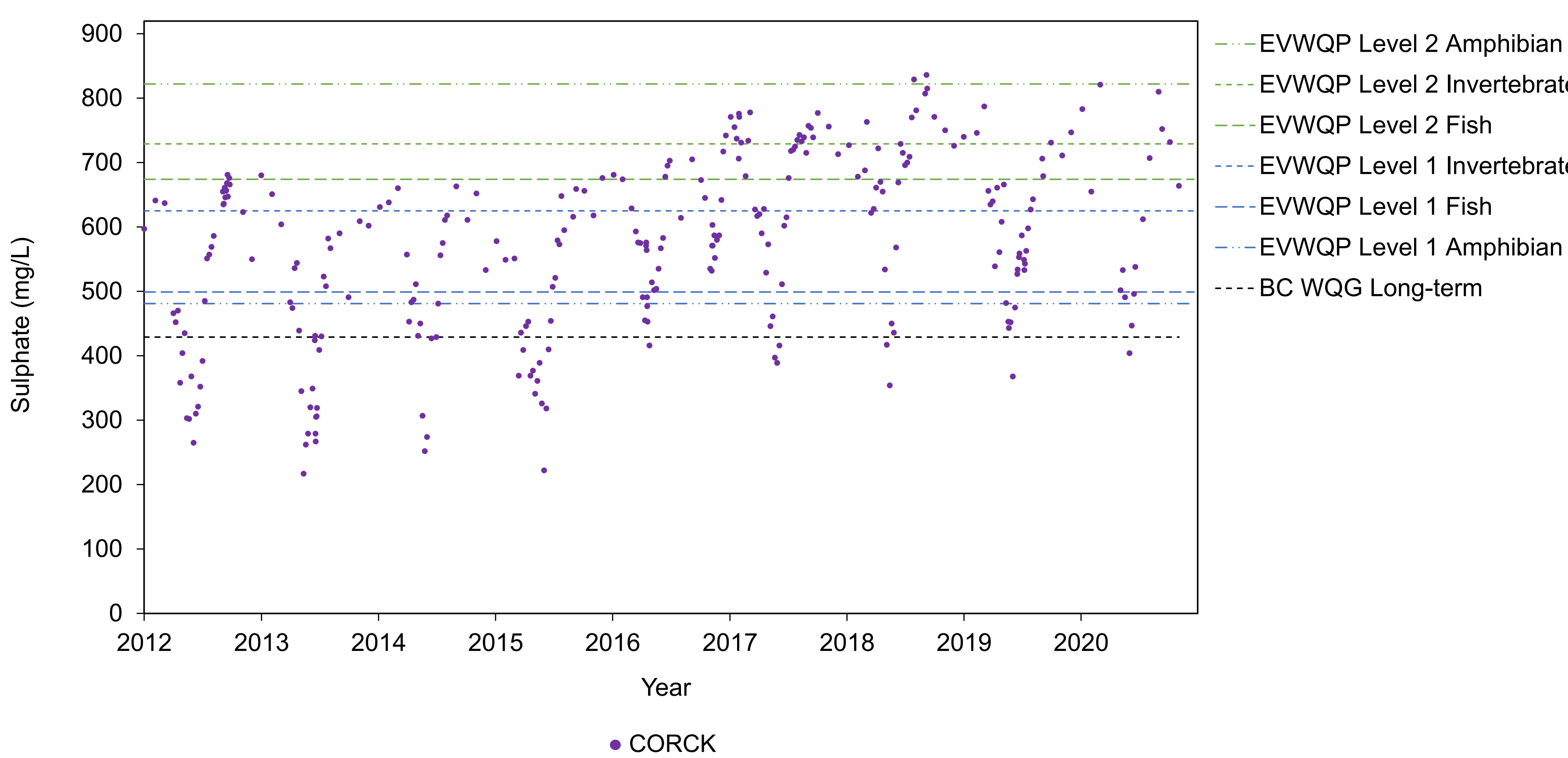
Notes: SRK modelled projections for dissolved selenium (SRK 2019). These projections were included for comparisons to total selenium. Measured concentrations for MI25, MIDCO and CORCK are shown as green, blue and purple circles and SRK projections are represented by the solid black line.

EVWQP screening values; level 1 invertebrate (104 µg/L), level 2 fish (74 µg/L), level 1 adult bird (203 µg/L), and level 1 juvenile bird (394 µg/L) not shown. Open symbols indicate non-detects.

BC WQG = British Columbia water quality guideline.

Figure 3.1-7: Total Sulphate Concentrations at MIDCO and MI25 (top panel), and CORCK (bottom panel), 2012 to 2021

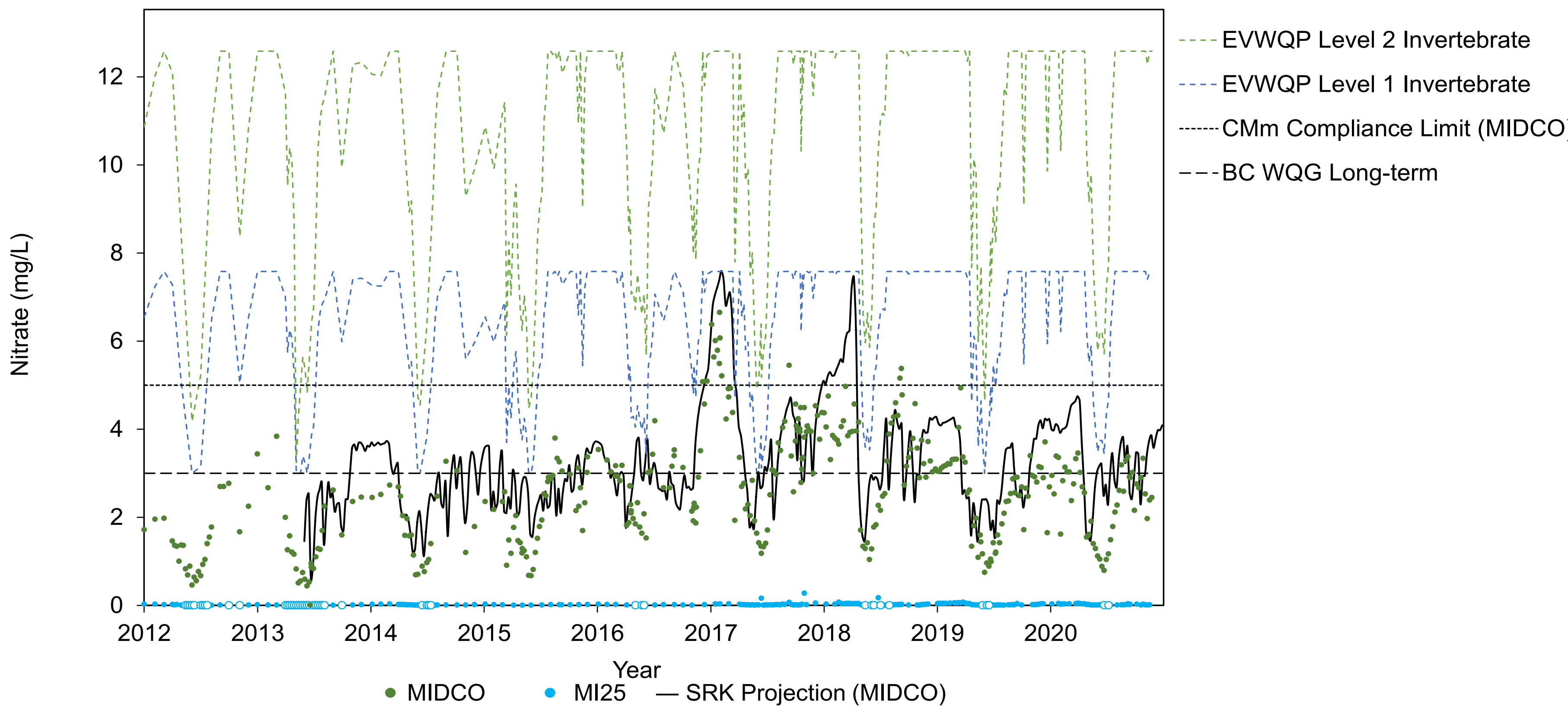


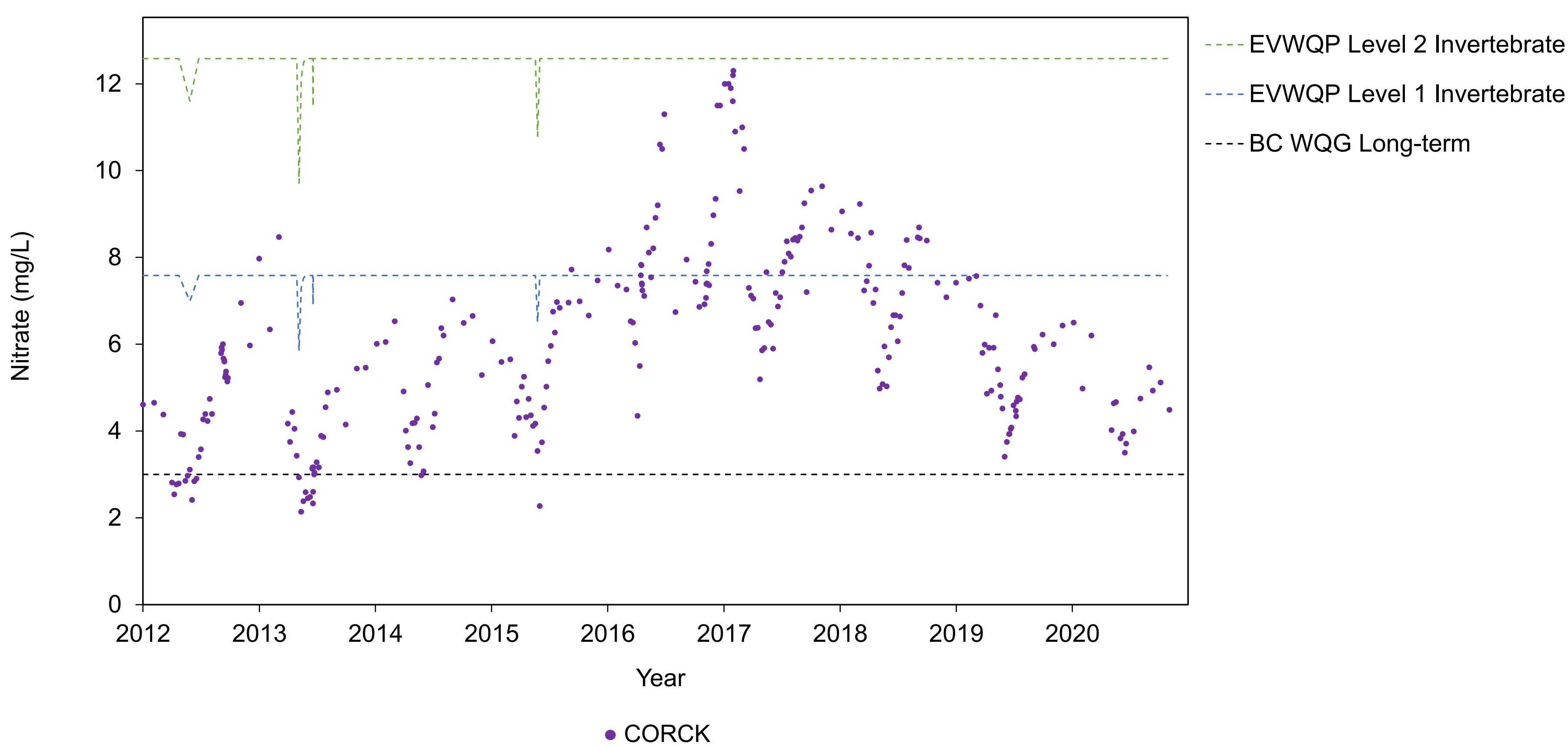


Notes: EVWQP screening values; level 3 invertebrate (1,315 mg/L), level 3 fish (1,173 mg/L), and level 3 amphibian (1,545 mg/L) not shown. Measured concentrations for MI25, MIDCO and CORCK are shown as green, blue and purple circles and SRK projections are represented by the solid black line.

BC WQG = British Columbia water quality guideline.

Figure 3.1-8: Total Nitrate Concentrations at MIDCO and MI25 (top panel), and CORCK (bottom panel), 2012 to 2021

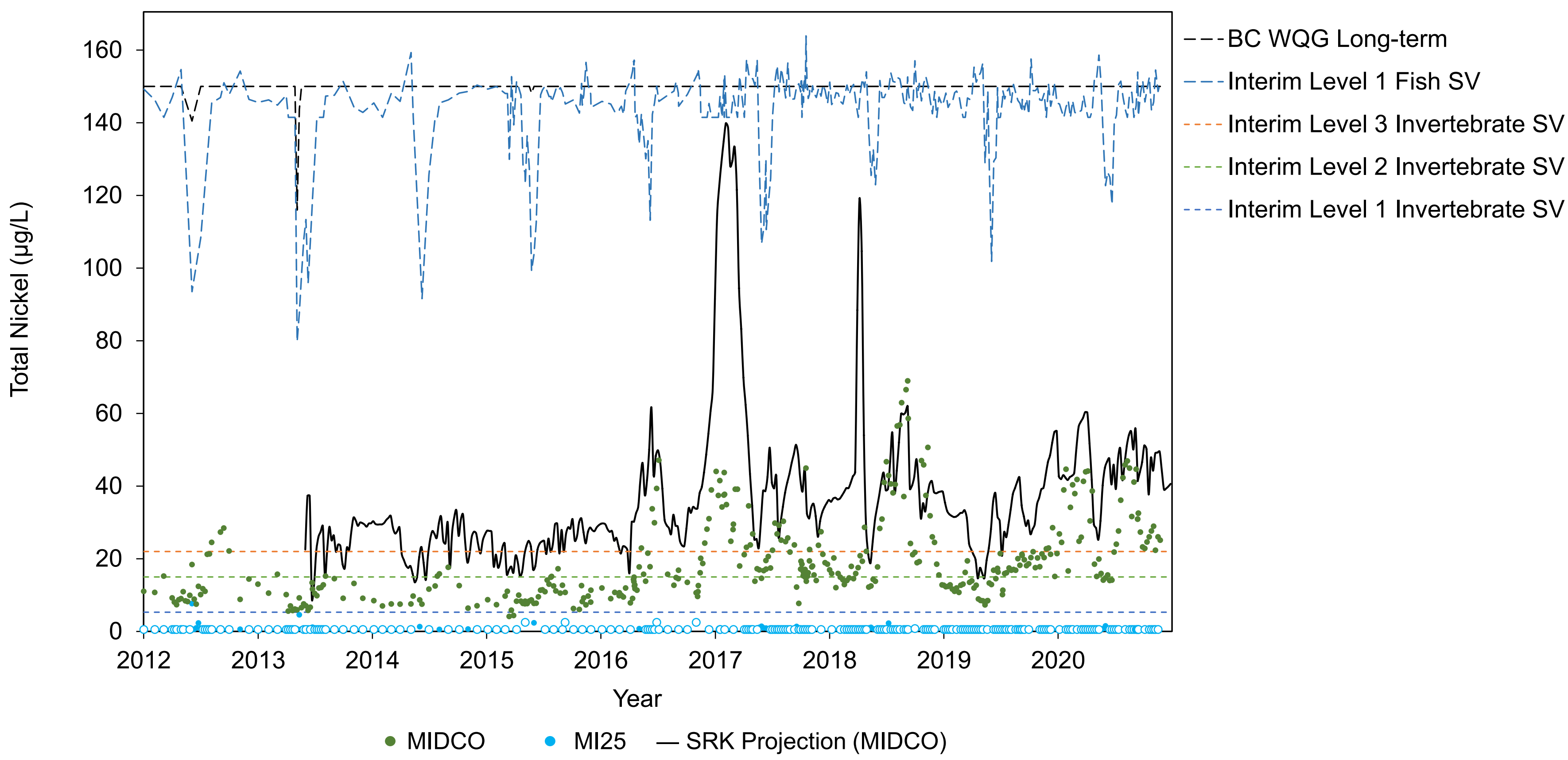


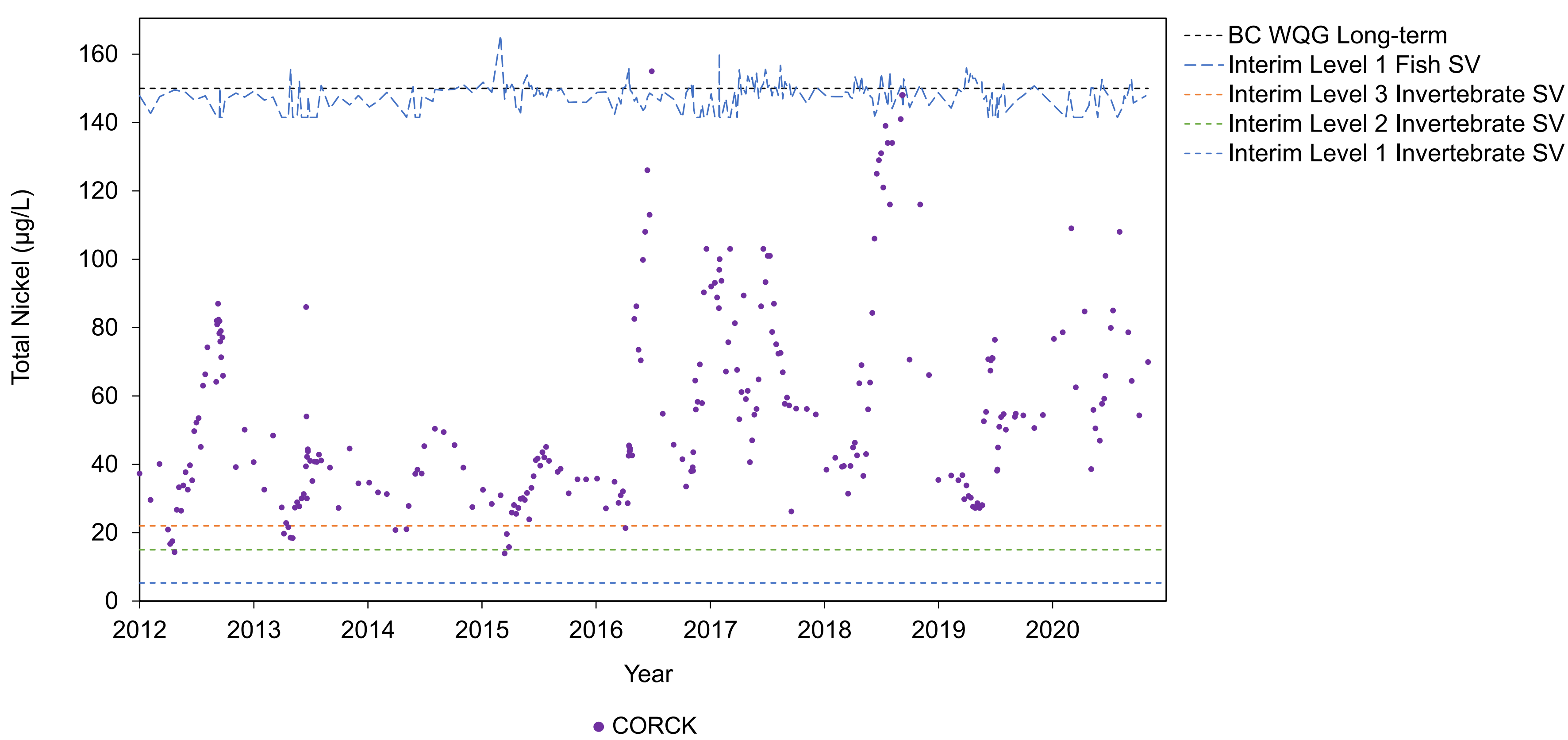


Notes: EVWQP screening values; level 3 invertebrate (12 to 52 mg/L), level 1 fish (5.0 to 22 mg/L), and level 1 amphibian (10 to 46 mg/L) not shown. Measured concentrations for MI25, MIDCO and CORCK are shown as green, blue and purple circles and SRK projections are represented by the solid black line.

Open symbols indicate non-detects. BC WQG = British Columbia water quality guideline.

Figure 3.1-9: Total Nickel Concentrations at MIDCO and MI25 (top panel), and CORCK (bottom panel), 2012 to 2021

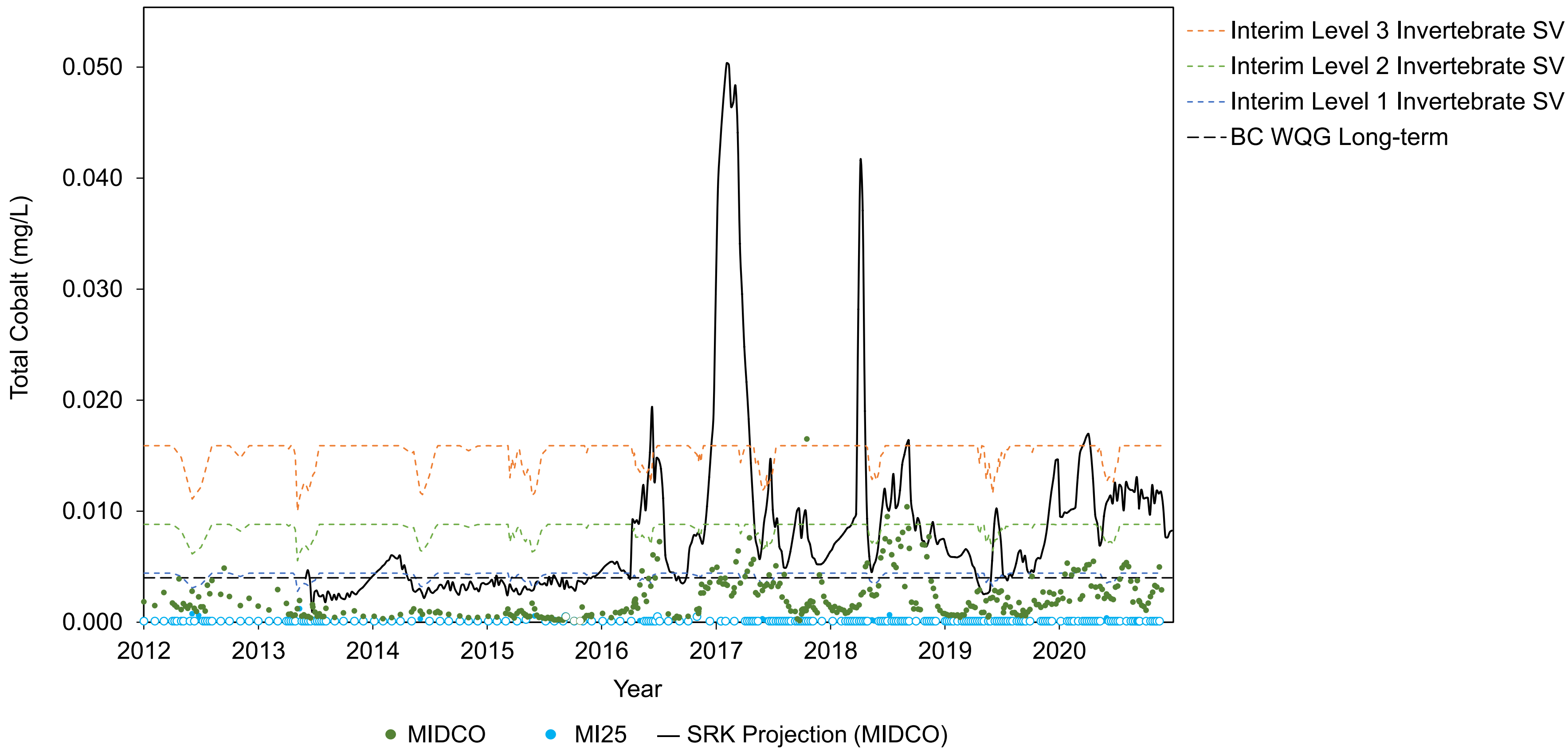


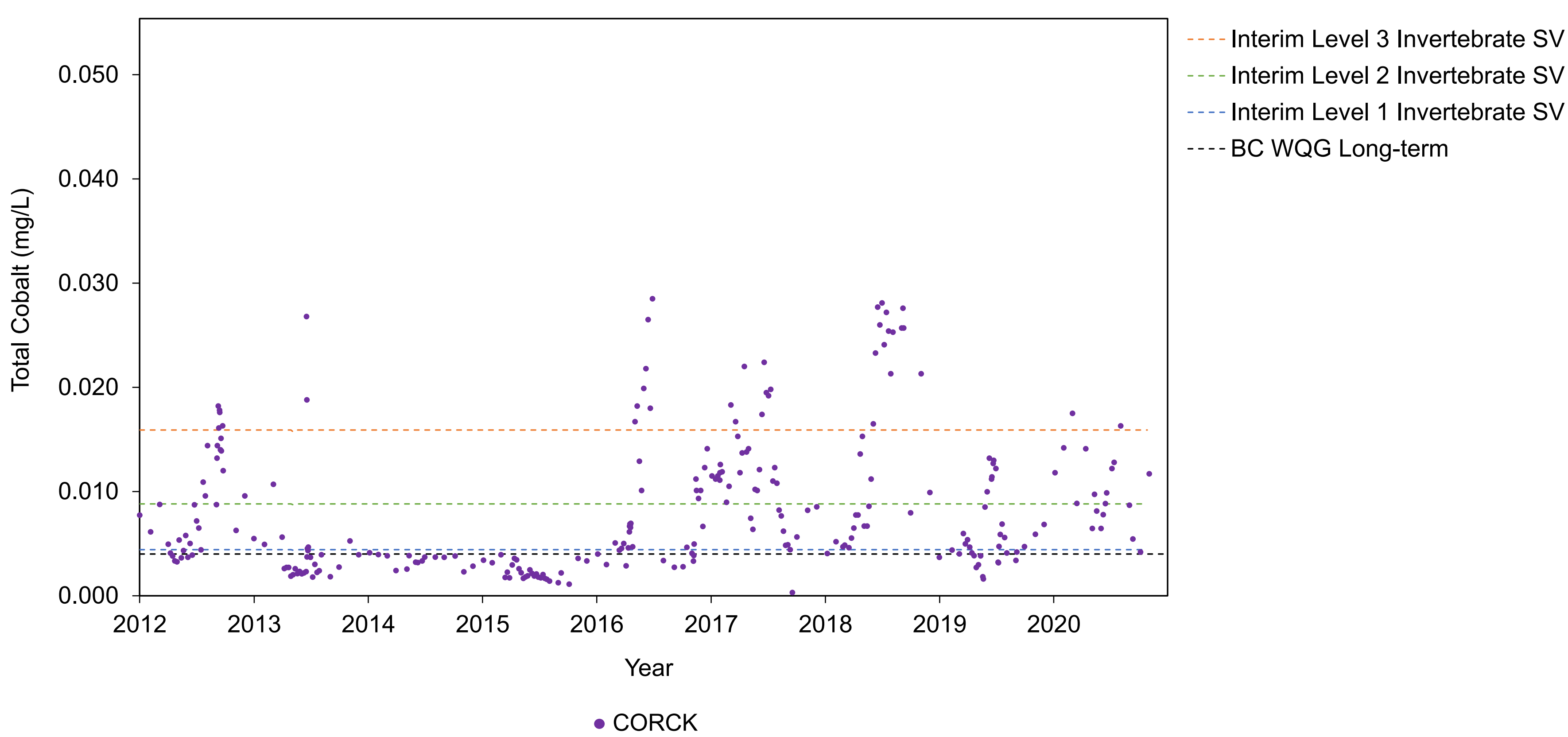


Notes: SRK modelled projections for dissolved nickel (SRK 2019). These projections were included for comparisons to total nickel. EVWQP screening values; level 2 fish (114 to 255 µg/L) not shown. Measured concentrations for MI25, MIDCO and CORCK are shown as green, blue and purple circles and SRK projections are represented by the solid black line.

Open symbols indicate non-detects. BC WQG = British Columbia water quality guideline; SV = screening value.

Figure 3.1-10: Total Cobalt Concentrations at MIDCO and MI25 (top panel), and CORCK (bottom panel), 2012 to 2021

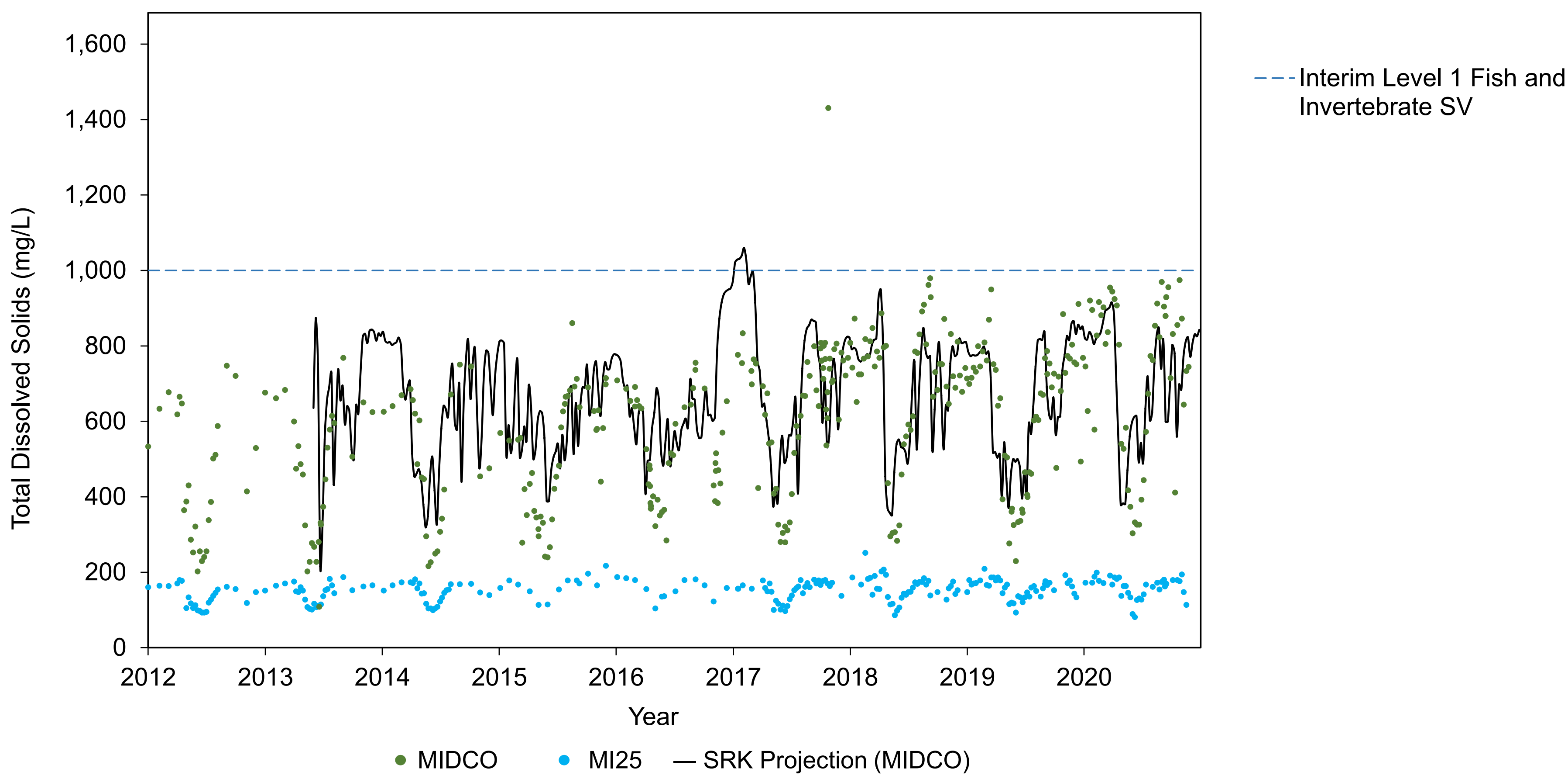


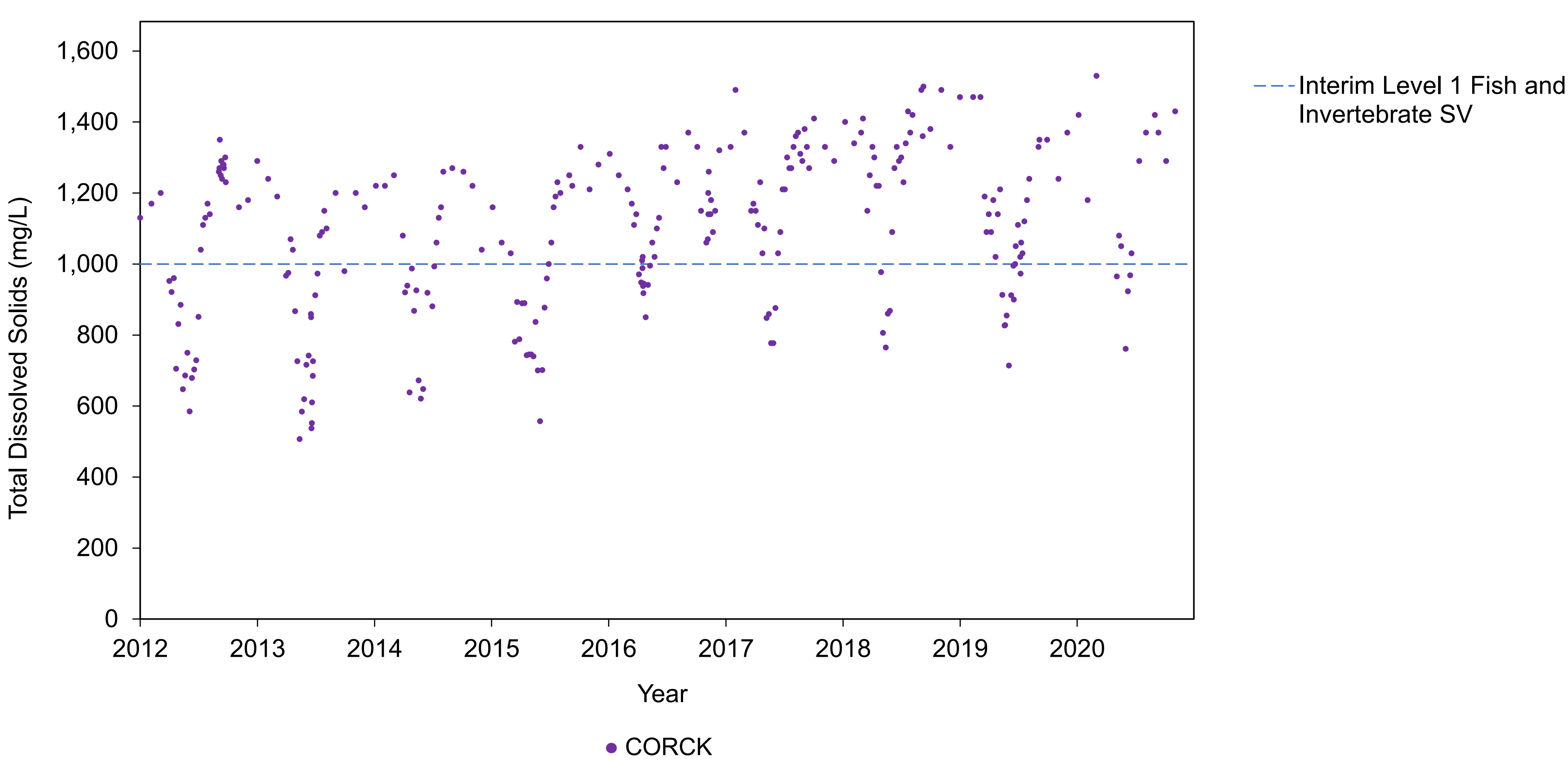


Notes: SRK modelled projections for dissolved cobalt (SRK 2019). These projections were included for comparisons to total cobalt. EVWQP screening values; level 1 fish (0.36 – 0.60 mg/L) not shown. Measured concentrations for MI25, MIDCO and CORCK are shown as green, blue and purple circles and SRK projections are represented by the solid black line.

Open symbols indicate non-detects; BC WQG = British Columbia water quality guideline; SV = screening value.

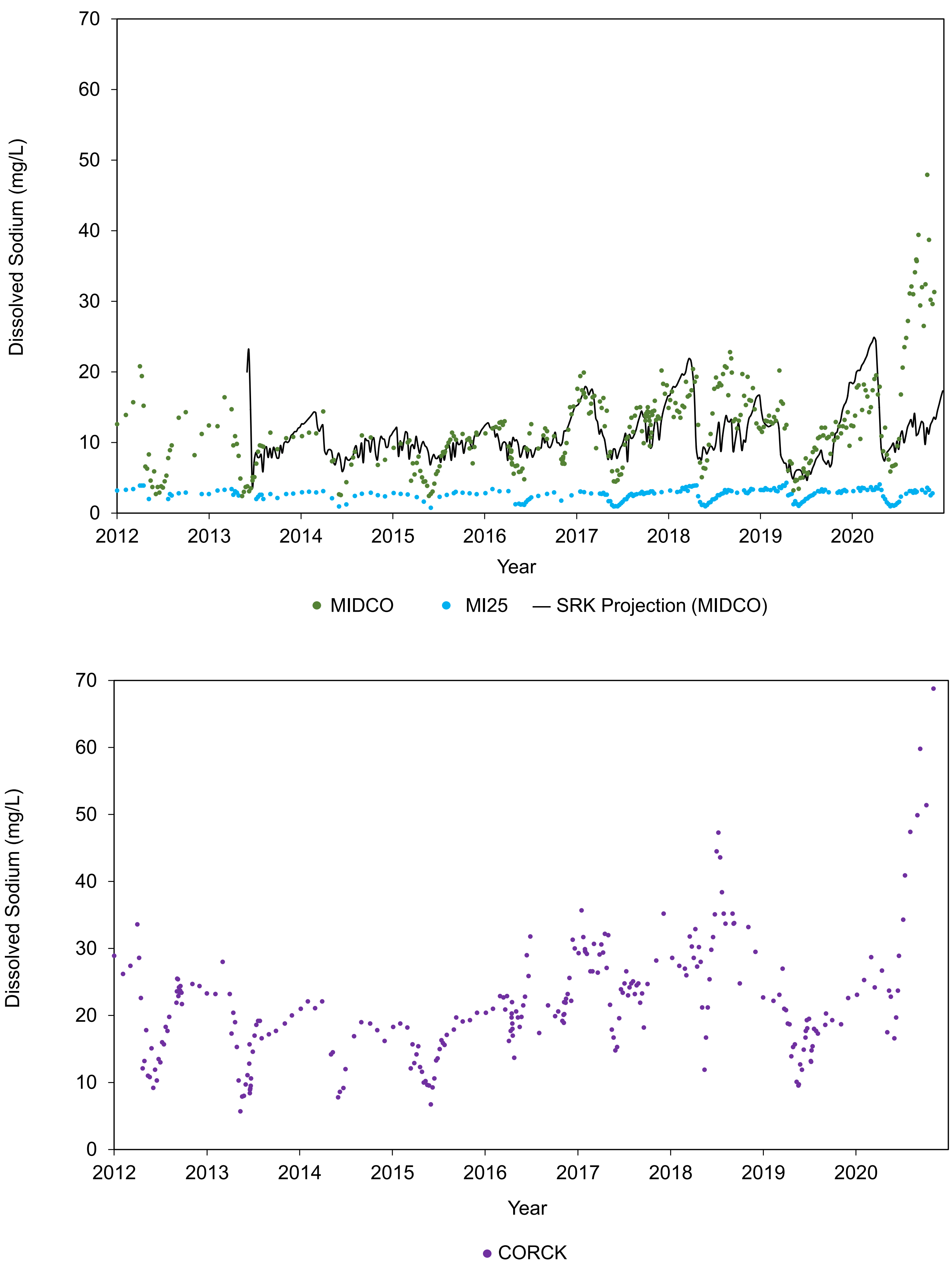
Figure 3.1-11: Total Dissolved Solids Concentrations at MIDCO and MI25 (top panel), and CORCK (bottom panel), 2012 to 2021





Notes: EVWQP screening values; level 2 invertebrate (1,750 mg/L), level 2 fish (2,000 mg/L) not shown. Measured concentrations for MI25, MIDCO and CORCK are shown as green, blue and purple circles and SRK projections are represented by the solid black line.
SV = screening value.

Figure 3.1-12: Dissolved Sodium Concentrations at MIDCO and MI25 (top panel), and CORCK (bottom panel), 2012 to 2021



Notes: Measured concentrations for MI25, MIDCO and CORCK are shown as green, blue and purple circles and SRK projections are represented by the solid black line.

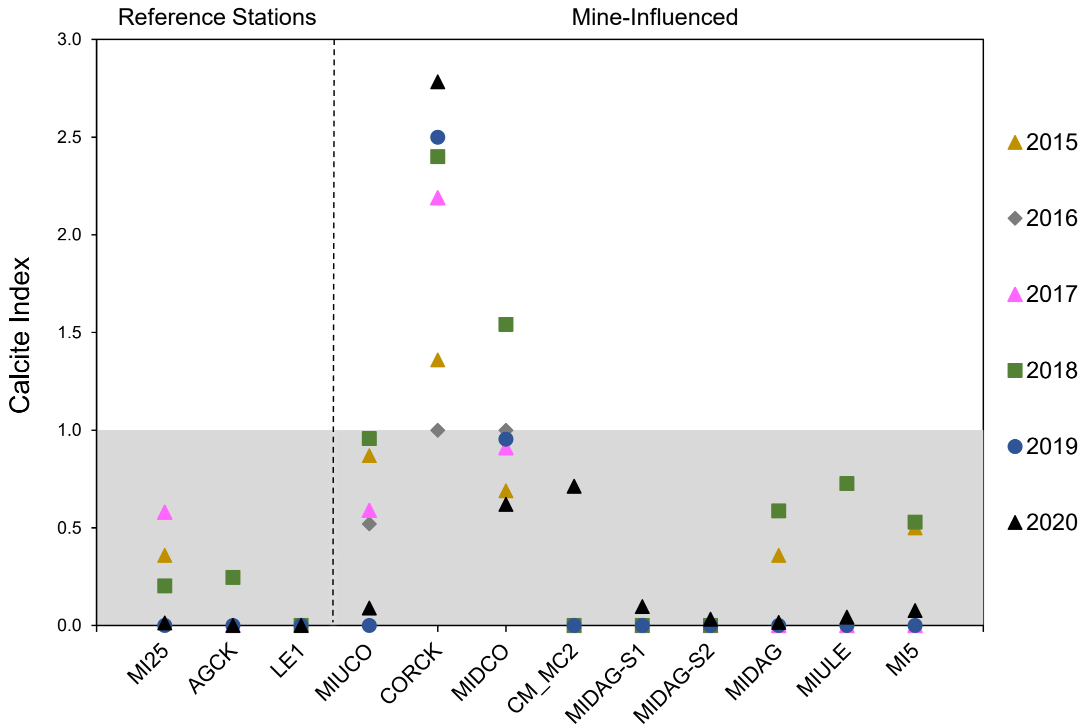
3.2 Calcite Index

Teck initiated a regional calcite monitoring program in 2013 to document calcite conditions in tributary and mainstem areas of the Elk River watershed (Robinson and Atherton 2016). In 2020, the regional calcite program sampled 99 reaches and 267 sites. Of these, 27 reaches in 18 mine-influenced streams had concretion scores above the 2024 Site Performance Objective of 0.5 (Lotic and Teck 2020). Within the CMm area, CORB1 and CORB2 on Corbin Creek had concretion scores above 0.5. These calcite results are not co-located with biological monitoring under the RAEMP or LAEMPs and are not specific to the habitats sampled under those programs, and therefore cannot be directly related to biological conditions to evaluate potential effects of calcite on biota. Rather, the regional program focuses on evaluating broad stream reaches, integrating across habitat types to provide a regional overview of calcite conditions.

To evaluate potential effects of calcite on biota, site-specific calcite monitoring is also conducted as part of the RAEMP and other biological monitoring programs, including the CMm LAEMP. Because this monitoring is targeted to the riffle habitats that are sampled for biota, results of this monitoring are not directly comparable to the regional program. Where the two programs give different results in the same watercourse, the calcite measurements taken under the biological monitoring programs are considered to be more directly relevant to potential effects of calcite on the BIC.

Calcite measurements taken for the CMm LAEMP were within the reference normal range of 0 to 1 at reference stations and in Michel Creek (Figure 3.2-1; Appendix G). Calcite index values above the reference normal range were observed at CORCK in all years except 2016, and in 2018 only at MIDCO. Calcite index values at MIDCO have been near the upper end of the reference normal range since 2016. Calcite index values at CORCK have been higher relative to stations in Michel Creek and have increased since 2016, with the highest values observed in 2020.

Figure 3.2-1: Spatial Variation in Calcite Index in the CMm LAEMP Study Area



Notes: Grey shading represents the normal range defined as the 2.5th and 97.5th percentiles of the 2012 and 2015 reference area data from the RAEMP (Minnow 2018b).

3.3 Sediment Quality

Sediment quality data screening and spatial trends in sediment quality data are summarized in Sections 3.3.1 and 3.3.2. Tabulated data and supplementary plots are provided in Appendices F and H.

3.3.1 Data Screening

Sediment quality results screened against the BC WSQG for the protection of aquatic life (BC ENV 2021) are provided in Appendix H. A summary of metal and polycyclic aromatic hydrocarbon (PAH) constituents with concentrations greater than BC WSQGs is provided in Tables 3.3-1 and 3.3-2. Plots showing spatial trends of constituents with concentrations higher than BC WSQGs are provided in Figures 3.3-1 to Figure 3.3-3 and plots for the remaining constituents are provided in Appendix F. Substrate composition, sediment texture, grain size and sediment TOC content are provided in Section 3.4.

3.3.2 Spatial Trends

Metal concentrations above lower BC WSQGs were observed at both reference and mine-influenced stations in 2020 (Table 3.3-1; Figure 3.3-1 to Figure 3.3-3). Metals above the lower BC WSQGs at mine-influenced stations were arsenic, cadmium, iron, manganese, mercury, nickel, selenium, and zinc; with the exceptions of selenium and mercury, these metals were also above BC WSQGs at one or more reference stations. Metal concentrations that were above upper the BC WSQGs were cadmium, manganese, nickel and zinc at CORCK and nickel at MIDCO, CM_MC2, MIDAG-S1, MIDAG-S2 and MIDAG in Michel Creek downstream of CORCK. Key spatial patterns in sediment quality results for metals in 2020 were:

- Concentrations of most constituents in sediment were lower at CORCK relative to Michel Creek, including aluminum, arsenic, beryllium, boron, chromium, copper, iron, lead, lithium, molybdenum, phosphorous, potassium, and vanadium.
- Concentrations of several sediment constituents were highest at CORCK and declined in a downstream gradient in Michel Creek, including cadmium, calcium, cobalt, manganese, nickel, sodium, strontium, sulfur, uranium, and zinc.
- Concentrations of a few sediment constituents were highest at the two most downstream stations in Michel Creek (MIULE and MI5): antimony, barium, and titanium.
- Downstream of MIDCO, metal concentrations were similar to or lower than concentrations at reference stations, with the exception of selenium and mercury which had higher concentrations at one or more downstream stations compared to reference stations.
  - Concentrations of selenium above lower BC WSQG occurred at CORCK and all Michel Creek stations except MIUCO (Figure 3.3-1). No spatial pattern in selenium was evident, and the highest concentrations were observed at CORCK, MIDAG, and MI5. Replicates at these stations with relatively high selenium also had relatively high sulfur concentrations compared to other replicates within the same station. This pattern may indicate that selenium was present in those samples in a sulfide-containing mineral, potentially indicating low bioavailability.
  - Concentrations of mercury (Figure 3.3-1) were below the lower BC WSQG except for one replicate at MIDAG (0.46 mg/kg) but the mean concentration across the five replicates was below the lower BC WSQG. No spatial patterns were apparent for mercury.

Polycyclic aromatic hydrocarbon concentrations were above the lower BC WSQGs at both reference and mine-influenced stations in 2020 (Table 3.2-2; Figures 3.3-2 and Figure 3.3-3), whereas PAHs above the upper BC WSQG occurred at CORCK and at stations downstream of CORCK on Michel Creek. PAH concentrations were consistently highest at CORCK and declined in a downstream gradient in Michel Creek. PAHs are slow to degrade and tend to accumulate in habitats where they are found in association with fine sediments, and high TOC and detritus content (Newman and Unger 2003). However, the substrate composition at both reference and mine-influenced stations was mostly composed of cobble (>50%) and TOC content in small depositional areas near the erosional BIC habitat was <10% (Section 2.5.3). Therefore, the PAH accumulation pattern observed does not align with the habitat variables.

3.3.3 Temporal Trends

An increase in concentration from 2018 to 2019 followed by a decrease in 2020 was observed for several sediment quality constituents at CORCK: cadmium, cobalt, manganese, nickel, selenium, strontium, and zinc (Figure 3.3-1; Appendix F). In contrast, at MIDCO, a decrease between 2018 and 2019 was observed for several constituents, followed by an increase in 2020: boron, cobalt, nickel, selenium, strontium, and uranium. This pattern was not observed in the water chemistry, indicating that this observation may reflect spatial variability in sediment quality within each station. Concentrations of metals at stations downstream in Michel Creek were generally similar or lower in 2020 compared to 2019, with the exception of selenium, which increased between 2019 and 2020.

Table 3.3-1: Summary of Sediment Quality Screening Exceedances for Metals at CMm in 2020

Constituent	BC Lower WSQG (mg/kg dw)	BC Upper WSQG (mg/kg dw)	Maximum Concentration (mg/kg dw)[(a)]											
			Reference Stations			Mine-influenced Stations								
			MI25	AGCK	LEI	MIUCO	CORCK	MIDCO	CM_CM2	MIDAG_S1	MIDAG_S2	MIDAG	MIULE	MI5
Arsenic	5.9	17	**11.5**	**6.07**	**5.97**	**8.05**	-	**7.52**	-	**8.47**	**6.99**	**6.89**	**8.51**	**5.9**
Cadmium	0.6	3.5	**1.47**	-	**2.03**	**0.88**	**9.39**	**1.96**	**1.54**	**1.34**	**1.23**	**1.26**	**1.32**	**1.71**
Iron	21,200	43,800	**24,800**	-	-	**21,500**	-	-	-	-	-	-	-	-
Manganese	460	1,100	**593**	-	-	**607**	**1,640**	**904**	**752**	**867**	**511**	-	-	-
Mercury	0.17	0.49	-	-	-	-	-	-	-	-	-	**0.46**	-	-
Nickel	16	75	**33.7**	-	**25.9**	**24.2**	**228**	**148**	**136**	**111**	**87.2**	**77.0**	**44.6**	**39.6**
Selenium	1.9	-	-	-	-	-	**4.88**	**2.92**	**2.29**	**2.26**	**3.20**	**5.69**	**2.81**	**4.79**
Zinc	123	315	**155**	-	-	-	**922**	**204**	**133**	**140**	**129**	**130**	**129**	-

Note: Stations are ordered upstream to downstream.

a) Concentrations shown are the maximum of the five replicate samples at each mine-influenced station and the maximum of three replicate samples at each reference station.

Bolded values exceed the lower BC WSQG for the protection of aquatic life (BC ENV 2021).

Shaded values exceed the upper BC WSQG for the protection of aquatic life (BC ENV 2021).

"-" = no data available or values below detection limit; mg/kg dw = milligram per kilogram dry weight; WSQG = working sediment quality guideline; CMm = Coal Mountain Mine.

Table 3.3-2: Summary of Sediment Quality Screening Exceedances for Polycyclic Aromatic Hydrocarbons at CMm in 2020

Constituent	BC Lower WSQG (mg/kg dw)	BC Upper WSQG (mg/kg dw)	Maximum Concentration (mg/kg dw)[(a)]											
			Reference Stations			Mine-influenced Stations								
			MI25	AGCK	LEI	MIUCO	CORCK	MIDCO	CM_CM2	MIDAG_S1	MIDAG_S2	MIDAG	MIULE	MI5
Acenaphthene	0.0067	0.089	-	**-**	**-**	-	**0.05**	**0.008**	**0.007**	-	-	-	-	-
Acenaphthylene	0.0059	0.13	-	-	-	-	**0.01**	-	-	-	-	-	-	-
Benz(a)anthracene	0.032	0.39	-	-	-	-	**0.07**	-	-	-	-	-	-	-
Benzo(a)pyrene	0.032	0.78	-	-	-	-	**0.05**	-	-	-	-	-	-	-
Chrysene	0.057	0.86	-	**0.06**	**0.08**	-	**0.36**	**0.15**	**0.06**	**0.15**	**0.18**	**0.15**	**0.09**	**0.07**
Fluoranthene	0.11	2.4	-	-	-	-	-	-	-	-	-	**0.12**	-	-
Fluorene	0.021	0.14	-	-	-	-	**0.22**	**0.07**	**0.03**	**0.05**	**0.05**	**0.05**	**0.03**	**0.03**
2-Methylnaphthalene	0.020	0.2	-	**0.12**	**0.09**	**0.16**	**2.05**	**0.65**	**0.29**	**0.57**	**0.47**	**0.36**	**0.22**	**0.21**
Naphthalene	0.035	0.39	-	**0.06**	**0.04**	**0.06**	**0.68**	**0.24**	**0.14**	**0.25**	**0.19**	**0.16**	**0.11**	**0.11**
Phenanthrene	0.042	0.52	-	**0.16**	**0.20**	**0.13**	**0.97**	**0.38**	**0.18**	**0.55**	**0.4**	**0.38**	**0.23**	**0.26**
Pyrene	0.053	0.88	-	-	-	-	**0.11**	-	-	**0.07**	**0.06**	**0.1**	-	-
LMW PAH[(b)]	0.10	-	-	**0.46**	**0.35**	**0.39**	**4.0**	**1.39**	**0.65**	**1.46**	**1.14**	**1.0**	**0.6**	**0.61**
Total PAH	4.0	35	-	**-**	**-**	**-**	**7.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Note: Stations are ordered upstream to downstream.

a) Concentrations shown are the maximum of the five replicate samples at each station.

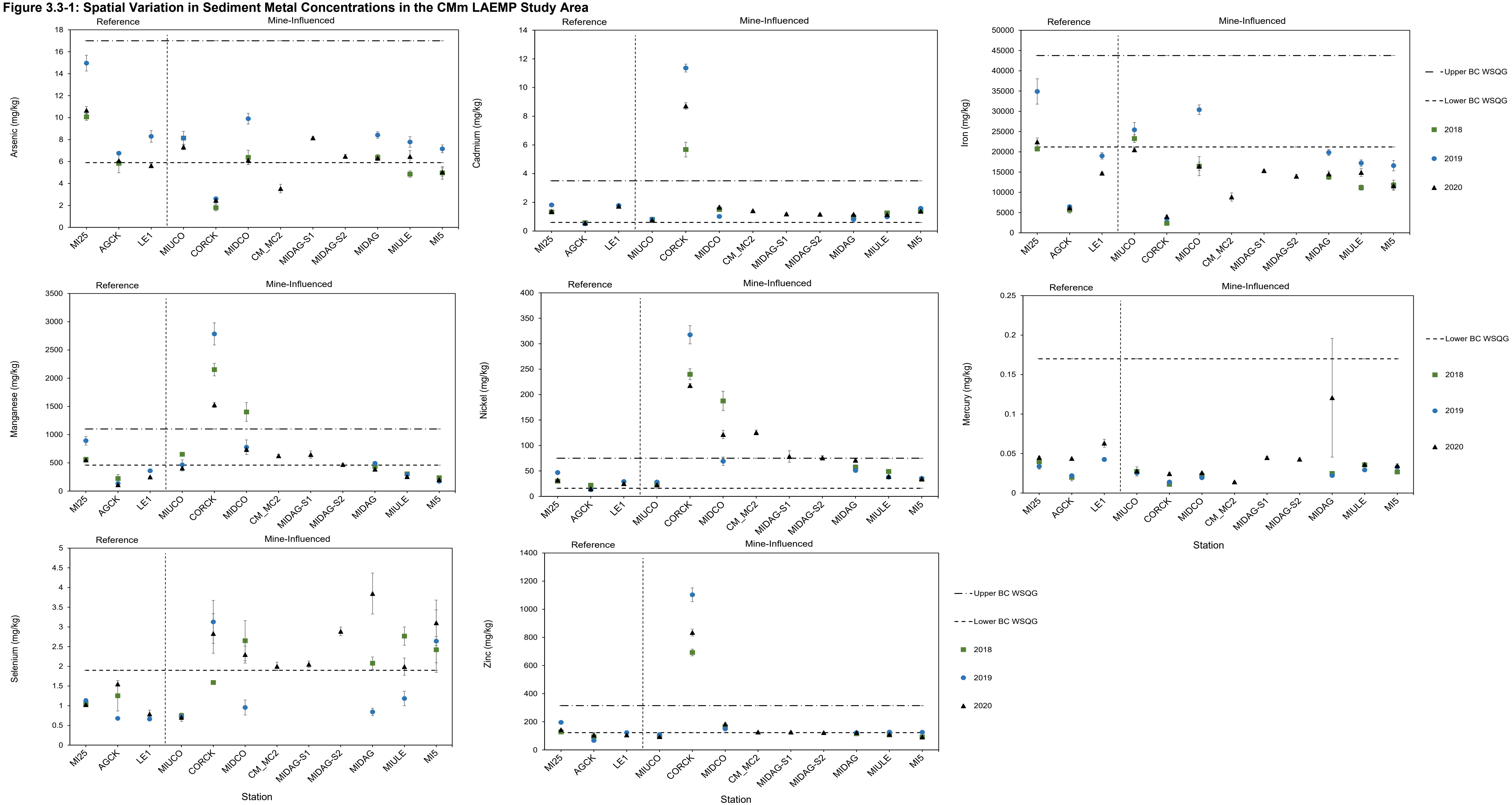
b) Low molecular weight PAHs are comprised of acenaphthene, acenaphthylene, anthracene, fluorene, 2-methylnaphthalene, naphthalene, and phenanthrene.

Bolded values exceed the lower BC WSQG for the protection of aquatic life (BC ENV 2017).

Shaded values exceed the upper BC WSQG for the protection of aquatic life (BC ENV 2017).

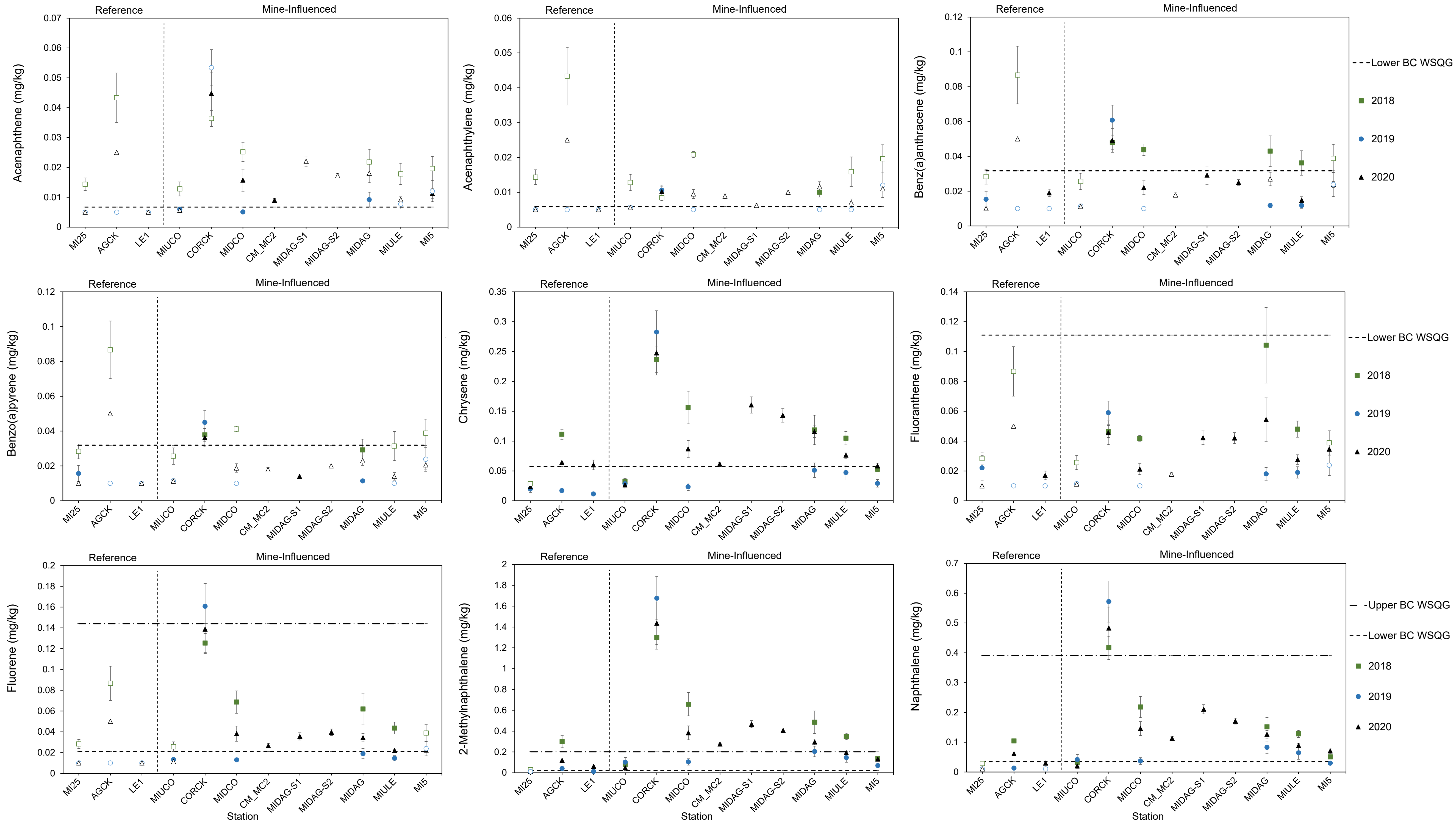
"-" = values below detection limit; mg/kg dw = milligram per kilogram dry weight; LMW = low molecule weight; PAH = polycyclic aromatic hydrocarbon; BC = British Columbia; WSQG = working sediment quality guidelines; CMm = Coal Mountain Mine.

Figure 3.3-1: Spatial Variation in Sediment Metal Concentrations in the CMm LAEMP Study Area



WSQG = working sediment quality guideline; mg/kg = milligrams per kilogram dry weight; CMm = Coal Mountain Mine.

Figure 3.3-2: Spatial Variation in Sediment Polycyclic Aromatic Hydrocarbon Concentrations in the CMm LAEMP Study Area

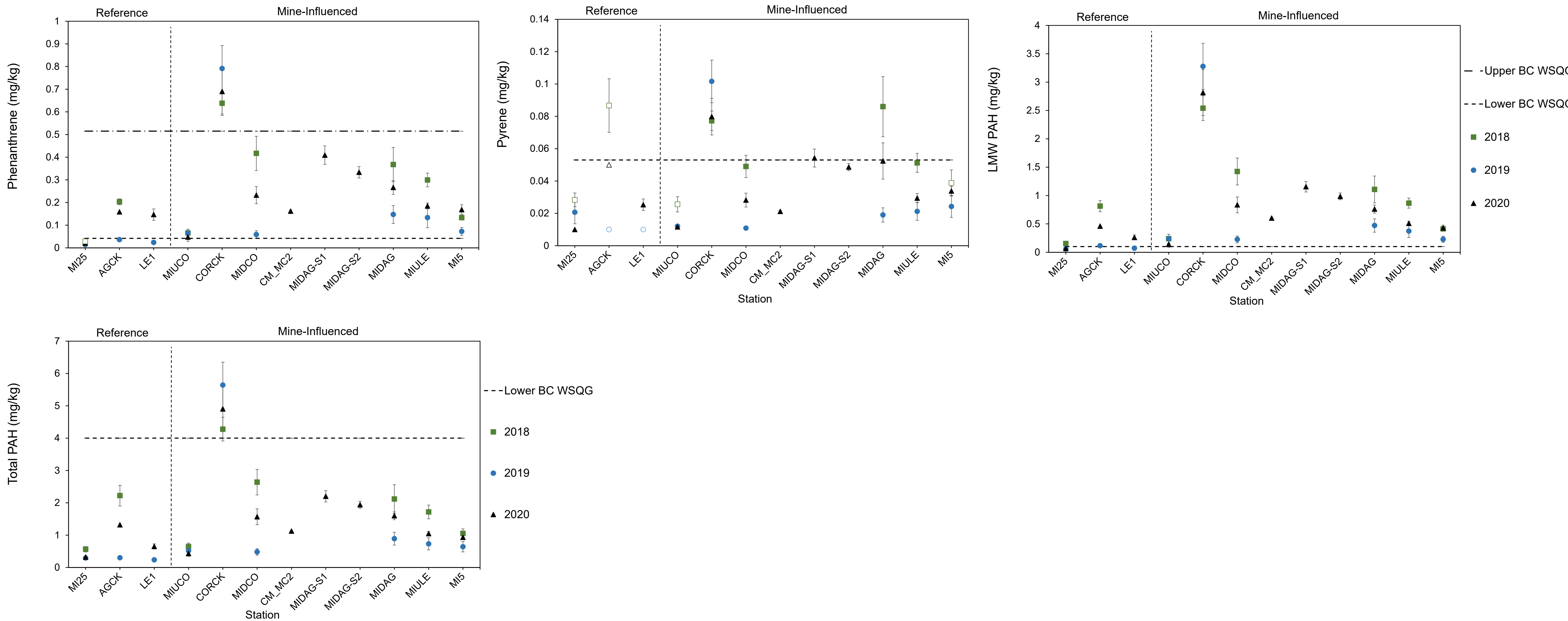


Notes: Upper BC WSQG not shown for acenaphthene (0.089 mg/kg), acenaphthylene (0.13 mg/kg), benz(a)anthracene (0.39 mg/kg), benzo(a)pyrene (0.78 mg/kg), chrysene (0.86 mg/kg), and fluoranthene (2.4 mg/kg).

Open symbols represent non-detects.

WSQG = working sediment quality guideline; mg/kg = milligrams per kilogram dry weight; CMm = Coal Mountain Mine.

Figure 3.3-3: Spatial Variation in Sediment Polycyclic Aromatic Hydrocarbon Concentrations in the CMm LAEMP Study Area



Notes: Upper BC WSQG not shown for pyrene (0.89 mg/kg), and total PAH (35 mg/kg).

Open symbols represent non-detects.

WSQG = working sediment quality guideline; mg/kg = milligrams per kilogram dry weight; CMm = Coal Mountain Mine.

3.4 Physical Habitat Characteristics

Variation in physical habitat attributes such as water depth, velocity, sediment particle size, and TOC can influence BIC structure in streams (Rosenberg and Resh 1992). Water depth ranged between 0.12 m and 0.24 m among sampling stations in 2020, and stream velocity ranged from 0.30 to 0.67 m/s (Table 3.4-1).

Field water quality measurements taken at the benthic invertebrate sampling stations in Michel Creek in 2020 indicated that pH was neutral to slightly basic and ranged from 7.9 to 8.5, the water was well oxygenated (i.e., ranged from 8.7 to 10.4 mg/L of DO) and these constituents were similar among stations (Table 3.4-1; Appendix I). Specific conductivity was lower at the reference stations and at MIUCO upstream of CMm (i.e., 199 to 327 µS/cm), and higher at CORCK, MIDCO, and CM_MC2 (i.e., ranged from 1,230 to 1,767 µS/cm), but decreased with increasing distance from CMm (Table 3.4-1). Water temperature was relatively similar among stations and ranged from 7.8 °C to 13.7 °C.

Based on visual examination of the area, substrate composition at both reference and mine-influenced stations was mostly composed of cobble and gravel (>50%; Table 3.4-1; Figure 3.4-1; Appendix I). Sediment texture, based on the sediment samples collected near BIC stations not within the erosional habitat where BIC was collected was sandy, silty loam, and particle size generally consisted of sand/silt, with low proportions of gravel and clay (Table 3.4-1; Figure 3.4-1; Appendix I). Sediment TOC content was similar among stations and was generally below 7% between 2018 and 2020, with the exception of AGCK (2018 and 2020), CORCK (2019 and 2020), MIDAG-S1 (2020), and MIDAG-S2 (2020), which had higher sediment TOC content, ranging from 7.1% to 9.5%.

Overall, the physical habitat characteristics were similar between reference and mine-influenced stations and there was similar substrate composition and sediment particle size distribution between stations (Table 3.4-1; Figure 3.4-1; Appendix I, Figures 4.0-1 and 4.0-2).

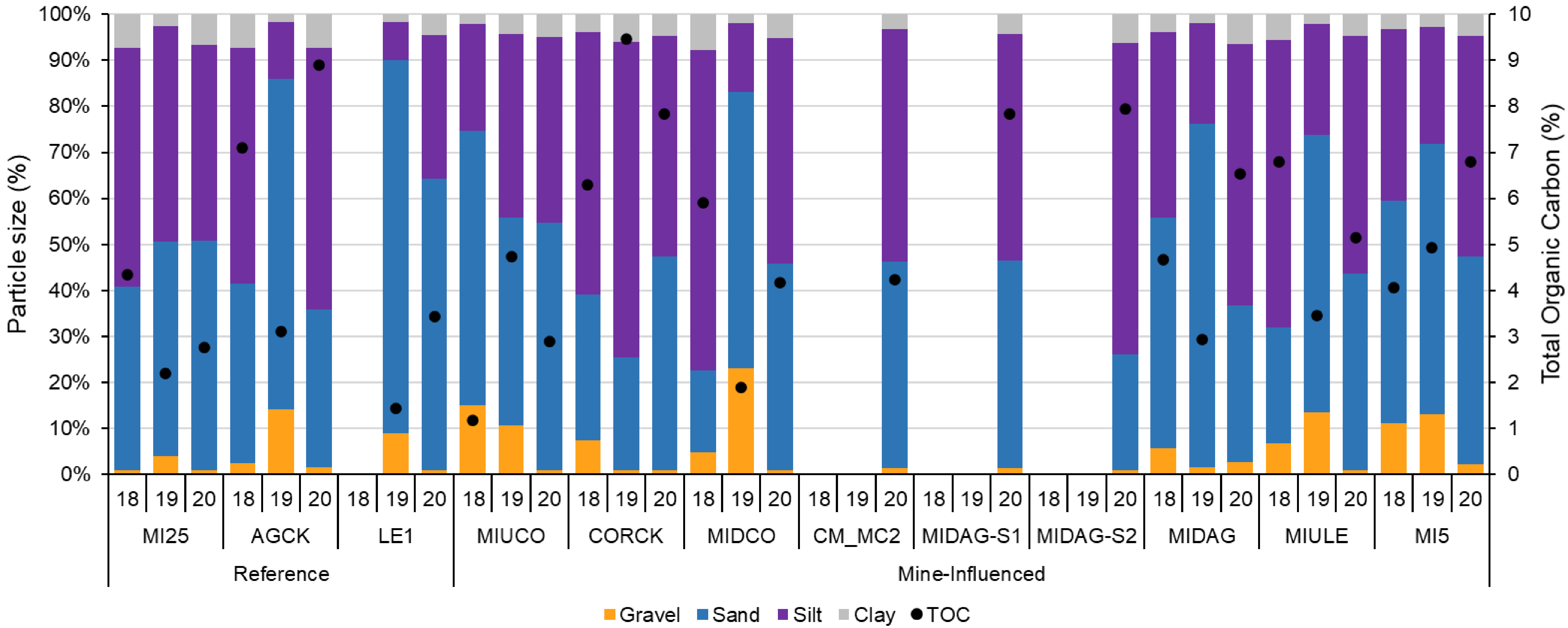
Table 3.4-1: Habitat Characteristics at Benthic Invertebrate Sampling Stations within the Coal Mountain Operations Local Aquatic Effects Monitoring Program, September 2020

Parameter	Units	Reference Stations			Mine-Influenced Stations								
		MI25	AGCK	LEI	MIUCO	CORCK	MIDCO	CM_MC2[(a)]	MIDAG-S1[(a)]	MIDAG-S2[(a)]	MIDAG	MIULE	MI5
Physical Parameters													
Sample water depth	m	0.12	0.19	0.15	0.17	0.15	0.19	0.19	0.15	0.17	0.22	0.24	0.21
Velocity	m/s	0.30	0.34	0.42	0.30	0.31	0.34	0.46	0.67	0.38	0.50	0.37	0.51
Water temperature	°C	7.8	7.8	11.7	9.7	12.5	9.6	10.3	7.9	10.8	9.0	9.1	13.7
Dissolved oxygen	mg/L	9.1	10.4	9.7	10.0	9.1	10.3	10.4	8.7	9.3	10.3	10.2	9.0
Specific conductivity	µS/cm	315	267	199	327	1,767	1,230	1,234	863	812	795	670	521
pH	-	8.0	8.2	7.9	8.2	7.9	8.2	8.3	8.1	8.1	8.2	8.3	8.5
Organic Carbon													
Total organic carbon	%	2.8	8.9	3.4	2.9	7.8	4.2	4.2	7.8	7.9	6.1	4.4	6.8
Sediment Particle Size													
Clay (<0.004 mm)	%	7	7	5	5	5	5	3	4	6	6	4	5
Silt (0.0004 to 0.06 mm)	%	22	28	16	20	24	25	25	25	34	29	26	24
Fine sand (0.06 to 0.25 mm)	%	15	8	27	20	17	12	13	13	8	9	17	10
Coarse sand (0.25 to 2.0 mm)	%	6	6	3	5	4	7	7	6	3	5	3	8
Gravel (>2.0 mm)	%	<1	2	<1	<1	<1	<1	1	1	<1	<1	<1	2
Substrate Composition													
Bedrock	%	0	0	0	0	0	5	0	0	0	0	0	0
Boulder	%	10	20	10	25	10	5	25	0	10	25	10	0
Cobble	%	35	45	86	40	50	45	45	35	35	30	40	85
Gravel	%	25	30	2	20	25	25	15	40	20	25	30	10
Sand	%	15	5	2	10	0	10	5	10	20	10	10	5
Finer	%	15	0	0	5	15	10	10	15	15	10	10	0

a) Special study stations.

µS/cm = microsiemens per centimetre; - = no data.

Figure 3.4-1: Mean Particle Size and Total Organic Carbon in Sediment CMm LAEMP Study Area, 2018 to 2020



CMm = Coal Mountain Mine.

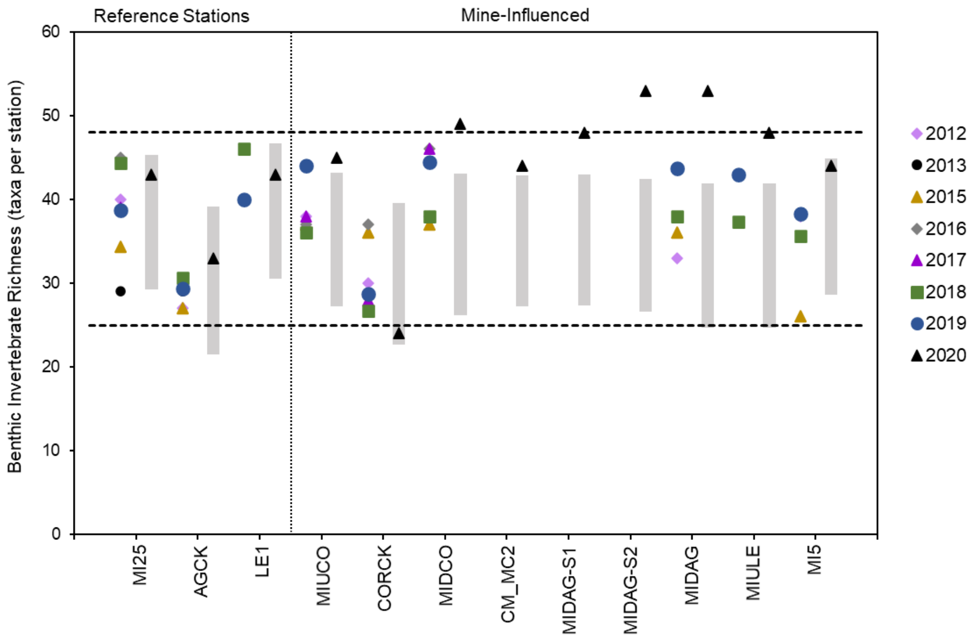
3.5 Benthic Invertebrate Community

3.5.1 Richness and Abundance

Benthic invertebrate richness was similar among stations between 2012 and 2019; however, richness was significantly higher in 2020 at all stations except CORCK, where richness significantly decreased in 2020 relative to previous years (Appendix J, Table J-4). In all instances, the magnitudes of the differences were less than 2 SD, indicating that although statistically significant, these differences are not biologically meaningful because they are still within the typical range of variability observed in previous years. Richness was within or above the site-specific and regional normal ranges at mine-influenced stations and reference stations in 2020, except for CORCK where richness was within the site-specific normal range but was below the regional normal range (Figure 3.5-1; Appendix J). Richness at CORCK was also significantly lower than downstream stations (i.e., MIDCO to MI5; Appendix J, Table J -3), and the magnitude of difference was -3.5 SD based on the contrast mean (Section 2.5.3). Richness was significantly higher at MIDAG-S2, MIDAG, and MIULE relative to downstream stations, but the differences were within 2 SD, indicating that although statistically significant, these differences are not biologically meaningful because they are still within the typical range of variability observed at downstream and reference stations.

Benthic invertebrate abundance was similar among years between 2012 and 2019 (Figure 3.5-2). There were no significant differences in abundance at mine-influenced stations in 2020 compared to previous years (i.e., 2012-2019), but abundance decreased at all three reference stations in 2020 compared to previous years, with a magnitude of difference less than 2 SD (Appendix J, Table J-4). Abundance of the BIC was within or above the upper bound of the site-specific and regional normal ranges at most reference and mine-influenced stations between 2012 and 2020. In 2020, BIC abundance was below the site-specific normal range at reference station MI25 and at MIUCO (Figure 3.5-2); however, the site-specific normal ranges for MI25 and MIUCO, were higher and more variable than most other areas based on local habitat conditions. Spatially, invertebrate abundance was statistically significantly lower at MIUCO, CORCK, and CM_MC2 compared to downstream and reference stations, although magnitudes of difference were less than 2 SD (Appendix J, Table J-3). BIC abundance at MIDAG-S1, MIDAG-S2, MIDAG, and MIULE was significantly higher relative to downstream and reference stations in 2020, with magnitudes of difference ranging from 1.2 to 2.8 SD (Appendix J, Table J-3).

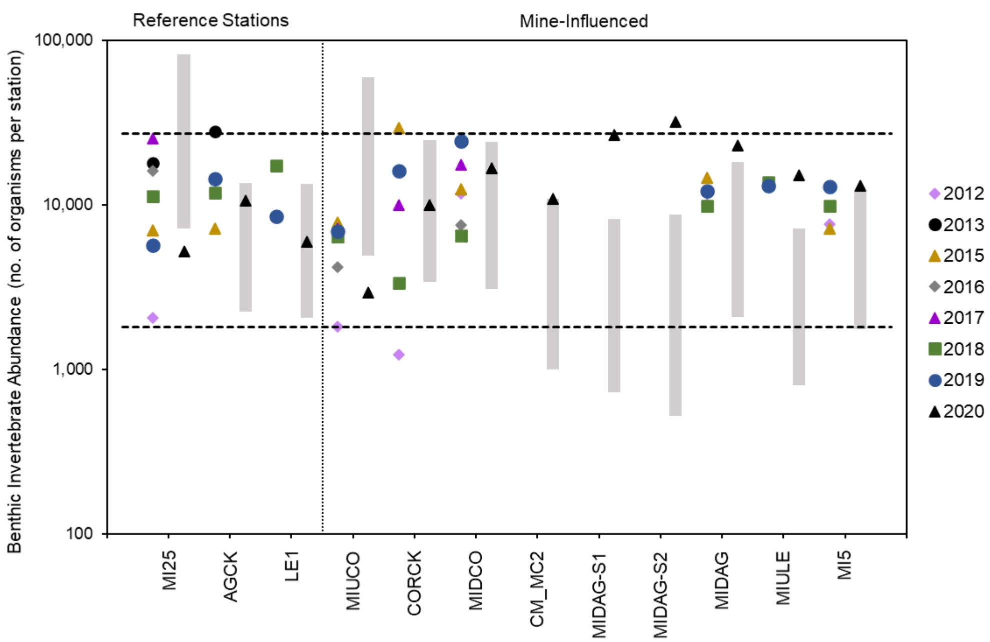
Figure 3.5-1: Benthic Invertebrate Taxonomic Richness in the CMm LAEMP Study Area



Notes: Grey shading represents the 2020 site-specific normal ranges (i.e., best attainable endpoints given local and landscape predictors) for comparisons to 2020 results only; data from 2012 to 2020 compared to each year's site-specific normal range are presented in Appendix C. The dotted line represents the regional normal range defined as the 2.5th and 97.5th percentiles of the 2012 to 2019 reference area data from the RAEMP (Minnow 2020a).

CMm = Coal Mountain Mine.

Figure 3.5-2: Benthic Invertebrate Abundance in the CMm LAEMP Study Area



Notes: Grey shading represents the 2020 site-specific normal ranges (i.e., best attainable endpoints given local and landscape predictors) for comparisons to 2020 results only; data from 2012 to 2020 compared to each year's site-specific normal range are presented in Appendix C. The dotted line represents the regional normal range defined as the 2.5th and 97.5th percentiles of the 2012 to 2019 reference area data from the RAEMP (Minnow 2020a).

CMm = Coal Mountain Mine.

3.5.2 Community Composition

The BIC at the reference stations was dominated by Ephemeroptera in 2020, with the exception of LE1 which was co-dominated by Ephemeroptera and Plecoptera (Figure 3.5-3). The proportions of the other major groups differed among stations. Ephemeroptera also dominated the community at most mine-influenced stations in Michel Creek between 2012 and 2020 (i.e., MIUCO, MIDAG-S2, MIDAG, MIULE, and MI5), except at MI5, which was co-dominated by Ephemeroptera and Trichoptera in 2015 and 2019 (Figure 3.5-4). The BIC in Corbin Creek (i.e., CORCK) and in Michel Creek closest to CMm (i.e., MIDCO and CM_MC2) were dominated by Diptera, with higher proportions of Chironomidae compared to reference stations and stations in Michel Creek farther downstream from CMm. Higher proportions of Oligochaeta were observed at CORCK from 2016 to 2020, compared to other stations. A decrease in the proportion of Ephemeroptera and an increase in the proportion of Diptera was observed at MIUCO and MIDAG between 2012 and 2020 (Figure 3.5-4).

Following review of the 2019 CMm LAEMP (Golder 2020a), the EMC suggested that Acari be explored as a potential indicator of stress in the Elk Valley, at CMm specifically. Although there is support in the literature for the use of Acari as an indicator of water quality (at the family level) and that Acari can be sensitive to environmental conditions (Goldschmidt 2016), the 2012 to 2020 CMm LAEMP results do not support the use of Acari as an indicator of stress in Michel Creek. Acari abundance was lower at the reference stations in most years (i.e., ≤ 3%) compared to the mine-influenced stations in Michel Creek (i.e., approximately 7%); however, Acari abundance was low at CORCK (i.e., 0.4%) and there was no clear spatial pattern downstream of CMm evident. Libertiidae and Sperchontidae were the most common Acari taxa in Michel Creek in 2020.

Figure 3.5-3: Benthic Invertebrate Community Composition in the Reference Stations in the CMm LAEMP Study Area

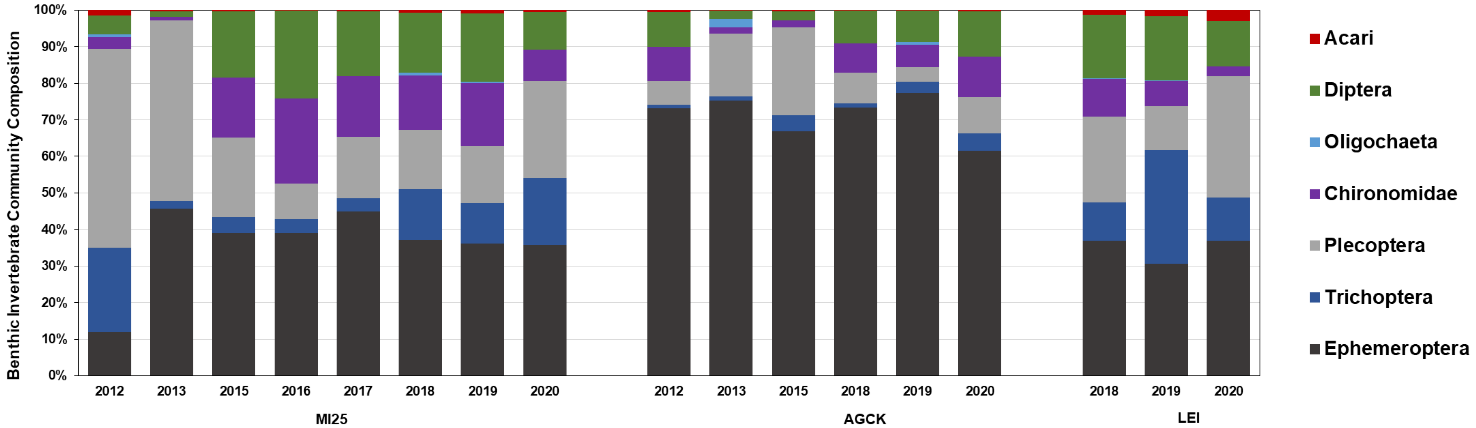
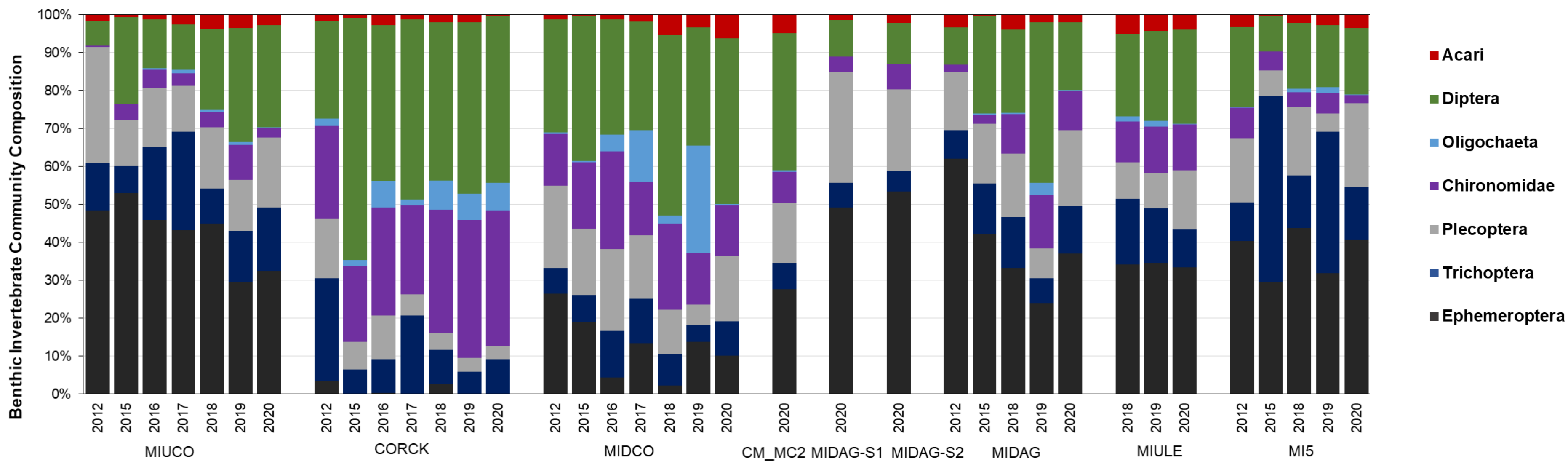


Figure 3.5-4: Benthic Invertebrate Community Composition in Mine-influenced Stations in the CMm LAEMP Study Area



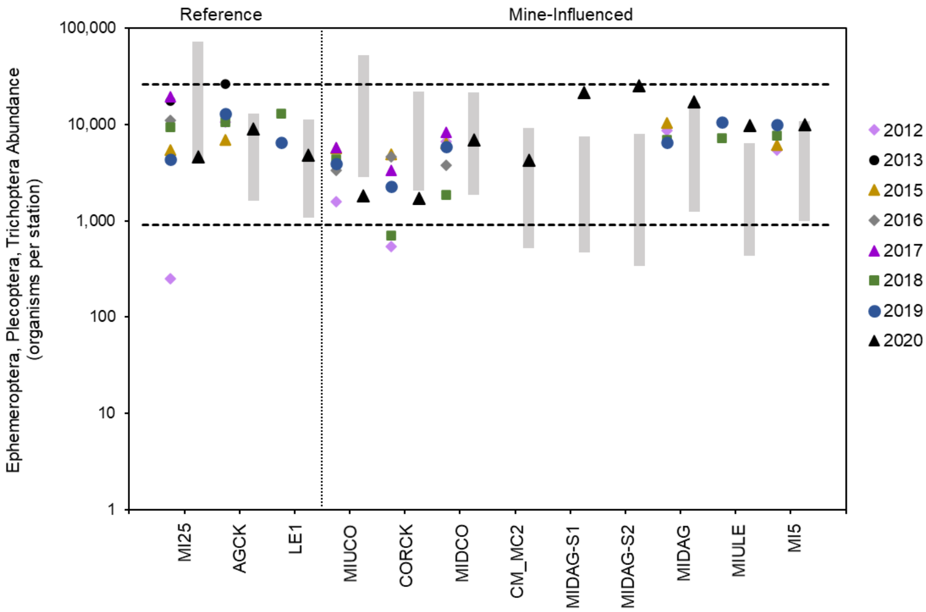
CMm = Coal Mountain Mine.

3.5.3 Ephemeroptera, Plecoptera, Trichoptera Abundance

Key spatial and temporal patterns in the abundance and proportion of EPT taxa (i.e., % EPT) were:

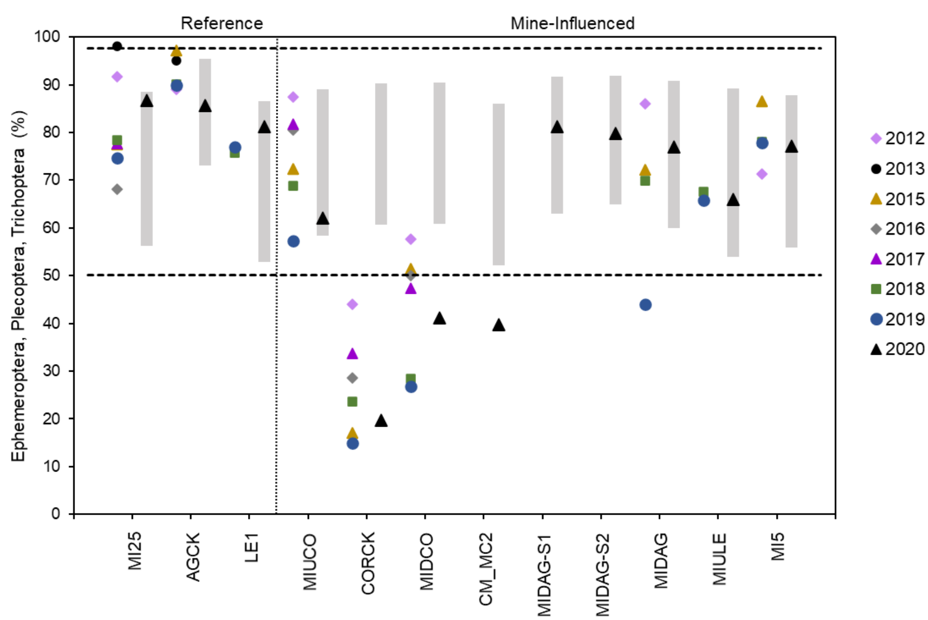
- Michel Creek EPT abundance was within or above the site-specific and regional normal ranges at reference and mine-influenced stations between 2012 to 2020, except at MIUCO and CORCK (Figure 3.5-5). In 2020, EPT abundance was below the site-specific normal range at MIUCO and CORCK. At CORCK, EPT abundance was below the lower boundary of the regional normal range in 2012 and 2018 and was significantly lower than the mean of the reference stations by a magnitude of difference greater than 2 SDs (Appendix J, Table J-3). At M125, EPT abundance was below the regional normal range in 2012 but increased thereafter.
- At MIUCO, CORCK, MIDCO, and CM_MC2, EPT abundance was a significantly lower compared to downstream and reference stations in 2020 but the magnitudes of difference were less than 2SD (Appendix J, Table J-3), indicating these differences are not biologically meaningful (Section 2.5.3).
- At LE1, MIUCO, and CORCK, EPT abundance significantly decreased in 2020 compared to previous years, although magnitudes of difference were less than 2SD (Appendix J, Table J-4), indicating these differences are not biologically meaningful (Section 2.5.3).
- At reference stations and at mine-influenced stations % EPT was often within the site-specific and regional normal ranges, except at CORCK, MIDCO, and CM_MC2 and MIDAG (Figure 3.5-6; Appendix J). At CORCK, MIDCO, and CM_MC2, % EPT was below the site-specific normal range in 2020 and below the regional normal range at CORCK (2012 to 2020), MIDCO (2017 to 2020), CM_MC2 (2020) and MIDAG (2019).
- At MIDAG in 2019, % EPT was below the regional normal range but it was within both the site-specific and regional normal ranges at MIDAG and MIDAG-S1 and MIDAG-S2 in 2020 (Figure 3.5-6).
- At mine-influenced stations closest to CMm (i.e., CORCK, MIDCO, and CM_MC2), % EPT was significantly lower in 2020, with magnitudes of difference greater than 2 SD compared to downstream and reference stations (Appendix J, Table J-3). There was also a significant decrease in % EPT at MIULE compared to downstream and reference stations (-2.7 SD).
- At CORCK and at stations downstream of CORCK in Michel Creek, % EPT in 2020 did not significantly differ from previous years (2012 to 2019; Appendix J, Table J-4). Percent EPT was significantly lower at MIUCO in 2018, 2019, and 2020 and at MIDCO in 2018 and 2019 compared to 2012 to 2017, and at MIDAG in 2019 compared to 2012 to 2018, with magnitudes of difference between -0.9 and -5.8 SD. At reference station AGCK, % EPT was significantly lower in 2020 compared to previous years (2012 to 2019), but the magnitude of difference was within 2SD, indicating these differences are not biologically meaningful (Section 2.5.3).

Figure 3.5-5: Ephemeroptera, Plecoptera, Trichoptera Abundance in the CMm LAEMP Study Area



Notes: Grey shading represents the 2020 site-specific normal ranges (i.e., best attainable endpoints given local and landscape predictors) for comparisons to 2020 results only; data from 2012 to 2020 compared to each year's site-specific normal range are presented in Appendix C. The dotted line represents the regional normal range defined as the 2.5th and 97.5th percentiles of the 2012 to 2019 reference area data from the RAEMP (Minnow 2020a).
CMm = Coal Mountain Mine.

Figure 3.5-6: Ephemeroptera, Plecoptera, Trichoptera Proportion in the CMm LAEMP Study Area



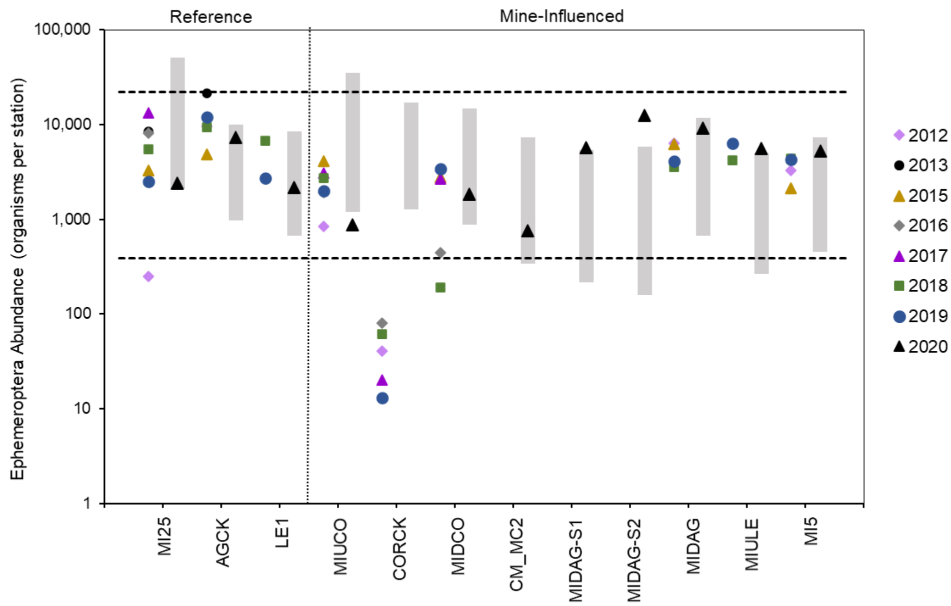
Notes: Grey shading represents the 2020 site-specific normal ranges (i.e., best attainable endpoints given local and landscape predictors) for comparisons to 2020 results only; data from 2012 to 2020 compared to each year's site-specific normal range are presented in Appendix C. The dotted line represents the regional normal range defined as the 2.5th and 97.5th percentiles of the 2012 to 2019 reference area data from the RAEMP (Minnow 2020a).
CMm = Coal Mountain Mine.

3.5.4 Ephemeroptera Abundance

Key spatial and temporal patterns in the abundance and proportion of Ephemeroptera taxa were:

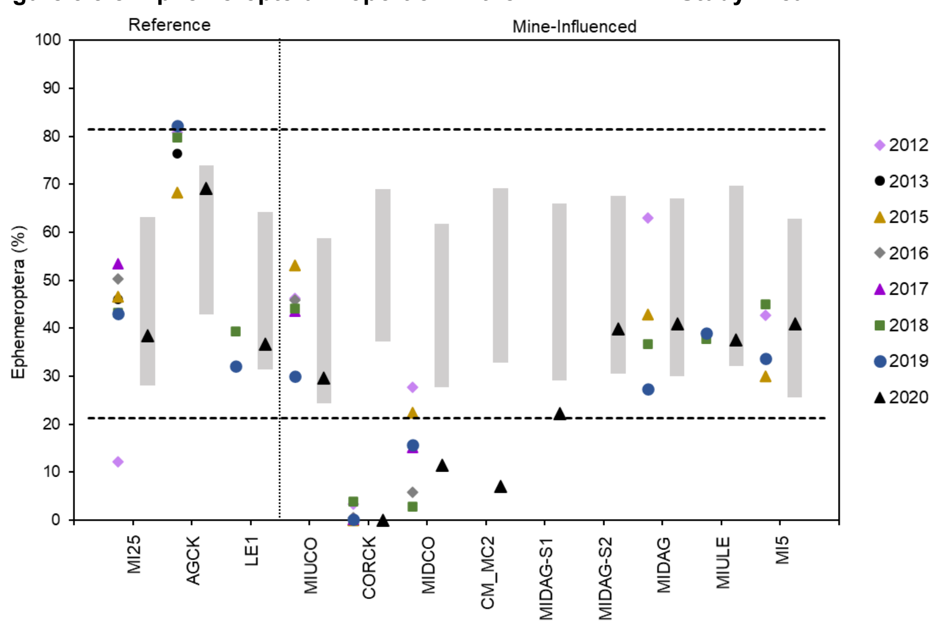
- There were no significant spatial differences in Ephemeroptera abundance between the reference stations and the mine-influenced stations in Michel Creek in 2020 (Appendix J, Table J-3). There were no Ephemeroptera observed or collected from CORCK in 2020.
- Ephemeroptera abundance was within or above the site-specific and regional normal ranges at reference and mine-influenced stations between 2012 to 2020, except for samples collect at CORCK (2012 to 2020), MIDCO (2016 and 2018), M125 (2012), and MIUCO (2020), which were below one or both the site-specific and/or regional normal ranges (Figure 3.5-7).
- Ephemeroptera abundance was significantly lower at MIUCO, MIDCO, and CM_MC2 compared to downstream and reference stations in 2020, although magnitudes of difference were less than 2 SD (Appendix J, Table J-3), indicating these differences are not biologically meaningful (Section 2.5.3).
- Ephemeroptera abundance was significantly lower at AGCK, LE1, and MIUCO in 2020 compared to previous years (2012 to 2019), although magnitudes of difference were less than 2SD (Appendix J, Table J-4), indicating these differences are not biologically meaningful (Section 2.5.3).
- Percent E was within or above the site-specific and regional normal ranges at reference and mine-influenced stations, except for samples collected at CORCK (2012 to 2020), MIDCO (2013 to 2020), CM_MC2 (2020), MIDAG-S1 (2020), MIDAG (2019), and M125 (2012), which were below one or both the site-specific and/or regional normal ranges (Figure 3.5-8).
- Percent E was significantly lower at mine-influenced stations closest to CMm (i.e., CORCK, MIDCO, CM_MC2, and MIDAG-S1) in 2020 compared to downstream and reference stations. However, magnitudes of difference greater than 2SD were only observed at CORCK and CM_MC2 (Appendix J, Table J-3).
- Percent E was not significantly different from previous years (2012 to 2019) at CORCK and at stations downstream of CORCK in Michel Creek in 2020 (Appendix J, Table J-4). Percent E was significantly lower at MIUCO in 2019, and 2020 compared to previous years (2012 to 2018), at MIDCO in 2016 and 2018 compared to 2012 to 2015, and at MIDAG in 2018 and 2019 compared to 2012 to 2017, with magnitudes of difference between -1.1 and -5.5 SD. Percent E was significantly higher at the further downstream station on Michel Creek (MI5) in 2018 compared to previous years (2012 to 2017), but the magnitude of difference was within 2SD, indicating these differences are not biologically meaningful (Section 2.5.3).

Figure 3.5-7: Ephemeroptera Abundance in the CMm LAEMP Study Area



Notes: Grey shading represents the 2020 site-specific normal ranges (i.e., best attainable endpoints given local and landscape predictors) for comparisons to 2020 results only; data from 2012 to 2020 compared to each year's site-specific normal range are presented in Appendix C. The dotted line represents the regional normal range defined as the 2.5th and 97.5th percentiles of the 2012 to 2019 reference area data from the RAEMP (Minnow 2020a). No Ephemeroptera collected at CORCK in 2015 and 2020; therefore, not shown on the plot.
CMm = Coal Mountain Mine.

Figure 3.5-8: Ephemeroptera Proportion in the CMm LAEMP Study Area



Notes: Grey shading represents the 2020 site-specific normal ranges (i.e., best attainable endpoints given local and landscape predictors) for comparisons to 2020 results only; data from 2012 to 2020 compared to each year's site-specific normal range are presented in Appendix C. The dotted line represents the regional normal range defined as the 2.5th and 97.5th percentiles of the 2012 to 2019 reference area data from the RAEMP (Minnow 2020a).
CMm = Coal Mountain Mine.

3.5.5 Benthic Invertebrate Community Summary

The abundance, richness, and overall community composition of the BIC were similar at most mine-influenced stations and reference stations and followed similar spatial patterns among years, with the exception of CORCK. All community variables analyzed were significantly lower at CORCK compared to downstream and reference stations with magnitudes of difference above 2SD for four out of six of the endpoints assessed. Richness and abundance of the BIC were generally within or above the site-specific and regional normal ranges between 2012 and 2020. Ephemeroptera dominated the community at reference and most mine-influenced stations, with the exceptions of CORCK, MIDCO, and MIDAG-S1, at which Diptera dominated.

Despite total abundances being similar among stations (i.e., not statistically different or if statistically different, within a magnitude of difference <2SD, indicating these differences are not biologically meaningful), EPT abundance, % EPT, Ephemeroptera abundance and% E differed among stations and years. Specifically, the following differences were identified in BIC endpoints at CORCK and at stations downstream of the Corbin Creek confluence on Michel Creek:

- Abundance of EPT was below regional and/or site-specific normal ranges at CORCK in 2012, 2018, and 2020.
- Ephemeroptera abundance was below the regional and/or site-specific normal ranges at CORCK in all years, and at MIDCO in 2016 and 2018, with no Ephemeroptera identified at CORCK in 2015 and 2020.
- Percent EPT was below the regional and/or site-specific normal ranges at CORCK, and MIDCO, in all years and at MIDAG in 2019 and CM_MC2 in 2020.
- Percent E was near or below the regional and/or site-specific normal ranges at CORCK, MIDCO, CM_MC2, and MIDAG-S1 in all years.

These patterns indicate that the mine-related influence on some EPT taxa is localized to near the Corbin Creek confluence, immediately downstream of CMm (i.e., CORCK to CM_MC2), with community endpoints generally within normal ranges by MIDAG-S1.

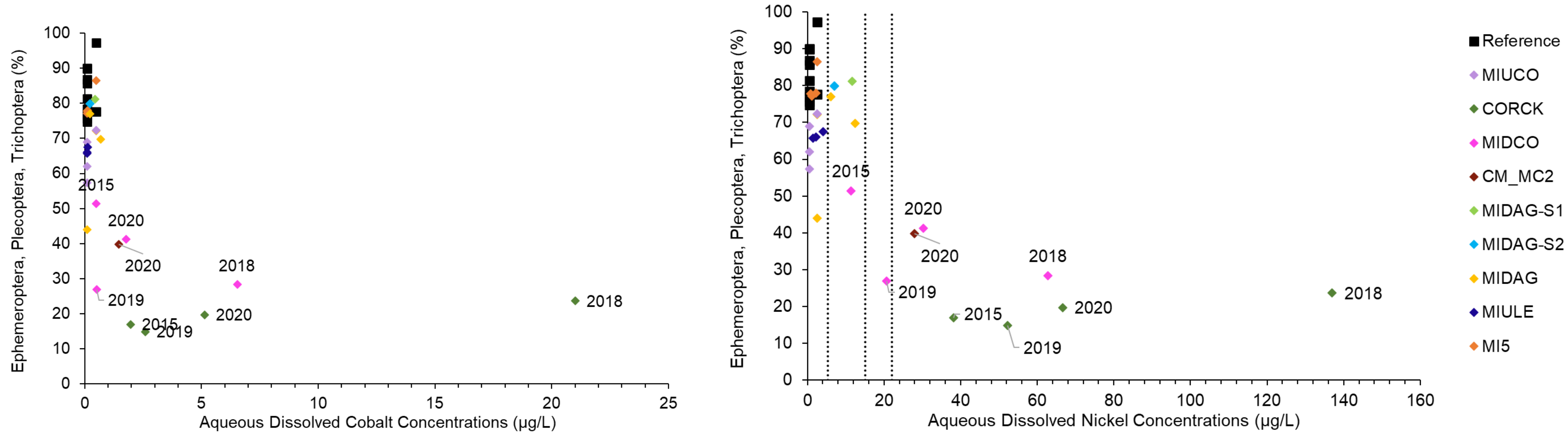
3.5.6 Benthic Invertebrate Community Relationships to Habitat Variables and Aqueous Cobalt and Nickel

The relationship between percent fines, sand, gravel, cobble, and boulder and % EPT and% E demonstrated that it is unlikely, based on the visual evaluation, that differences in habitat characteristics caused the differences observed in BIC downstream of CMm in Michel Creek (Appendix I, Figures 4.0-1 and 4.0-2). Habitat variables were similar between reference and mine-influenced stations and there were similar substrate compositions and sediment particle sizes among stations.

An inverse relationship was observed between % EPT and % E and aqueous cobalt and nickel concentrations, based on the 2012 to 2020 data (Figures 3.5-9 and 3.5-10). Other constituents that showed an inverse correlation with % EPT and % E included aqueous sulphate, nitrate, nitrite, major ions (e.g., calcium), manganese, and molybdenum.

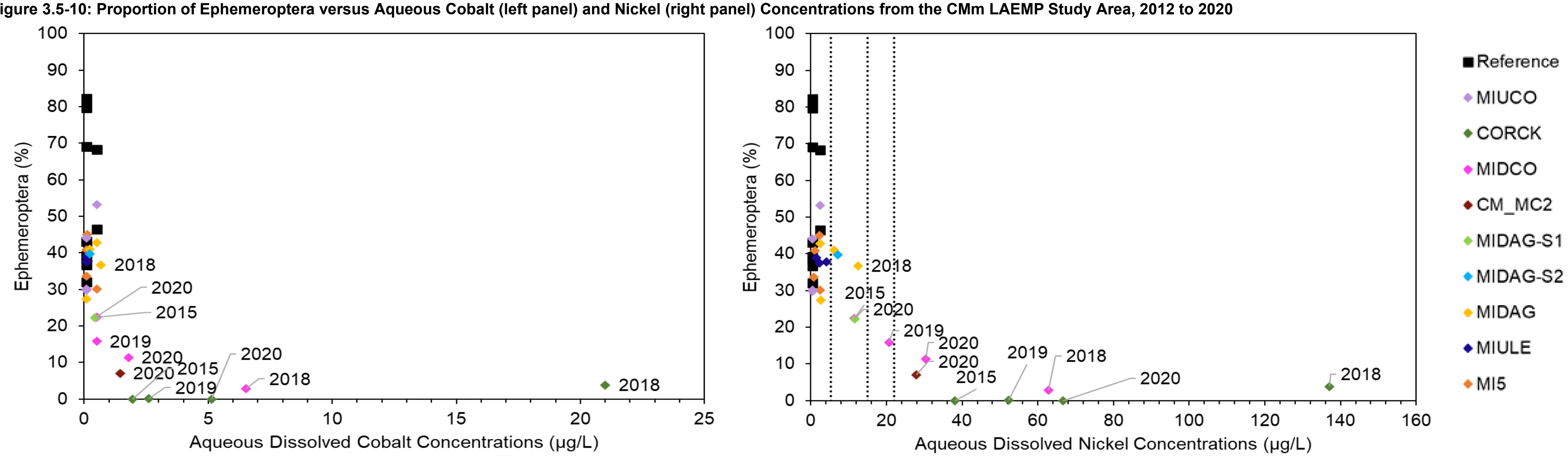
Based on the visual evaluation of the spatial patterns, aqueous cobalt and/or nickel may be responsible for patterns in % EPT and% E in the CMm area. Although % EPT decreased with aqueous nickel and cobalt, some EPT taxa were observed and appeared to tolerant to the high cobalt and nickel concentrations observed at CORCK in 2018 (Figure 3.5-9). Intercorrelations among these potential stressors and other water quality constituents make it challenging to identify the cause(s) of the observed BIC changes downstream of CMm. However, if screening value exceedances are considered, it is likely that nickel is the main constituent responsible for the reduction in % EPT and% E at stations closest to CMm. This is because nickel concentrations exceeded the level 3 invertebrate screening value at CORCK, MIDCO, and CM_MC2 between 2018 and 2020, and the level 1 invertebrate screening value at MIDCO (2015), MIDAG-S1 (2020), MIDAG-S2 (2020), MIDAG (2018 and 2020). Cobalt concentrations, however, only exceeded the level 2 and 1 invertebrate screening values at CORCK.

Figure 3.5-9: Proportion of Ephemeroptera, Plecoptera, and Trichoptera versus Aqueous Cobalt (left panel) and Nickel (right panel) Concentrations from the CMm LAEMP Study Area, 2012 to 2020



Note: Values below detection limit were substituted with the detection limit. Total cobalt invertebrate screening values are hardness dependent and were, therefore, not plotted. Total cobalt concentration was above the invertebrate level 1 screening value at CORCK (2018, 2019, and 2020) and MIDCO (2018). Total nickel invertebrate screening values (level 1, level 2, and level 3) are represented by dashed vertical lines, with the leftmost line representing level 1 and the rightmost line representing level 3.
CMm = Coal Mountain Mine.

Figure 3.5-10: Proportion of Ephemeroptera versus Aqueous Cobalt (left panel) and Nickel (right panel) Concentrations from the CMm LAEMP Study Area, 2012 to 2020



Note: Values below detection limit were substituted with the detection limit. Total cobalt invertebrate screening values are hardness dependent and were, therefore, not plotted. Total cobalt concentration was above the invertebrate level 1 screening value at CORCK (2018, 2019, and 2020) and MIDCO (2018). Total nickel invertebrate screening values (level 1, level 2, and level 3) are represented by dashed vertical lines, with the leftmost line representing level 1 and the rightmost line representing level 3.
CMm = Coal Mountain Mine.

3.6 Benthic Invertebrate Tissue Chemistry

Benthic invertebrate tissue data for cobalt, nickel, and selenium were plotted relative to previous results and relative to the reference normal range for selenium (Golder 2019). This information was used to help interpret results of water quality and BIC monitoring by providing a direct indication of the bioaccumulative potential of aqueous selenium and a direct, tissue-based measure of exposure to evaluate potential effects of selenium. As discussed in more detail below, benthic invertebrate tissue metals concentrations, including cobalt and nickel, are less directly related to bioavailability (because of differences among taxa in how metals bioconcentration is regulated) and less directly related to potential effects (because mechanisms of toxic action relate to aqueous metal ions). BIT chemistry results for other constituents are provided in Appendix K.

Between 2012 and 2020, BIT Se concentrations were within or below the regional normal range at reference and mine-influenced stations, with the exception of MIULE in 2018 and MIDAG in 2019, which were above the regional normal range (Figure 3.6-1). In all sampling areas, in all years, BIT Se concentrations were less than the lowest level 1 benchmark (Figure 3.6-1; Appendix K). Although most BIT Se concentrations at mine-influenced stations were within the normal range (with the noted exceptions), a spatial gradient was observed, particularly in 2020. The lowest BIT Se concentrations were observed at CORCK, with an increase in BIT Se concentrations observed with increasing distance downstream in Michel Creek until MIULE, and a subsequent decrease at M15.

A potential source of selenium input was identified upstream of MIDAG from Tent Mountain Mine, operated by Montem Resources. Tent Mountain Mine is not currently active, however, and the same spatial gradient was not observed in aqueous selenium concentrations or in tissue concentrations of other mine-related constituents. This suggests that input from Tent Mountain Mine is unlikely to be driving the spatial trends in BIT Se. Because BIT Se concentrations are below the invertebrate benchmark, this trend does not represent a concern to BIC or BIC-consumers in Michel Creek.

In 2020, BIT Co and BIT Ni concentrations were highest in Michel Creek between MIDCO and MIDAG, whereas concentrations at CORCK, upstream of CORCK (MIUCO), and downstream on Michel Creek (i.e., MIUCO and MI5) were similar to reference stations (Figures 3.6-2 and 3.6-3; Appendix K). BIT Co and BIT Ni concentrations appeared similar across years, except for a spike in 2018 at CORCK for BIT Co and BIT Ni and MIDCO for BIT Co only.

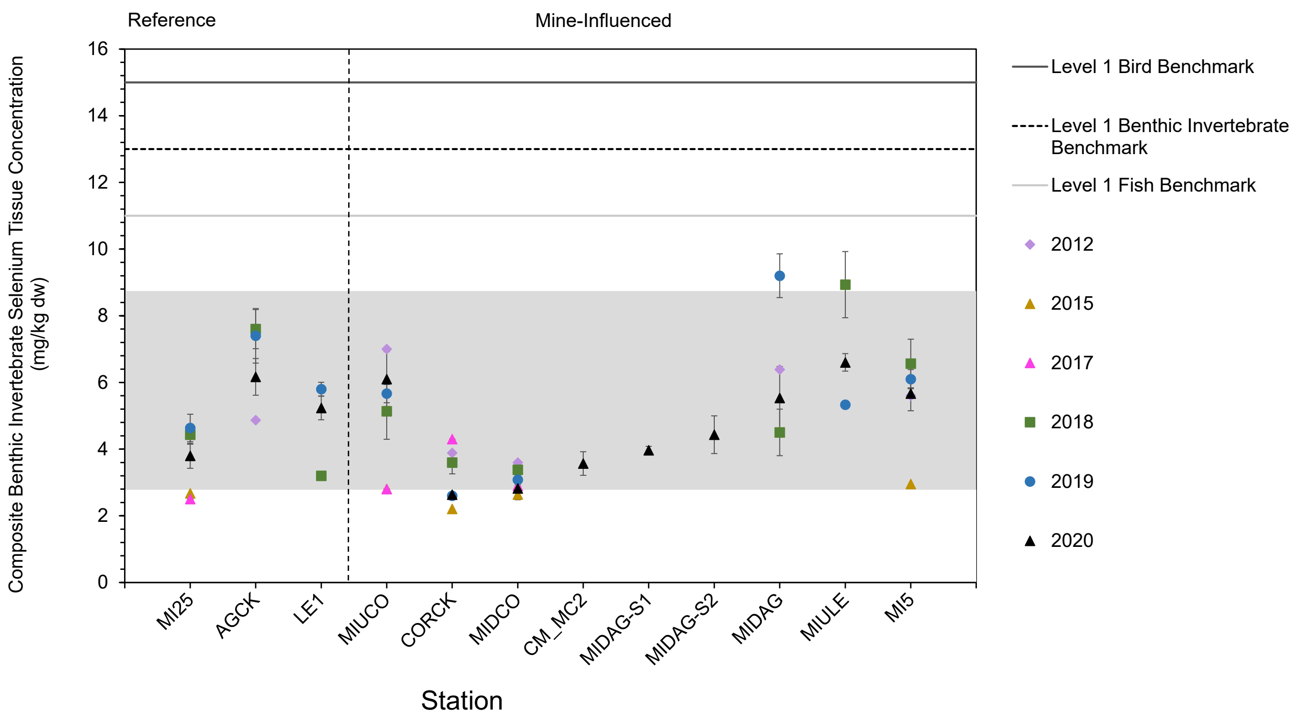
There was no clear relationship between BIT Se concentrations and aqueous or sediment selenium concentrations (Figures 3.6-4 and 3.5-5); however, there was a clear relationship between BIT Co and BIT Ni concentrations and aqueous cobalt and nickel concentrations (Figures 3.6-4). Composite BIT Co and BIT Ni concentrations increased with increasing aqueous cobalt and nickel concentrations.

It is recommended for the 2021 CMm LAEMP that analysis of BIT chemistry be reduced to focus on BIT Se concentrations. Potential effects of other mine-related constituents will be evaluated using aqueous concentrations, based on the following rationale:

Selenium is a unique element that has a complex mode of toxicity related to its uptake and bioaccumulation through the food chain (BC MOE 2014), which has led to the derivation of tissue related benchmarks.
The exposure route and mode of effects of selenium are distinct from other water quality constituents for which potential effects are evaluated by considering direct exposure to aqueous concentrations (i.e., the primary route of exposure for selenium is food). This is not the case for a majority of the other mine-related constituents (including nickel and cobalt), which have lower potential risk associated to BIC consumers through dietary exposure and, therefore, lack tissue-related benchmarks (Cardwell et al. 2013, Pyle and Couture 2012, Blust 2012).

There is no evidence for biomagnification of nickel in aquatic ecosystems (Cardwell et al. 2013, Pyle and Couture 2012). A negative relationship between exposure concentration and both bioconcentration and bioaccumulation factors has been observed across a wide range of aquatic organisms (McGeer et al. 2003, DeForest et al. 2017). This relationship is the result of a combination active regulation of nickel body burdens and rate-limited uptake of nickel across biological membranes (McGeer et al. 2003, Pyle and Couture 2012). Cobalt does not strongly accumulate in most fish species and does not appear to biomagnify in the food web either (Blust 2012). Monitoring results provided in the RAEMP have shown that fish cobalt and nickel tissue concentrations collected from Corbin Creek were below the detection limit of 5 mg/kg dw, suggesting that there is minimal uptake of cobalt or nickel through the water or through dietary sources at the study area. As well, the mean condition factor for fish caught in the upper Michel Creek was indicative of fish in good health, suggesting that waterborne and dietary nickel and cobalt exposure in Corbin and Michel Creek is not harmful to fish health. Following the approach taken in generic WQGs and the site-specific conclusions of Windward (2014), it is recommended that future evaluations of BIT chemistry focus on selenium. Other constituents, including nickel and cobalt, will be evaluated relative to aqueous exposure.

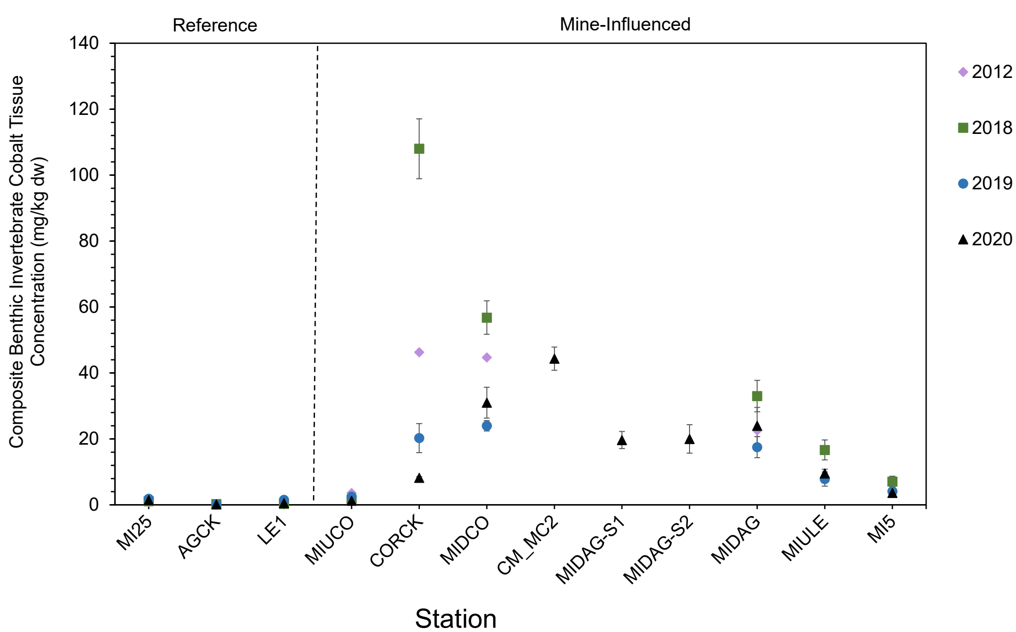
Figure 3.6-1: Composite Benthic Invertebrate Tissue Selenium Concentrations from the CMm LAEMP Study Area



Notes: Grey shading represents the normal range defined as the 2.5th and 97.5th percentiles of the 2012 and 2019 reference area data from the RAEMP (Minnow 2020a).

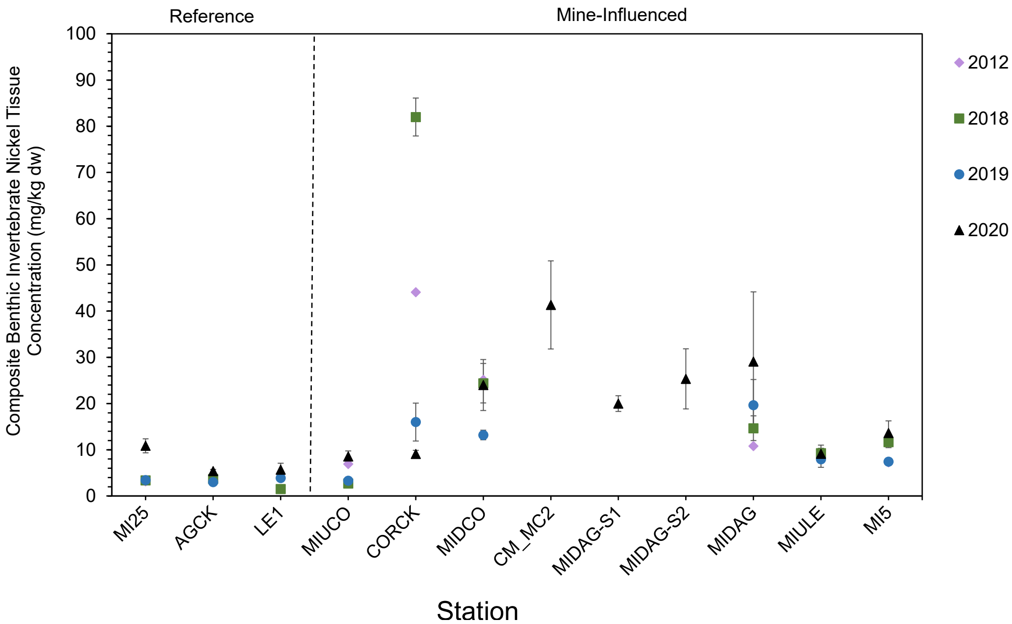
CMm = Coal Mountain Mine.

Figure 3.6-2: Composite Benthic Invertebrate Tissue Cobalt Concentrations from the CMm LAEMP Study Area



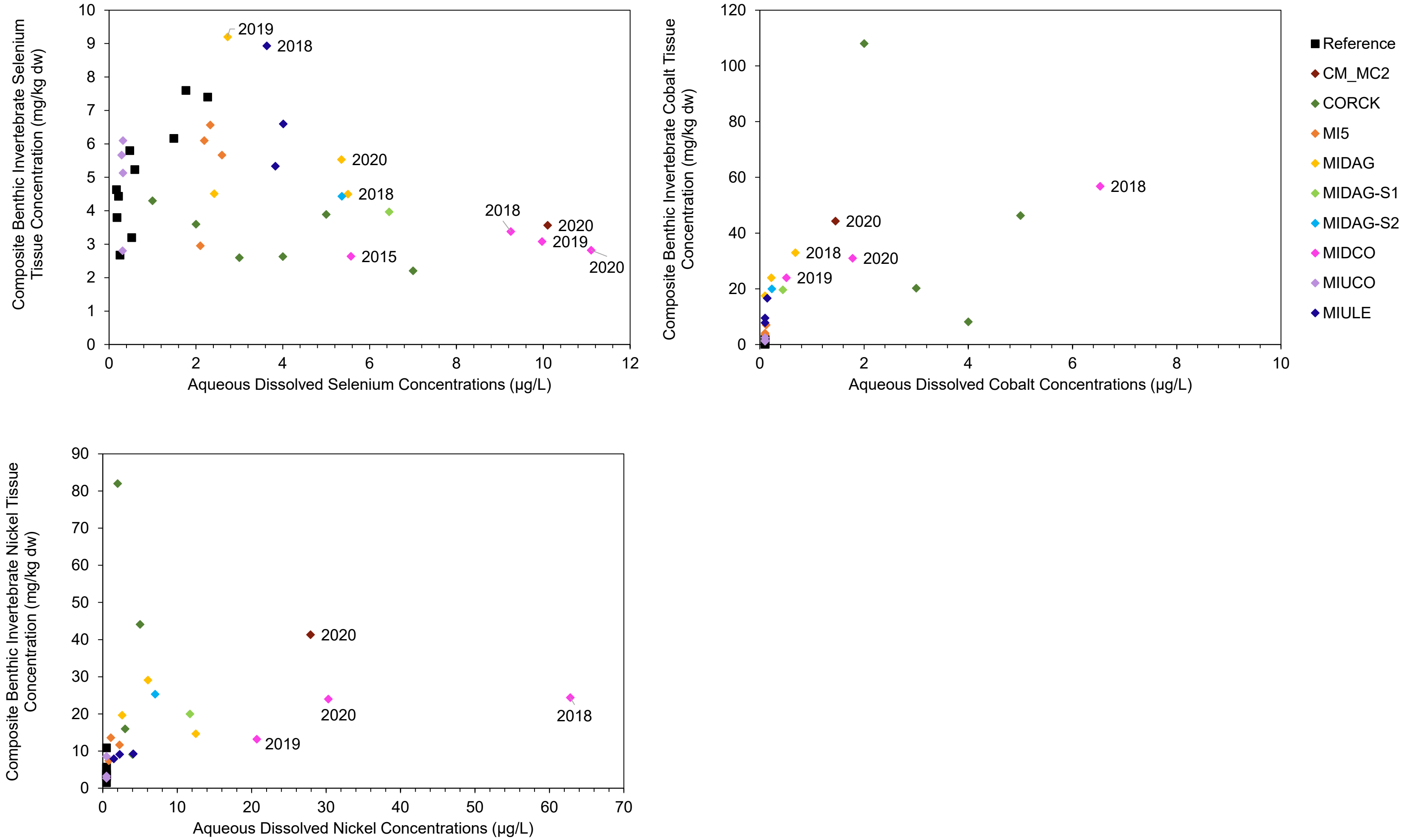
CMm = Coal Mountain Mine.

Figure 3.6-3: Composite Benthic Invertebrate Tissue Nickel Concentrations from the CMm LAEMP Study Area



CMm = Coal Mountain Mine.

Figure 3.6-4: Composite Benthic Invertebrate Tissue Concentrations versus Aqueous Selenium (top left), Cobalt (top right) and Nickel (bottom left) Concentrations from the CMm LAEMP Study Area



Note: Open symbols indicate non-detects. The selenium dataset includes data from 2012 to 2020; the cobalt and nickel datasets include data from 2012 and 2018 to 2020.

CMm = Coal Mountain Mine.

4.0 RELATED AQUATIC PROGRAMS

The following summary of related aquatic programs in the Michel Creek watershed provides linkages across studies and supplements the CMm LAEMP results while providing content relevant to answering the study questions outlined in Section 1.2.

4.1 Regional Aquatic Effects Monitoring Program

Teck's RAEMP provides spatially comprehensive monitoring and assessment of potential mine-related effects on the aquatic environment downstream from Teck's coal mines in the Elk Valley. The RAEMP reporting encompasses monitoring data for the six management units associated with Teck's five coal mines (Minnow 2018b). Management Unit 4 applies to the CMm area and the EVO areas.

The objective of the RAEMP is to monitor, assess, and interpret indicators of aquatic ecosystem condition related to mine operations, and to inform adaptive management relative to expectations established in approved plans for mine development and in Permit 107517 (Minnow 2020b). Another objective of the RAEMP is to determine if conditions in the aquatic environment are consistent with expectations outlined in Environmental Assessments (EAs) supporting approved mine development applications.

The 2017 to 2019 RAEMP represents the second comprehensive RAEMP cycle (Minnow 2020a) and follows the 2015 to 2018 and the 2018 to 2020 RAEMP Study Designs (Minnow 2018a,b). The first comprehensive RAEMP presented results from 2015 and 2016 (Minnow 2018b). Previously, an Aquatic Effects Monitoring Program (AEMP; Minnow 2014) was conducted in 2012, and selenium monitoring programs were conduct in 2006 (Minnow et al. 2007) and 2009 (Minnow et al. 2011).

The RAEMP data evaluation incorporates data from all lines of evidence applicable to each assessment endpoint. The data are interpreted relative to the RAEMP study questions, and in support of the AMP (Section 1.3). An Aquatic Data Integration Tool (ADIT) Version 4 (Table 4.1-1; Golder 2020b) was developed to integrate applicable lines of evidence and help Teck use their monitoring data to inform environmental management decisions.

A summary of the RAEMP results applicable to CMm are presented in Section 4.1.1. In addition, Westslope Cutthroat Trout (*Oncorhynchus clarkii lewisi)* selenium tissue concentrations are discussed in Section 4.1.2 and the Chronic Toxicity Testing Program results are summarized in Section 4.1.3.

Table 4.1-1: Interpretation of Aquatic Data Integration Tool (ADIT) Scores

ADIT Score	Indication of Change	Indication of Potential Effect
0	No apparent change; well within normal range.	No effect; less than lowest benchmark.
1	Possible change, still consistent with reference; within normal range but near edge.	Possible low-level effect on chronic, sublethal endpoint for most sensitive species. Not expected to be measurable or ecologically meaningful.
2	Probable change, possibly different from reference. Sometimes outside the normal range or often near the edge, in the direction of adverse effects.	Probable effect, potentially measurable and ecologically meaningful. Potential for changes to populations of sensitive species.
3	Likely change, likely different from reference. Often or always outside the normal range in the direction of adverse effects.	Likely effect. Expected to be measurable and ecologically meaningful. Potential for changes to benthic invertebrate communities and fish populations.

Source: Golder 2020b.

4.1.1 RAEMP Results Applicable to CMm

Key results from the RAEMP applicable to CMm are:

- Peak seasonal concentrations of mine-related water quality constituents in the CMm area were highest in the tributary to Michel Creek (i.e., CORCK) and were generally higher than one or more of the respective benchmarks or interim screening values. Concentrations of sulphate were above the level 2 benchmark (ADIT score of two; Table 4.1-1) for effects to benthic invertebrates in at least one season and were higher in 2019 compared to the previous RAEMP cycle and/or the base year (i.e., 2012). Total nickel concentrations were also greater than the level 3 interim screening value (ADIT score of three) at CORCK.
- Aqueous concentrations of mine-related constituents in Michel Creek were below respective level 1 benchmarks or screening values in all areas except for immediately downstream of Corbin Creek at MIDCO, where total nickel concentrations were greater than the level 2 interim screening value and approaching the level 3 interim screening value (ADIT score of two). Increases over time were observed for selenium and sulphate at MIDCO and MIDAG (downstream of Andy Good Creek), and nickel at MIDCO.
- Summer seven-day flow was flagged as being lower than the level 3 screening value in Michel Creek (Golder 2020b), but annual seven-day flows and annual peak flows were within the expected range (ADIT score of zero). The calcite index was high (1.0 or greater) at CORCK but had not changed since the previous RAEMP cycle.
- Benthic invertebrate tissue selenium concentrations were below the level 1 benchmark for effects to benthic invertebrates (ADIT score of zero) in most areas near CMm and temporal increases since the base year and the previous cycle were not observed (Minnow 2020a).
- Westslope Cutthroat Trout muscle selenium concentrations were below respective benchmarks for effects near CMm. No significant temporal changes were observed in muscle selenium concentrations (Section 4.1.2).
- The greatest effects to BIC (i.e., ADIT scores of two and three) were observed in the tributaries with the highest aqueous concentrations of mine-related constituents (e.g., CORCK). Specifically, low % EPT,% E, and Ephemeroptera abundance were observed at CORCK. Lower % EPT and % E than normal ranges were also observed at MIDCO, located downstream of Corbin Creek, and to a lesser extend at MIDAG, downstream of Andy Good Creek.
- Lower than expected BIT Se was observed based on water quality data at CORCK and stations on Michel Creek. However, greater than expected effects to one or more BIC endpoints were observed at CORCK and MIDCO, based on water quality. The majority of observed effects were represented by lower than expected % EPT and% E, but lower EPT and/or Ephemeroptera abundances were also observed at CORCK.

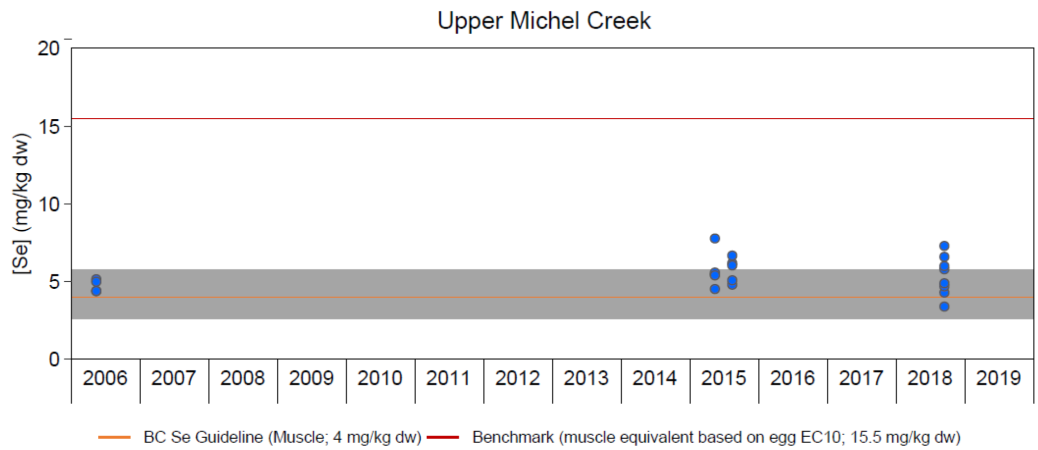
The RAEMP also evaluates the overall condition of the MU currently and/or in the future. A spatial roll-up was completed in the ADIT to summarize the proportion of the watershed associated with each score for each endpoint (Golder 2020b; Minnow 2020a). An ADIT score of 0, indicating no effects and no apparent change in condition from the normal reference ranges or benchmarks, was observed for 89% of the assessed habitat area in the lotic portion of the watershed evaluated. On average, an ADIT score of 1 was observed for 2.7% of the assessed habitat area; an ADIT score of 2 was observed for 7.0%, and an ADIT score of 3 was observed for 1.4%. The measurement endpoints exhibiting the greatest effect (i.e., ADIT score of 3) were aqueous nickel concentrations, flow (summer seven-day flow), and BIC metrics (i.e., % EPT and% E).

4.1.2 Westslope Cutthroat Trout Tissue Selenium Concentrations

Westslope Cutthroat Trout muscle samples were collected non-lethally under the RAEMP at MIDCO in 2018 to evaluate tissue selenium concentrations and compare them to the relative normal ranges, EVWQP benchmarks, and predictions (Minnow 2020a). Four out of the eight samples collected were below the upper limit of the normal range and all samples were less than the site-specific benchmark of 15.5 mg/kg dw (Nautilus Environmental and Interior Reforestation 2011]; Figure 4.1-1). Westslope Cutthroat Trout muscle selenium concentrations have been similar over time in the upper Michel Creek area near CMm with no significant differences detected among years (Minnow 2020a).

Length and weight measurements of each Westslope Cutthroat Trout caught were also documented and Fulton's condition factor was calculated for each fish as an indicator of fish health (Table 4.1-2; Minnow 2020a). Mean condition factor (K) of fish caught in the upper Michel Creek was 1.25, indicative of fish in good health (K≥1, Weatherly 1972).

Figure 4.1-1: Westslope Cutthroat Trout Muscle Selenium Concentrations in Upper Michel Creek, 2006 to 2019



Source: 2017 to 2019 RAEMP (Minnow 2020a).

Notes: 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. Fish collected from lotic areas only.

Table 4.1-2: Westslope Cutthroat Trout Health Endpoints and Tissue Selenium Concentrations Collected from MIDCO, September 2018

Replicate	Sex	Total Length (cm)	Fork Length (cm)	Body Weight (g)	Fulton's Condition Factor (K)	Muscle Tissue Selenium Concentration (mg/kg dw)
WCT-01	U	39.6	37.8	670	1.24	5.8
WCT-02	U	21.6	20.5	112	1.30	4.3
WCT-03	U	24.7	23.7	154	1.16	6.6
WCT-04	U	40.9	39.8	735	1.17	4.7
WCT-05	U	34.1	32.6	460	1.33	3.4
WCT-06	U	47.2	45.4	1,100	1.18	4.9
WCT-07	U	24.5	23.4	165	1.29	6.0
WCT-08	U	36.4	34.5	525	1.28	7.3
Mean ± SD	**-**	**33.6 ± 9.2**	**32.2 ± 8.9**	**490 ± 344**	**1.24 ± 0.07**	**5.4 ± 1.3**

Source: 2017 to 2019 RAEMP (Minnow 2020a).

Notes: The majority of the fish were designated as U (unknown) sex as we could only confirm male or female if gametes were released with gentle pressure of the abdomen of the fish.

mg/kg dw = milligrams per kilograms dry weight; K = condition factor; WCT = Westslope Cutthroat Trout; SD = standard deviation; U = unknown.

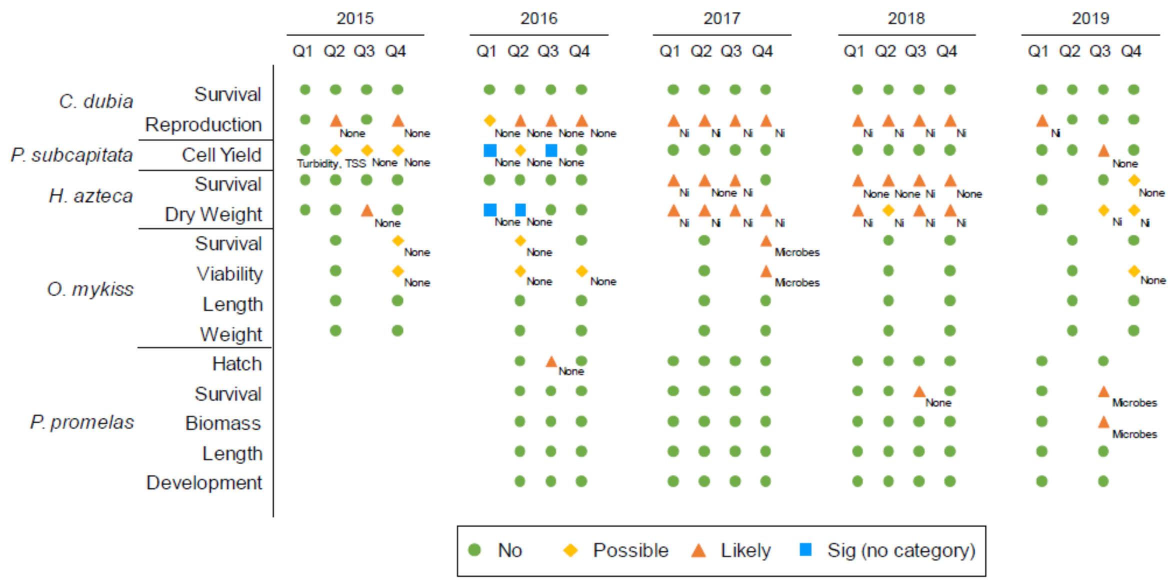
Opportunistic fish tissue sampling was also carried out in 2019 in Corbin Creek at CM_CC1 (CORCK) and CM_CC2 (upstream of CORCK; Table 4.1-3). Two fish muscle tissue samples were collected during the September EFN electrofishing survey by Ecofish. The two fish captured were Westslope Cutthroat Trout. Tissue selenium concentrations was 4.2 mg/kg dw in both samples and was below the lowest level 1 benchmark for fish (i.e., 11 mg/kg dw; Table 4.1-3). Fish tissue cobalt and nickel concentrations were below the detection limit of 5 mg/kg dw in both samples.

4.1.3 Chronic Toxicity Testing Program

The chronic toxicity testing program supports AMP Management Question #2 and #5 (Section 1.3). The program reviews data quality to confirm that results meet acceptability criteria, standardizes the data to help discern toxicological responses from other sources of variability in data, considers the size of response in each test and how that compares to responses in tests of reference waters (not influenced by mining) to categorize each result as “no”, “possible”, or “likely” adverse response, and evaluates the correspondence between test responses and indicators of mine-related water quality. This evaluation includes statistical assessment of patterns and specialized laboratory tests (called “toxicity identification evaluations”) designed to identify causes of toxicity.

Chronic toxicity tests were conducted annually using water collected from two stations on Michel Creek near CMm between 2015 and 2020; one station was located 1.80 km downstream of CMm (CM_MC2), and the second station was located 5.27 km downstream (MIDAG), which was originally sampled at CM_MC3 (2018). Test results for CM_MC2 from 2015 to 2019 are summarized in Figure 4.1-2 and 2020 results are shown in Figure 4.1-3. Test results for CM_MC3 (2018) and MIDAG (2019) are summarized in Figure 4.1-4 and 2020 results are presented in Figure 4.1-5. Chronic toxicity results for CM_MC2 have shown consistent patterns of response over time for *C. dubia* reproduction and *H. azteca* survival and dry weight. These two crustacean species are known to be sensitive to dissolved nickel exposure, and multiple lines of evidence have implicated nickel at this sampling location for these species. For other test species, CM_MC2 has shown few adverse responses, with no apparent consistent pattern of responses over time and no clear evidence of causal factors. In 2020, Fathead Minnow (*Pimephales promelas*) tests showed evidence of microbial growth, which may have contributed to the observed effects to biomass. No adverse responses were observed at MIDAG in 2019, but one likely adverse response was observed for *H. azteca* survival in Q4 and one possible adverse response was observed for *H. azteca* growth in Q2 (Golder 2020d). No water quality constituent was identified as potentially contributing to the observed responses, and replicates in these tests showed high variability. Overall, the test results indicate that the potential nickel response may be localized, and the spatial extent of effects does not extend to MIDAG (i.e., 5.27 km downstream).

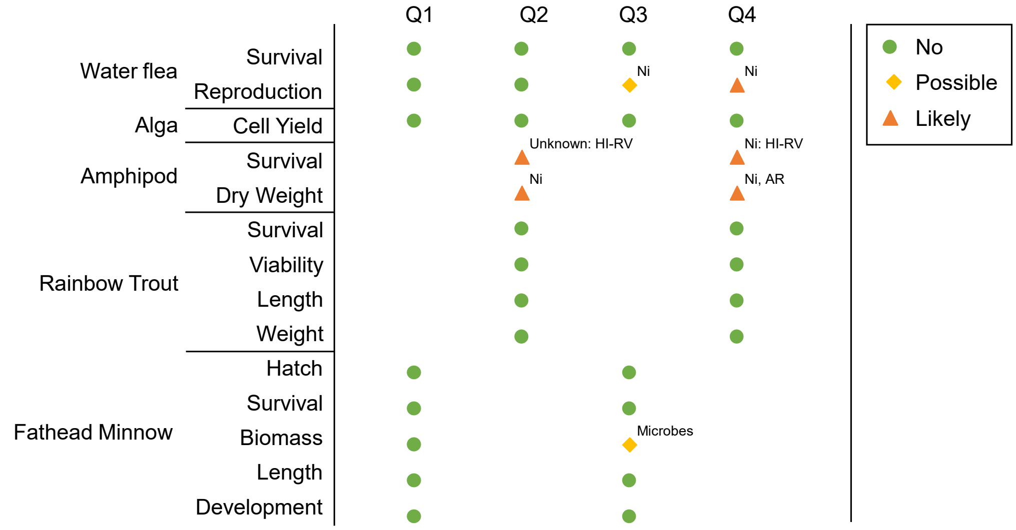
Figure 4.1-2: Summary of Test Results by Category at CM_MC2, 2015 to 2019



Source: 2017 to 2019 RAEMP (Minnow 2020a).

Note: No, possible, likely, and significant (no category) symbols are annotated with constituent(s) identified as potentially contributing to observed response. Ni = nickel; TSS = total suspended solids; None = no water quality constituent associated with observed responses was identified. Toxicity identification evaluations were conducted to support the causation assessment for *C. dubia* tests in 2017 (Q3 and Q4), 2018 (Q1 to Q4) and 2019 (Q1 to Q4) and *H. azteca* tests in 2018 (Q1 to Q4) and 2019 (Q1, Q3, and Q4).

Figure 4.1-3: Summary of Test Results by Category at CM_MC2, 2020.



Source: Annual Interpretive Report - 2020 Chronic Toxicity Testing Program (Golder 2021).

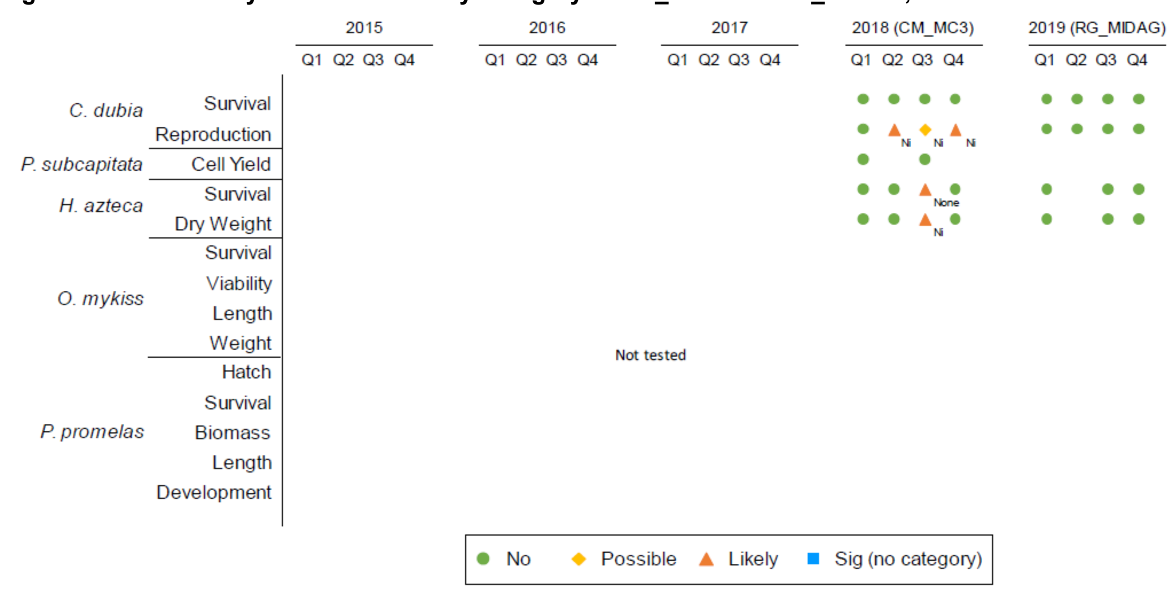
Note: No, possible and likely symbols are annotated with constituent(s) identified as potentially contributing to observed response.

Toxicity identification evaluations were conducted to support the causation assessment for water flea and amphipod tests.

HI-RV = high inter-replicate variability; Ni = nickel; Unknown = no water quality constituent associated with observed responses was identified.

Water flea = Ceriodaphnia dubia; Alga = Pseudokirchneriella subcapitata; Amphipod = Hyallela azteca; Rainbow Trout = Oncorhynchus mykiss; Fathead Minnow = Pimephales promelas.

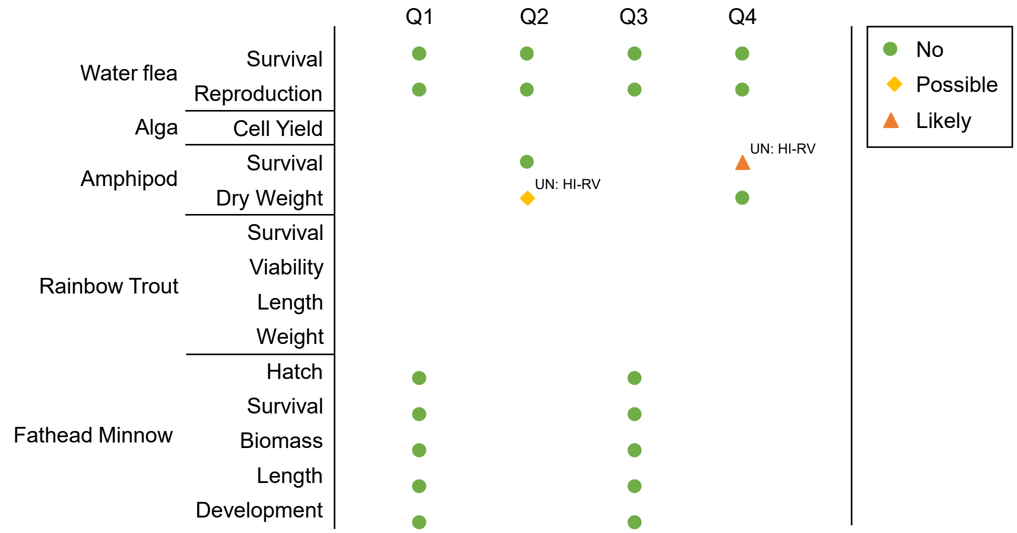
Figure 4.1-4: Summary of Test Results by Category at CM_MC3 and RG_MIDAG, 2018 and 2019.



Source: 2017 to 2019 RAEMP (Minnow 2020a).

Note: Test results for 2018 are for CM_MC3. In 2019, CM_MC3 was replaced by RG_MIDAG, a station located 2 km downstream of CM_MC3 (Golder 2020). No, possible, likely, and significant (no category) symbols are annotated with constituent(s) identified as potentially contributing to observed response. Ni = nickel; None = no water quality constituent associated with observed responses was identified.

Figure 4.1-5: Summary of Test Results by Category at RG_MIDAG, 2020.



Source: Annual Interpretive Report - 2020 Chronic Toxicity Testing Program (Golder 2021).

Note: No, possible, and likely symbols are annotated with constituent(s) identified as potentially contributing to observed response. No testing conducted for rainbow trout or green algae, as station is not currently part of Permit requirements. Station was assessed for select species to characterize spatial extent of effects.

HI-RV = high-inter-replicate variability; UN = no water quality constituent associated with observed responses was identified. Water flea = Ceriodaphnia dubia; Alga = Pseudokirchneriella subcapitata; Amphipod = Hyallela azteca; Rainbow Trout = Oncorhynchus myskis; Fathead Minnow = Pimephales promelas.

4.2 Lentic Area Supporting Study

Only a small proportion of aquatic habitat in the Elk River watershed is classified as lentic (Minnow 2018b). In the Michel Creek watershed, lentic areas are located in off-channel wetlands, beaver ponds or impoundments, swamps and marshes along Michel Creek (Figure 2.1-1).

The Lentic Area Supporting Study was conducted in 2018 and 2019. Preliminary surveys occurred in 2018 and additional surveys were conducted in 2019 to support the RAEMP. The Lentic Area Supporting Study provided information regarding the use of lentic areas by fish and aquatic-dependent wildlife and evaluated potential effects from mine-related constituents. Several lentic areas along Michel Creek (Table 4.2-1; Figure 2.1-1) and in reference areas, classified under the MU4 management unit in the RAEMP, were included in the Lentic Area Supporting Study. These areas were classified according to use (low, moderate or high, based on historical observations of habitat use and data gathered in 2018 and 2019) and exposure risk (Minnow 2020a). The lentic areas sampled near CMm were either classified as moderate or high use but were assigned a low exposure risk classification based on water and sediment chemistry and/or tissue selenium concentrations, except the southern portion of Michel Creek pond (RG_SLMICP), which was assigned a high exposure risk classification based on water chemistry and benthic invertebrate tissue selenium (Table 4.2-1). These results indicate that the lentic areas near CMm are highly used by fish and aquatic-dependent wildlife, but their exposure risk to mine-related effects is low with the exception of RG_SLMICP (Minnow 202a; Appendix K).

The Lentic Area Supporting Study evaluated amphibian use and amphibian egg tissue chemistry, bird use and bird egg tissue chemistry, fish use, fish abundance, and fish tissue chemistry, benthic invertebrate tissue chemistry, habitat features, water quality, and sediment chemistry. Components evaluated in the Lentic Area Supporting Study and the years these evaluations were conducted are listed in Table 4.2-2.

Table 4.2-1: Lentic Sampling Areas near CMm

Lentic Area ID	Area Description	UTM Coordinates (NAD83, Zone 11U)		Classifications Based on Overall Ratings	
		Easting	Northing	Use Classification	Exposure Risk Classification[a]
RG_SMCIM	Southern Michel Creek impoundment	667979	5484119	High	Low
RG_MCIMCC	Michel Creek impoundment at Corbin Creek	668254	5487064	High	Low
RG_MCWB	Michel Creek Wetlands	668051	5487358	Moderate	Not Assigned
RG_MCWA	Michel Creek Beaver Pond	667917	5487467	High	Low
RG_MCWAGC	Michel Creek Wetland at Andy Good Creek	667308	5488107	Moderate	Sediment-based risk only
RG_NMCIM	Northern Michel Creek Impoundment	666651	5488412	Moderate	Not Assigned
RG_MI16	Michel Creek/Corbin Road Wetland	665055	5489432	High	Low
RG_SLMICP	Southern Lower Michel Creek Pond	664106	5490363	Moderate	High
RG_MIC2	Michel Creek Oxbow #2	659533	5496626	High	Low
RG_MIWW	Lower Michel Wetland d/s Wheeler Creek	659707	5498474	High	Low

Source: 2017 to 2019 RAEMP (Minnow 2020a; Appendix K).

Note: The Lentic Area Supporting Study report was submitted as part of the 2017 to 2019 RAEMP (Minnow 2020a). Overall use and exposure risk classifications were carried out in the 2017 to 2019 RAEMP.

a) Exposure risk ratings and classifications were not assigned to lentic areas where chemistry sampling (i.e., water, sediment, or tissue) was not completed.

CMm = Coal Mountain Mine.

Table 4.2-2: Lentic Sampling Components near CMm, 2018 and 2019

Lentic Area ID	Amphibian Survey [(a)]				Amphibian Egg Collections			Bird Surveys[(b)]	Bird Egg Collections[(c)]	Fish Survey	Fish Meristics[(d)]	Fish Tissue	Benthic Invertebrate Composite Tissue
	Egg Survey	Tadpole/ Larvae Survey	Adult Survey 1	Adult Survey 2	Columbia Spotted Frog	Western Toad	Long-toed Salamander						
RG_SMCIM	2018, 2019	2018, 2019	2018, 2019	2019	2019	2019	-	2018, 2019	-	2018	-	-	2018, 2019
RG_MCIMCC	2018, 2019	2018, 2019	2018, 2019	2019	-	2019	-	2018, 2019	-	2018	2019	2019[(e)]	2019
RG_MCWB	-	-	-	-	-	-	-	2018, 2019	-	-	-	-	-
RG_MCWA	2018, 2019	2018, 2019	2018, 2019	2019	-	-	-	2018, 2019	-	-	-	-	2019
RG_MCWAGC	-	-	-	-	-	-		2018, 2019	-	-	-	-	-
RG_NMCIM	-	-	-	-	-	-	-	2018, 2019	-	-	-	-	-
RG_MI16	2018, 2019	2018, 2019	2018, 2019	2019	2018	-	-	2018, 2019	2019	2018	-	-	2018, 2019
RG_SLMICP	-	-	-	-	-	-	2018	-	-	-	-	-	2018
RG_NLMICP	-	-	-	-	-	2018	-	2018	-	-	-	-	-
RG_MIC2	-	-	-	-	-	-	-	2018, 2019	-	-	2019	-	2019
RG_MIWW	2018, 2019	2018, 2019	2018, 2019	2019	2018	-	-	2018, 2019	2019	2018	2019	2019[(f)]	2018, 2019

Source: 2017 to 2019 RAEMP (Minnow 2020a; Appendix K).

a) Amphibian occurrence and distribution surveys were completed by VAST Resource Solutions.

b) Surveys focused on aquatic and aquatic-dependent bird species.

c) Red-winged blackbird and spotted sandpiper.

d) Targeted eight female longnose sucker for tissue in May 2019 and 100 young-of-year and 100 non young-of-year for non-lethal measurements in September 2019.

e) Muscle and aging structures.

f) Muscle, ovary, and aging structures.

g) Three samples were collected per lentic area per sampling event, concurrent with fish surveys in 2019 and amphibian egg, bird egg, or fish tissue chemistry sampling in 2018 and 2019.

CMm = Coal Mountain Mine.

4.2.1 Lentic Area Supporting Study Results Summary

Water Quality

Two of the mine-influenced lentic areas immediately downstream of CMm and within 500 m of mine-related infrastructure were considered heavily influenced based on specific conductivity measurements: Michel Creek impoundment at Corbin Creek (RG_MCIMCC; mean = 1,322 µS/cm; n = 29), and Michel Creek Beaver Pond (RG_MCWA; mean = 1,369 µS/cm; n = 13). With the exception of DO, selenium, nitrate and sulphate, water quality analyte concentrations were below BC WQG, applicable EVWQP Level 1 benchmarks, or relevant screening values (Minnow 2020a). Most lentic areas had at least one DO measurement less than the 8 mg/L BC WQG for fish life stages other than buried embryos/alevin. Concentrations less than the 5 mg/L instantaneous minimum guideline were also common. Aqueous total selenium concentrations in samples from RG_MCIMCC were elevated relative to the BC WQG and nitrate and sulphate were measured at elevated concentrations relative to the most conservative Level 1 benchmarks at RG_MCIMCC.

Sediment Quality

Sediment quality was variable in lentic areas near CMm. Concentrations of cadmium, nickel, selenium, fluorene, 2-methylnaphthalene, and phenanthrene in sediment samples were frequently greater than the lower BC WSQG, alert concentration for selenium, and/or the upper boundary of the reference area normal range (Minnow 2020a). Mean selenium concentrations in sediment samples collected from the Michel Creek/Corbin Road Wetland (RG_MI16) between 2015 and 2019 and the Lower Michel Wetland downstream of Wheeler Creek (RG_MIWW) in 2018 and 2019 were consistently and significantly higher than concentrations in the base year (2013). At RG_MI16, concentrations of most metals and PAHs included in the temporal analyses were lower in 2015, 2018, and 2019, relative to 2013. Concentrations of some PAHs were also lower in RG_MIWW in 2018 and 2019 compared to 2013.

Amphibians

Amphibian detections recorded in 2018 and 2019 indicated that Columbia spotted frog (*Heleioporus albopunctatus*), western toad (*Anaxyrus boreas*) and long-toed salamander (*Ambystoma macrodactylum*) use lentic habitats near CMm to fulfill one or more life cycle functions (Minnow 2020a). Egg and larval life stages of Columbia spotted frog, western toad, and long-toed salamander were detected at RG_MCIMCC (western toad eggs and larvae) and RG_MCWA (western toad eggs and larvae and long-toed salamander larvae). The distributions of metamorph/sub-adult/adult life stages of Columbia spotted frog and western toad were generally similar to those of egg and larval life stages. Long-toed salamander metamorphs/sub-adults/adults were detected at RG_MCIMCC and RG_MCWA.

Amphibian eggs collected from lentic habitat in the CMm area in 2018 and 2019 had selenium concentrations that were within the reference area normal range (9.61 µg/g dw; Minnow 2020a). None of the amphibian eggs collected in 2018 or 2019 had selenium concentrations exceeding the preliminary Level 1 benchmark of 45 µg/g dw (Massé et al. 2015) and were within model predictions.

Aquatic and Aquatic-Dependent Birds

Aquatic and aquatic-dependent birds were observed using lentic habitats in the CMm area in 2018 and 2019. The most commonly encountered species were the red-winged blackbird (*Agelaius phoeniceus*), tree swallow (*Tachycineta bicolor*), and common yellowthroat (*Geothlypis trichas*; Minnow 2020a). Species diversity was highest at mine-exposed area RG_MI16, which is a large impoundment with abundant grassy, shrubby, and woody vegetation. Michel Creek Wetlands (RG_MCWB), RG_MI16, and RG_MIWW were confirmed as nesting and chick-rearing habitats for a variety of aquatic and aquatic-dependent bird species in 2018 and 2019. Few changes in bird species presence/absence and relative abundance over time (i.e., since 2012; Minnow 2014) were identified for lentic areas around CMm. Selenium concentrations in bird eggs were generally elevated relative to the reference area normal range and guidelines, but were less than the Level 1 benchmark and were within model predictions.

Fish

A total of 5 fish species were observed in lentic habitats near CMm in 2018 and/or 2019: Brook Trout (*Salvelinus fontinalis*), Longnose Dace (*Rhinichthys cataractae*), Longnose Sucker (Catostomus Catostomus), Mountain Whitefish (*Prosopium williamsoni*), and Westslope Cutthroat Trout (*Oncorhynchus clarkia lewisi*; Minnow 2018a). Of these Westslope Cutthroat Trout is the only species with special conservation status in the Kootenay Region of B, it is blue-listed provincially (Pearson and Healey 2012) and listed as threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and as Special Concern under the Species at Risk Act (SARA; COSEWIC 2016; Government of Canada 2018). Westslope Cutthroat Trout were only captured at RG_MIC2.

Juvenile (including young-of-the-year [YOY]) longnose sucker were captured from RG_MIWW indicating this area is used for rearing and juvenile foraging. Juvenile salmonids were also incidentally observed using RG_MI16 and RG_MIWW. Some differences in endpoints were observed related to survival, recruitment, body size, and energy storage for YOY and non-YOY longnose sucker captured in lentic areas in the CMm area. In May 2019, larger adult longnose suckers were more abundant in the catches from mine-influenced lentic areas in the CMm area, relative to the reference areas, except at RG_MCIMCC. Longnose suckers captured from RG_MIWW, were, on average, in better condition than reference fish, which suggests individuals from RG_MIWW likely spawned later than reference fish; however, reference areas were not in the watershed. Overall, YOY longnose suckers from mine-influenced areas around the CMm (except RG_MIWW) were in significantly better condition than fish from reference areas. Few statistically significant and biologically meaningful differences in length, weight, or condition were identified for non-YOY fish captured in September 2019, relative to reference.

Selenium concentrations in muscle and ovaries/eggs from female longnose sucker captured in lentic areas near CMm were consistently greater than the tissue-specific reference area normal ranges (i.e., 6.03 µg/g dw and 5.70 µg/g dw, respectively). Selenium concentrations in muscle from all areas and in ovaries/eggs from RG_MIWW were also consistently greater than the applicable BC MOE (2019a) guidelines. Mean selenium concentrations in longnose sucker ovaries/eggs were within the range of model uncertainty for stations in the CMm area. No statistically significant temporal changes in selenium concentrations were observed in longnose sucker ovaries.

Benthic Invertebrates

Except for RG_SLMICP, BIT Se were within the range of model uncertainty for the lentic areas near CMm, where mean concentrations were higher than expected based on the model results. Mean BIT Se from lentic areas near CMm were often greater than the BC MOE (2019a) guideline of 4 µg/g dw. Mean BIT Se samples collected from mine-exposed areas, RG_MI16, and RG_MIWW also exceeded the level 1 benchmark for dietary effects to juvenile fish (Golder 2014).

4.3 Nutrient Study

A Nutrient Study was conducted to support the 2017 to 2019 RAEMP (Minnow 2020a). It was intended to fulfill ENV's condition that Teck should undertake "additional studies to address nutrient loading in the Fording and Elk Rivers from mine-related sources." The Nutrient Study aimed to identify the aqueous nutrient most likely to be limiting biological productivity, and estimate the trophic (productivity) classification, at each monitoring station in the Elk River, Fording River, Michel Creek, and associated tributaries, based on water samples collected between 2013 and 2019.

Stations near CMm were classified as ultra-oligotrophic and phosphorus-limited with high total nitrogen (TN) concentrations and high total nitrogen to total phosphorus (TP) ratios (Minnow 2020a). Concentrations of TN at CM_CC1 (CORCK) and CM_MC2 have increased significantly relative to 2013 (Minnow 2020a), but appear to have peaked between 2016 and 2017. At CORCK, TP concentrations have decreased resulting in a significant increase in TN:TP ratios.

4.4 Nickel Benchmark Study

A nickel benchmark is currently in development by Teck. It is anticipated finalized results and interpretation will be available for incorporation into the 2021 CMm LAEMP.

4.5 Environmental Flow Needs Study

Teck retained Ecofish Research Ltd. (Ecofish) to develop and evaluate alternative EFN thresholds for Corbin Creek. To support this work, Ecofish completed three background studies between 2019 and 2020: a Fish Community Survey (Regehr et al. 2020a), a Fisheries Habitat Assessment Procedure (Regehr et al. 2020b), and an Instream Flow Study (IFN; Healey and Hatfield 2020).

Existing information on fish species documented in Corbin Creek and surrounding area was reviewed. Fish species documented in Corbin Creek were Brook Trout[3], Mountain Whitefish, and Westslope Cutthroat Trout (BC MOE 2019a). Downstream in Michel Creek, Bull Trout[4], Mountain Whitefish, Westslope Cutthroat Trout and Longnose Sucker (Golder 2015, BC MOE 2019b) were documented. Westslope Cutthroat Trout was consistently the most common species observed in these two streams (Golder 2015, BC MOE 2019b). Tributaries such as Corbin Creek provide spawning, juvenile rearing, and high flow velocity refuge habitats that are limited in the frequently confined mainstem of Michel Creek (Golder 2015).

During the fish community survey, electrofishing captures were mostly Westslope Cutthroat Trout (81%, 96%, and 91% of captures for open-site electrofishing, closed-site electrofishing, and minnow trapping, respectively), although a few longnose sucker and Brook Trout were also captured (Regehr et al. 2020a). Analysis of density

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[3] Brook Trout is an introduced species, native to eastern North America.

[4] Numerous FIDQ records note the presence of Dolly Varden in Michel Creek; however, based on known provincial Dolly Varden distribution, Golder (2015) assumed that these records referred to incorrectly identified Bull Trout.

and biomass by age class, as determined from closed-site electrofishing results, indicated that fry (0+ years), parr (1+ years), parr (2+ years), and sub-adult (3+ years) age classes were present in Corbin Creek; adults ($\geq$4+ years) were not captured. Mountain Whitefish, which were previously documented in Corbin Creek (BC MOE 2019b), were not detected during the Fish Community Survey.

Fry, parr, and sub-adult age classes of Westslope Cutthroat Trout were captured in Corbin Creek; no adult fish were captured (Regehr et al. 2020a). Three redds were identified in June and July 2020 downstream of the Mine. The presence of fry during the growing season sampling program indicated that spawning had occurred in the vicinity of Corbin Creek despite spawners not being observed in 2020. Spawners and redds were not observed in Corbin Creek during spawning surveys in 2019.

Westslope Cutthroat Trout were present in Corbin Creek during the winter and accounted for 95% of the fish observed during the overwintering assessment (Regehr et al. 2020a). A comparison of numbers of fish observed and habitat characteristics by sub-site (defined as a section of stream that had similar habitat characteristics within an overwintering site) suggested that sub-sites with cover tended to have higher numbers of fish, and that fish presence was associated with the presence of cover (Regehr et al. 2020b).

Physical habitat parameters (i.e., wetted area, water depth, and water velocity) were identified as potentially limiting for fish, as well as water temperature (Regehr et al. 2020a; 2020b). Because calcite concretion has been observed in Corbin Creek, overwintering cover in the substrate may be limiting; habitats with other cover sources (i.e., small woody debris, deep pool, undercut banks, overhanging vegetation, and organics) were identified as important for overwintering. Based on water temperature data, the growing season for Westslope Cutthroat Trout in Corbin Creek is estimated as April 16 to October 15 (Regehr et al. 2020a).

The IFN study (Healey and Hatfield 2020) provided an evaluation of prospective minimum flow thresholds for Corbin Creek, considering the quantity of water available for Teck Coal and the habitat available for fish. The proposed minimum flow thresholds were designed as the maximum instream flow rates that will provide 0.001 m^3/s for water use by Teck Coal.

5.0 ADAPTIVE MANAGEMENT

All replicates at CORCK, MIDCO, and CM_MC2 had % EPT results that resulted in a biological trigger event (Appendix A). These findings are consistent with results of sampling and evaluation in previous years that prompted management action under the AMP response framework. Teck first investigated localized effects on % EPT at CMO in 2017 as part of the Integrated Water Management Plan for Closure for CMO (Golder 2017). Analyses presented in Golder (2017) attributed the localized effects at least in large part to nickel, although effects in Corbin Creek are interpreted to also reflect calcite conditions there. Since 2017, Teck has conducted a series of laboratory and field investigations to better understand nickel toxicity and effects to % EPT, with the objective of deriving benchmarks to guide assessment and management of nickel in the Elk Valley. Teck also initiated the CMO LAEMP (of which this biological triggers assessment is part) and initiated ongoing evaluations of nickel treatment options. These activities are reported annually in AMP reporting.

None of the replicates in 2020 had concentrations of BIT Se above the biological trigger threshold or above the level 1 benchmarks for juvenile fish. These findings to not indicate a need to track BIT Se under the AMP framework.

6.0 STUDY QUESTIONS

An integrated evaluation of CMm LAEMP data is presented below to address each study question (Sections 6.1 and 6.2), and a tabular summary is presented in Section 6.3.

6.1 Study Question 1

What are the magnitude and spatial extent of influence from CMm on water quality, calcite, sediment quality, and benthic invertebrate communities in Michel Creek downstream of CMm, how are these conditions changing over time, and are the conditions expected?

The highest concentrations of mine-influenced water quality constituents were observed at the CORCK station in Corbin Creek, followed by the first station downstream of CMm on Michel Creek (MIDCO, 0.94 km downstream), with a declining gradient of concentrations further downstream. This was expected as Corbin Creek receives discharges of mine-influenced water before entering Michel Creek. Concentrations of most water quality constituents were similar between the reference stations and MIUCO, which is 0.82 km upstream of CORCK and 1.76 km upstream of MIDCO. Within Michel Creek downstream of CMm, concentrations of cobalt, and nickel returned to concentrations observed at MIUCO by MIDAG, which is 5.27 km downstream. Spatially, concentrations of sulphate, selenium, and nitrate remained elevated, compared to reference, at the furthest station downstream of CMm (MI5); however, only selenium was above a British Columbia Water Quality Guideline (BC WQG) at MI5.

Concentrations of sulphate, nitrate, total cobalt, total nickel, and total selenium were lower in 2020 compared to in 2018. The decrease from 2018 in these mine-related constituents downstream of CMm in Michel Creek was expected based on projections derived by SRK (, which projected a decrease between 2017 and 2019 based on changes in mine water management with the transition to Care and Maintenance. Overall, concentrations of sulphate, nitrate, and nickel were either lower than or similar to the SRK projections (with some infrequent exceptions) in 2020. Concentrations of total selenium and cobalt were either lower than or similar to projections for dissolved selenium and cobalt for all years.

Concentrations of sulphate, nitrate, total cobalt, total nickel, and total selenium were lower in 2020 compared to in 2018. The decrease from 2018 in these mine-related constituents downstream of CMm in Michel Creek was expected based on projections derived by SRK (SRK 2019), which projected a decrease between 2017 and 2019 based on changes in mine water management with the transition to Care and Maintenance. Overall, concentrations of sulphate, nitrate, and nickel were either lower than or similar to the SRK projections (with some infrequent exceptions) in 2020. Concentrations of total selenium and cobalt were either lower than or similar to projections for dissolved selenium and cobalt for all years.

Consistent with the 2015 to 2016 RAEMP results, sediment selenium and PAH concentrations were higher at mine-influenced stations in the CMm area compared to reference stations and were above the lower sediment quality guidelines at mine-influenced stations. Cadmium, manganese, nickel, selenium, and zinc concentrations were above the BC WSQGs and were higher at CORCK and MIDCO compared to downstream and reference stations. Sediment metals concentrations downstream of MIDCO were generally similar to reference stations, with the exception of selenium.

Calcite presence was high in Corbin Creek (calcite index >1) but generally low in Michel Creek (calcite index <1) in 2020. Calcite index values were not high enough for calcite to be an influencing factor in benthic invertebrate effects in Michel Creek (Minnow 2018b); however, may have been a factor in Corbin Creek. Calcite index values remained within the reference normal range in Michel Creek in 2020.

Benthic invertebrate community richness and abundance were similar among mine-influenced and reference stations and were within or above the site-specific and/or regional normal ranges in Michel Creek in 2020. Benthic invertebrate taxonomic richness was significantly greater at MIDCO and MIDAG in 2020 compared to previous years and was beyond the site-specific and/or regional normal ranges at most stations in Michel Creek. Ephemeroptera dominated at mine-influenced stations in Michel Creek, except at MIDCO, which was dominated by Diptera. The BIC at reference stations was also largely dominated by Ephemeroptera.

Significant changes to BIC were identified at CORCK in 2020 compared to reference stations and stations on Michel Creek, in the form of reduced taxonomic richness, overall abundance, abundance of the sensitive taxa Ephemeroptera, Plecoptera, Trichoptera (EPT), abundance of Ephemeroptera (E), % EPT, and % E. There were also changes in community composition (i.e., Diptera dominance) at CORCK compared to reference stations and stations on Michel Creek. However, richness and overall BIC abundance in Corbin Creek were within site-specific normal ranges in 2020, and statistical differences were within a magnitude of difference of less than two standard deviations (2 SD) indicating these differences are not biologically meaningful. The reductions in sensitive taxa abundance and percentage of sensitive taxa relative to reference areas were greater than expected based solely on habitat variables.

The influence of CMm on the abundance of EPT taxa and Ephemeroptera decreased with distance from CMm in Michel Creek. While significantly lower abundances were noted in 2020 at MIDCO and CM_MC2 compared to reference stations and stations further downstream, the magnitudes of the differences were within 2 SD, indicating these differences are not biologically meaningful and mean abundances of EPT and Ephemeroptera were within or above site-specific and regional normal ranges at all Michel Creek stations downstream of Corbin Creek in 2020.

Percent EPT and % E were significantly lower in Michel Creek downstream of CORCK and compared to reference stations. The extent of effect went as far as CM_MC2 for % EPT and MIDAG-S1 for % E. Values have been below the regional and/or site-specific normal ranges for % EPT and % E since 2012 at MIDCO. Percent EPT and % E increased in 2020 compared to 2019 and/or 2018 at MIDCO, but remained below the site-specific and regional normal ranges in 2020.

Benthic invertebrate tissue selenium concentrations were within the regional normal range at reference and mine-influenced stations in 2020 and were less than the lowest level 1 benchmark.

The findings from the Chronic Toxicity Monitoring Program (Golder 2017, 2019b, 2020, 2021) support the interpretation in Golder (2017) that nickel is likely responsible for the BIC changes. BIC effects from nickel in Michel Creek appear to be localized near CORCK and do not extend farther on Michel Creek than MIDAG-S1. Chronic toxicity monitoring results also indicate no adverse effects on fish.

6.2 Study Question 2

How do spatial and temporal patterns in the benthic invertebrate communities correspond to water quality, calcite, sediment quality, and other potential stressors, and what does this tell us about what factors are causing observed effects?

Habitat variables were largely similar between reference and mine-influenced stations and it was concluded that differences in habitat are unlikely to have caused the differences observed in % EPT and % E at the stations downstream of CMm in Michel Creek. It is also unlikely that calcite presence and concretion in Michel Creek was a factor in the lower proportions of EPT and Ephemeroptera taxa at MIDCO and CM_MC2, because calcite index values were low between 2012 and 2020 and within the reference normal range in Michel Creek. However, calcite presence may have been a factor at CORCK.

Comparisons across stations indicated correlations of % EPT and % E with aqueous concentrations of nickel. There were intercorrelations of nickel with other potential stressors (e.g., cobalt, selenium) and intercorrelations between aqueous concentrations, sediment concentrations, and tissue concentrations in benthic invertebrates. However, the only water quality constituent with concentrations in Michel Creek above invertebrate screening values was nickel. Concentrations were above the level 3 invertebrate screening value of 22 µg/L at CORCK and in Michel Creek downstream of CMm at MIDCO and CM_MC2.

Spatial and temporal patterns in BIC endpoints corresponded more closely with mine-influenced water quality than with sediment quality or calcite, supporting the interpretation that observed patterns in BIC are attributable to water quality. Spatial and temporal patterns in constituent concentrations greater than WQGs, benchmarks, or screening values support previous assessments completed through the Chronic Toxicity Monitoring Program (Golder 2017, 2019b, 2020d, 2021) which have implicated nickel as the likely cause of observed effects in BIC.

6.3 Summary

The objective of the CMm LAEMP is to assess the magnitude and extent of influence from CMm on water quality, calcite, sediment quality, and benthic invertebrate communities downstream of CMm, and to assess what factors are contributing to the observed effects. This objective is effectively met through the study design, the results of which are presented herein for 2020 and summarized in Table 6.3-1.

Table 6.3-1: Summary of 2020 CMm LAEMP Results

Study Questions	Water Quality[(a)]	Calcite[(b)]	Sediment Quality[(c)]	BIC	BIT Se
Study Question 1: What are the magnitude and spatial extent of influence from CMm in 2020?	Aqueous Ni > level 3 interim screening value at MIDCO (0.94 km ds) and CM_MC2 (1.8 km ds), between the level 1 and level 2 interim screening values from MIDCO (0.94 km ds) to MIDAG (5.27 km ds). No other constituents > benchmarks or screening values.	Within the reference normal range (0 to 1) at all stations in Michel Creek. Above 0.5 at MIDCO (0.94 km ds) and CM_MC2 (1.8 km ds), near zero by MIDAG-S1 (3.05 km ds).	Ni >BC WSQG from MIDCO (0.94 km ds) to MIDAG (5.27 km ds) 2-Methylnaphthalene >BC WSQG from MIDCO (0.94 km ds) to MI5 (18.25 km ds) Phenanthrene >BC SWG only at MIDAG-S1 (3.05 km ds)	% EPT below habitat-adjusted normal range and significantly lower than reference stations at MIDCO (0.94 km ds) and CM_MC2 (1.8 km ds). % E below habitat-adjusted normal range and significantly lower than reference stations from MIDCO (0.94 km ds) to MIDAG-S1 (3.05 km ds).	BIT Se within normal range and lower than level 1 benchmark at all stations.
Study Question 1: Are the conditions changing over time?	Aqueous Ni has decreased since 2018.	Calcite index was lower in 2020 compared to 2018.	no clear temporal trend	% EPT and % E are variable across years at MIDCO, which appears to relate to variation in aqueous Ni.	No
Study Question 1: Are the 2020 results expected based on projections, historical conditions, or habitat conditions?	Aqueous Ni consistent with SRK projections and previous RAEMP and LAEMP results.	Consistent with previous RAEMP and LAEMP results.	Consistent with previous RAEMP and LAEMP results.	% EPT and % E are consistent with expected effects of aqueous Ni evident in monitoring since 2015.	BIT Se is consistent with aqueous Se concentrations and historical conditions.
Study Question 2: Are spatial and temporal patterns in exposure variables correlated with BIC?	Yes for Ni and constituents that correlate with Ni.	Not in Michel Creek.	Yes, because sediment quality is correlated with water quality.[(d)]	n/a	No
Study Question 2: What factors may be causing effects?	Water quality, calcite, and sediment quality in Michel Creek downstream of CMm are related to historical mining and pit pumping.			Aqueous Ni is the most likely cause of observed BIC effects.	BIT Se reflects low aqueous Se at CMm.

a) Only constituents with exceedances of a benchmark or screening value shown; BC WQG exceedances not shown when below the EVWQP benchmarks derived for the Elk Valley because they are not expected to negatively impact the benthic invertebrate community (Section 3.1).

b) Calcite data collected during the RAEMP/CMm LAEMP does not apply to the Regional Calcite Monitoring Program data.

c) Only constituents exceeding the upper BC WSQG shown; those constituents below the lower BC WSQG not shown.

d) BIC collected in erosional habitat not depositional habitat; therefore, unlikely pathway for mine-effects.

BIC = benthic invertebrate community; BIT = benthic invertebrate tissue; CMm = Coal Mountain Mine; Ni – Nickel; ds = downstream; BC WSQG = British Columbia Working Sediment Quality Guideline; % EPT = percent Ephemeroptera, Plecoptera, Tricoptera;% E = percent Ephemeroptera; SS NR = site-specific normal range; RNR = regional normal range; SD = standard deviation; Se = selenium; Co = cobalt; n/a = not applicable; >= greater than; <= less than; µg/L = micrograms per litre; mg/kg = milligrams per kilograms; dw = dry weight; km = kilometers.

7.0 RECOMMENDATIONS

The current study design is effective at collecting sufficient data to address the study questions; therefore, there are no recommended changes to data collection for the CMm LAEMP 2020 study design. It is recommended that analysis of BIT chemistry be reduced to focus on BIT Se concentrations (Section 3.6), while risk from the remaining mine-related constituents (including cobalt and nickel) be evaluated using water-based benchmarks.

The CMm LAEMP will continue to assess relevant site-specific issues, as required, until sufficient data have been collected, concerns no longer exist, or monitoring can be incorporated into the RAEMP. The next CMm LAEMP field program is planned for September 2021.

Signature Page

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https://golderassociates.sharepoint.com/sites/139643/project files/6 deliverables/3.0 issued/003-r-rev0-1000-2020 cmo laemp rpt/20449345-003-r-rev0-1000 2020 cmm laemp report 30jun_21.docx

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APPENDIX A

Adaptive Management Plan – Biotriggers

Table of Contents

A ADAPTIVE MANAGEMENT – BIOLOGICAL TRIGGERS

A1 INTRODUCTION

A1.1 Background

Biological triggers for management action have been developed as part of Teck's Adaptive Management Plan (AMP; Teck 2018). Triggers are intended as a simple way to provide warning of potential unexpected monitoring results that may require management action. Additionally, information provided from the analysis of biological triggers may lead to the opening of a response framework under the AMP, which would be reported within the annual AMP report.

Draft biological triggers for Management Question 5 were developed in the 2018 AMP (Teck 2018) for three measurement endpoints:

- Percent EPT (% EPT; Ephemeroptera, Plecoptera, and Trichoptera) – based on travelling kick samples (CABIN protocol), generally three replicates per location per sampling event
- Benthic invertebrate tissue selenium (BIT Se) – generally several replicates collected per location per sampling event, where each replicate is a composite sample of invertebrates
- Westslope cutthroat trout muscle tissue selenium (WCT Se) – generally 8 replicates collected per location per sampling event, where each replicate corresponds to a sample from a single fish

These three endpoints are evaluated (where data are available) in detailed spatial and/or temporal analyses in Local Aquatic Effects Monitoring Program (LAEMP) and the Regional Aquatic Effects Monitoring Program (RAEMP) reports and, therefore, there is some degree of redundancy in evaluating the same data using biological triggers. Notably, data collected under the RAEMP are incorporated into the aquatic data integration tool (ADIT), where they are used in an integrated way to characterize the state of the aquatic environment. Biological trigger analyses are not identical to the evaluations in the LAEMP, RAEMP, and ADIT and are intended to be complementary to these other analyses. The methods applied for biological trigger analyses reflect refinements made in consultation with the EMC since the draft triggers were developed in the 2018 AMP (Teck 2018). Through future iterative evaluations, the process and/or biological triggers may be adjusted over time.

A2 METHODS

A2.1 Overview

Biological trigger analyses for the 2020 CMO LAEMP included two of the three measurement endpoints (%EPT and BIT Se) because fish tissue sampling is not conducted as part of the CMO LAEMP. Expected conditions for these endpoints were developed using projected water quality (rather than measured water quality) so that the triggers would detect biological results that were unexpected, regardless of whether those results relate to unexpected water quality or unexpected relationships between water quality and biological endpoints. Therefore, biological triggers were applied at locations where water quality projections were available[1].

[1] Biological triggers have not been developed for lentic areas because the complex and site-specific hydrology of lentic areas precludes the development of useful water quality projections and because the highly variable and site-specific habitat of lentic areas precludes the development of useful normal ranges for benthic invertebrate community metrics.

Specifically, two mine-influenced stations on Michel Creek (MIDCO and CM_MC2) and one on Corbin Creek (CORCK; CM_CC1) were evaluated for biological triggers for the CMO LAEMP.

A2.2 Percent EPT

Data for percent EPT were compared to:

- Normal range: The lower limit of habitat-adjusted normal range (2.5th percentile).
- Expectations: The % EPT corresponding to the predicted ADIT score. Predicted ADIT scores correspond to modelled potential effects on benthic invertebrate community (BIC) endpoints, based on relationships between concentrations of nitrate, sulphate, and nickel[2] and sensitive toxicity test endpoints that are interpreted to be predictive of potential effects on BIC endpoints. A predicted ADIT score of 3 corresponds to >50% potential effects on the sensitive toxicity test endpoint, 2 corresponds to 20-50% potential effects, 1 corresponds to 10-20% potential effects, and 0 corresponds to potential effect levels of 10% or less.

  Predicted ADIT scores were compared to measured ADIT scores, which are calculated in the ADIT as follows (Golder 2020):

  - an ADIT score of 0 corresponds to measured % EPT ≥ the 10th percentile of the habitat-adjusted normal range
  - an ADIT score of 1 corresponds to measured % EPT between the 10th percentile and the 2.5th percentile of the habitat-adjusted normal range
  - an ADIT score of 2 corresponds to measured % EPT between the 2.5th percentile and half of the 2.5th percentile of the habitat-adjusted normal range
  - an ADIT score of 3 corresponds to measured % EPT ≤ half of the 2.5th percentile and ≥ 0

Individual replicate habitat-adjusted normal ranges were used at each location for establishing the % EPT percentiles 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 September for the 2020 CMO LAEMP were included in the biological trigger analysis.

2 Projections were based on the highest maximum monthly mean across all flow scenarios (i.e., low, average, high). Selenium was not included because selenium effects on BIC endpoints are not expected under the range of conditions evaluated herein.

A2.3 Benthic Invertebrate Tissue Selenium

Data for BIT Se were compared to:

- Normal range: The upper limit of regional normal range (97.5th percentile).
- Expectations: The upper limit of the 95% prediction interval based on the water to BIT bioaccumulation model. The model was originally developed in the EVWQP (Golder 2014) and was updated (Golder 2020). The updated best fit relationship is $log_{10}[Se]_{inv} = 0.720 + 0.071 \times log_{10}[Se]_{aq}$. Prediction intervals were calculated based on the *t*-distribution with *n*=2 degrees of freedom. Prediction intervals were estimated for BIT Se for individual replicates, taking into account that the data points for the original model were based on geometric means rather than individual replicates (Azimuth 2021, in preparation).

Benthic invertebrate tissue selenium data collected during the September 2020 CMO LAEMP sampling program was included in the biological trigger analysis and compared to the normal range information based on samples collected in September between 1996 and 2019.

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 (11, 18 and 26 mg/kg, respectively) for the most sensitive receptor (i.e., juvenile fish growth via dietary exposure) are included in plots.

A3 RESULTS

A3.1 Percent EPT

Percent EPT for each mine-influenced replicate was assessed against its respective biological trigger criteria (Table A-1 and Figure A-1). All replicates at CORCK, MIDCO, and CM_MC2 had % EPT lower than the 2.5th percentile of the habitat-adjusted normal range (i.e., indicating a change from the reference normal range) and measured ADIT scores greater than the the predicted ADIT score based on projected water quality (i.e., indicating a greater than expected change from the reference normal range), resulting in biological triggers at each station.

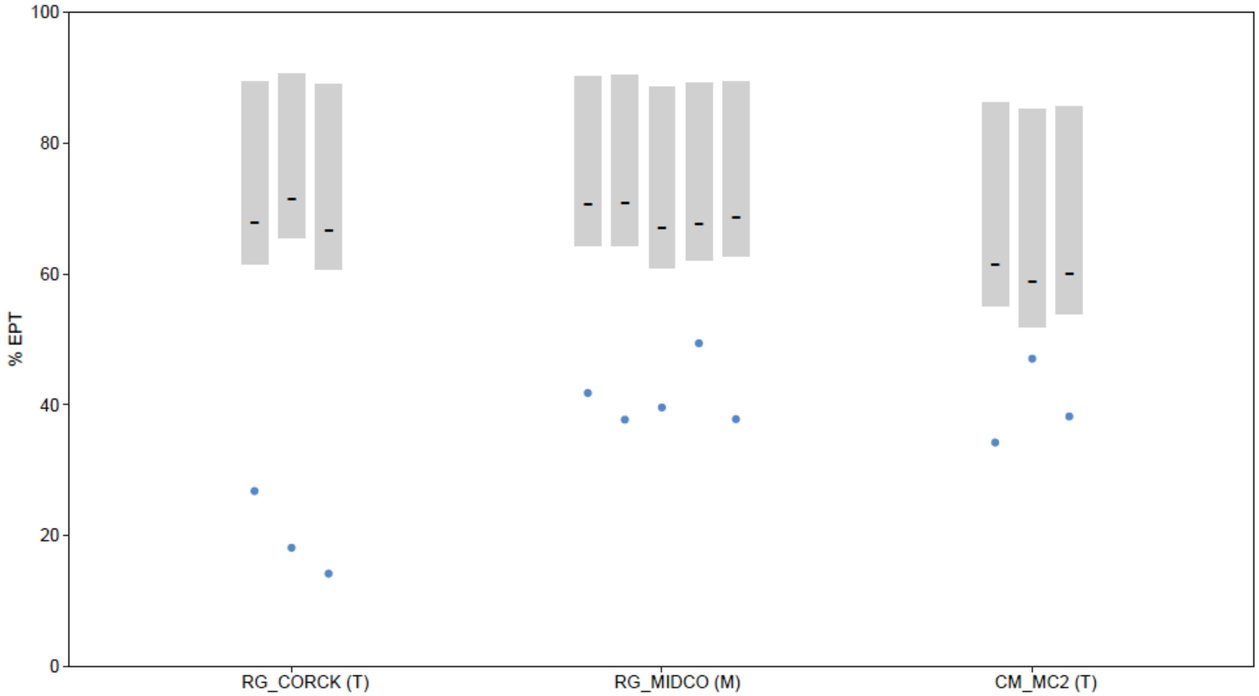
Table A-1: Biological Trigger Analysis for Percent Ephemeroptera, Plecoptera, and Trichoptera (EPT) at CMm LAEMP Sampling Stations, 2020

Watercourse		Station	Type	Replicate	Date	Measured %EPT	Measured ADIT Score	Predicted ADIT Score	2.5th Percentile of the Habitat Adjusted Normal Range	Biological Trigger Event?
Mine Influenced Stations	Corbin Creek	CORCK	T	1	12-Sep-2020	26.8	3	0	61.5	Yes
		CORCK	T	2	12-Sep-2020	18.1	3	0	65.5	Yes
		CORCK	T	3	12-Sep-2020	14.1	3	0	60.7	Yes
	Michel Creek	MIDCO	M	1	15-Sep-2020	41.8	2	0	64.3	Yes
		MIDCO	M	2	15-Sep-2020	37.7	2	0	64.4	Yes
		MIDCO	M	3	15-Sep-2020	39.6	2	0	61.0	Yes
		MIDCO	M	4	15-Sep-2020	49.4	2	0	62.1	Yes
		MIDCO	M	5	13-Sep-2020	37.8	2	0	62.8	Yes
		CM MC2	M	1	18-Sep-2020	34.2	2	0	55.1	Yes
		CM MC2	M	2	19-Sep-2020	47.0	2	0	51.8	Yes
		CM MC2	M	3	19-Sep-2020	38.2	2	0	53.9	Yes

Note: shaded cells signify individual replicates that were associated with a biological trigger (i.e., lower than both the ADIT value [based on predicted water quality] and the lower 2.5th percentile of habitat-adjusted normal range).

M = mainstem; T = tributary; ADIT = Aquatic Data Integration Tool.

Figure A-1: Percent Ephemeroptera, Plecoptera, and Trichoptera Compared to Predicted Values at CMO LAEMP Sampling Stations, 2020



Note: Black bars indicate the lower limit of the predicted ADIT score for the location. Blue dots represent values exceeding the trigger (below 2.5th percentile of the normal range and below the lower limit of the predicted ADIT score). Grey shading represents the habitat-adjusted site-specific normal range for each replicate. The water quality projection for RG_CM_MC2 was used for biological trigger calculations for both RG_CM_CM2 and RG_MIDCO.
M = mainstem; T = tributary; ADIT = Aquatic Data Integration Tool.

A3.2 Benthic Invertebrate Tissue Selenium

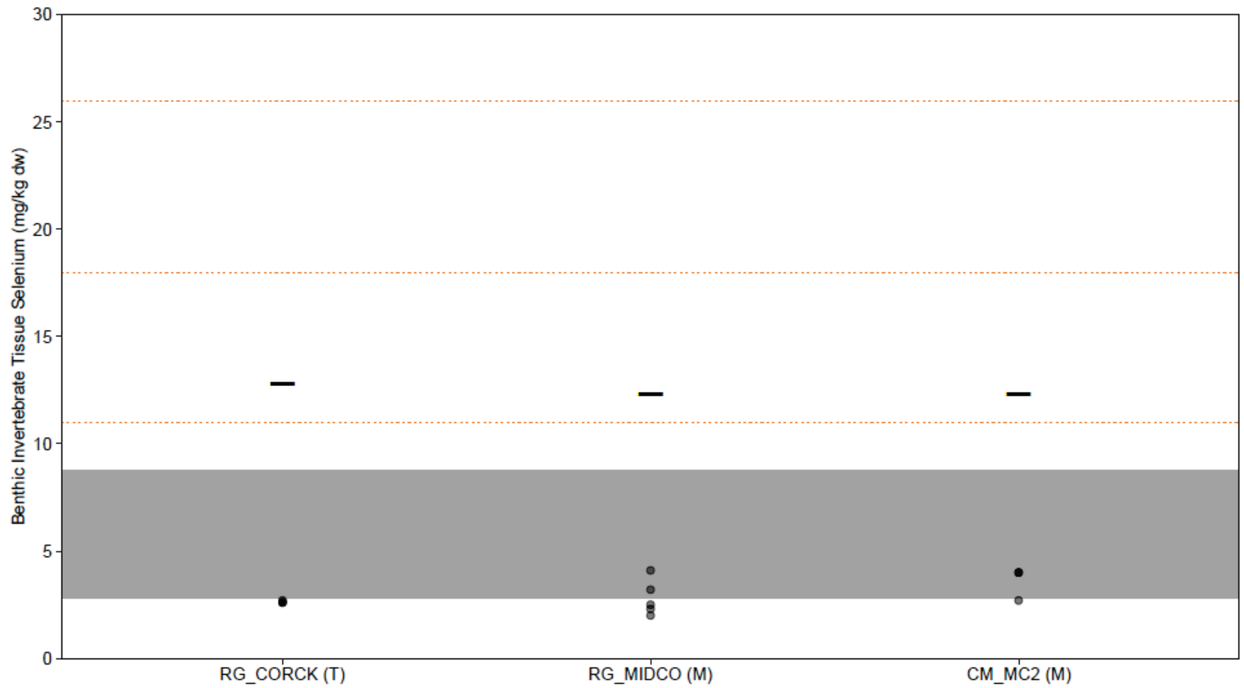
Concentrations of BIT Se for each mine-influenced replicate were assessed against their respective biological trigger criteria (Table A-2 and Figure A-2). None of the replicates in 2020 had concentrations of BIT Se above the biological trigger threshold (i.e., higher than both the upper 95% prediction limit based on predicted water quality, and the upper 97.5th percentile normal range), or above the level 1 benchmarks for juvenile fish (i.e., 11 mg/kg dw); resulting in no biological trigger for BIT Se.

Table A-2: Biological Trigger Analysis for Selenium Concentrations in Benthic Invertebrate Tissue at CMO LAEMP Sampling Stations, 2020

Watercourse		Station	Watercourse Type	Replicate	Date	Predicted Aqueous Selenium Concentration (µg/L)	Benthic Invertebrate Tissue Selenium Concentration (mg/kg dw)			Biological Trigger Event?
							Reported Concentration	Upper 95% Prediction Limit	97.5th Percentile of Normal Range	
Mine Influenced Stations	Corbin Creek	CORCK	T	1	12-Sep-2020	13.8	2.7	12.7	8.7	No
		CORCK	T	2	12-Sep-2020	13.8	2.6	12.7	8.7	No
		CORCK	T	3	12-Sep-2020	13.8	2.6	12.7	8.7	No
	Michel Creek	MIDCO	M	1	15-Sep-2020	8.3	2.0	12.3	8.7	No
		MIDCO	M	2	15-Sep-2020	8.3	4.1	12.3	8.7	No
		MIDCO	M	3	15-Sep-2020	8.3	2.3	12.3	8.7	No
		MIDCO	M	4	15-Sep-2020	8.3	2.5	12.3	8.7	No
		MIDCO	M	5	13-Sep-2020	8.3	3.2	12.3	8.7	No
		CM MC2	M	1	18-Sep-2020	8.3	4.0	12.3	8.7	No
		CM MC2	M	2	19-Sep-2020	8.3	4.0	12.3	8.7	No
		CM MC2	M	3	19-Sep-2020	8.3	2.7	12.3	8.7	No

M = mainstem; T = tributary; mg/kg = milligram per kilogram; mg/L = milligrams per litre; dw = dry weight.

Figure A-2: Selenium Concentrations in Benthic Invertebrate Composite Taxa Samples - Compared to Predicted Values at CMO LAEMP Sampling Stations, 2020



Note: Black bars indicate the upper 95th prediction interval of the bioaccumulation model. Dotted lines indicate level 1, 2, 3 benchmarks for juvenile fish (11, 18, and 26 mg/kg, respectively). Grey shading represents the reference area normal range defined as the 2.5th and 97.5th percentiles of the distribution of the reference area data (pooled 1996 to 2019 data) reported in the RAEMP. The water quality projection for CM_MC2 was used for biological trigger calculations for both CM_CM2 and MIDCO.
M = mainstem; T = tributary; mg/kg = milligrams per kilograms; dw = dry weight; RAEMP = regional aquatic effects monitoring plan.

A4 SUMMARY

All replicates at CORCK, MIDCO, and CM_MC2 had % EPT results that resulted in a biological trigger event. These findings are consistent with results of sampling and evaluation in previous years that prompted management action under the AMP response framework. Teck first investigated localized effects on % EPT at CMO in 2017 as part of the Integrated Water Management Plan for Closure for CMO (Golder 2017). Analyses presented in Golder (2017) attributed the localized effects at least in large part to nickel, although effects in Corbin Creek are interpreted to also reflect calcite conditions there. Since 2017, Teck has conducted a series of laboratory and field investigations to better understand nickel toxicity and effects to % EPT, with the objective of deriving benchmarks to guide assessment and management of nickel in the Elk Valley. Teck also initiated the CMO LAEMP (of which this biological triggers assessment is part) and initiated ongoing evaluations of nickel treatment options. These activities are reported annually in AMP reporting.

None of the replicates in 2020 had concentrations of BIT Se above the biological trigger threshold or above the level 1 benchmarks for juvenile fish. These findings to not indicate a need to track BIT Se under the AMP framework.

REFERENCES

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Minnow. 2020. Regional Aquatic Effects Monitoring Program (RAEMP) Report, 2017 to 2019. Prepared for Teck Coal Limited, Sparwood, BC. November. Project 187202.0011.

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APPENDIX B

Tissue Analysis – Method Validation

Table B-1: Inter-lab Comparison of Benthic Invertebrate Tissue Concentrations, 2020

Location		Trich Detection Limit	ALS Detection Limit	Reference Sites											
Watercourse				Michel Creek				Andy Good Creek				Leach Creek			
Station				MI25				AGCK				LE1			
Client Sample ID				RG_MI25_INV-1_2020-09-11				RG_AGCK_INV-1_2020-09-10				RG_LE1_INV-1_2020-09-17			
Laboratory				Trich	ALS	%CV	RPD	Trich	ALS	%CV	RPD	Trich	ALS	%CV	RPD
Laboratory Sample ID				007	VA20C2303-003			001	VA20C2303-001			004	VA20C2303-002		
Parameter	Unit														
Aluminum	mg/kg dw	0.043	5.0	1154	1210	3.4	4.7	127	112	8.9	13	532	275	45	64
Antimony	mg/kg dw	0.007	0.02	0.033	0.05	-	-	0.014	<0.020	-	-	0.04	0.061	29	42
Arsenic	mg/kg dw	0.42	0.05	0.94	1.4	26	36	1.7	1.5	7.9	11	0.46	0.51	6.7	9.5
Barium	mg/kg dw	0.001	0.05	88	38	56	79	13	5.0	63	90	65	25	62	88
Boron	mg/kg dw	0.1	1.0	2.9	4.2	26	37	0.51	<1.0	-	-	0.88	1.1	15	22
Cadmium	mg/kg dw	0.039	0.01	1.1	1.3	9.6	14	0.52	0.54	2.4	3.4	2.2	2.3	2.8	4.0
Calcium	mg/kg dw	24	20	1353	2350	38	54	1828	4370	58	82	1159	942	15	21
Chromium	mg/kg dw	0.32	0.2	3.7	32	112	159	1.9	4.2	54	76	3.3	19	100	141
Cobalt	mg/kg dw	0.005	0.02	0.75	1.4	41	58	0.098	0.16	32	46	0.45	0.72	33	46
Copper	mg/kg dw	0.005	0.2	13	14	4.7	6.7	9.2	7.9	10	15	18	17	4.0	5.7
Iron	mg/kg dw	6.1	5.0	532	1490	67	95	108	165	30	42	410	510	15	22
Lead	mg/kg dw	0.001	0.05	0.63	1.3	48	68	0.084	0.11	16	23	0.23	0.24	3.6	5.0
Lithium	mg/kg dw	0.004	0.5	0.55	1.5	65	92	0.2	<0.50	-	-	0.29	<0.50	-	-
Magnesium	mg/kg dw	0.044	2.0	1126	1240	6.8	9.6	1269	1140	7.6	11	1210	905	20	29
Manganese	mg/kg dw	0.013	0.05	53	102	45	63	13	16	14	20	57	106	43	60
Mercury	mg/kg dw	0.03	0.01	0.052	0.028	-	-	0.052	0.016	-	-	0.15	0.034	-	-
Molybdenum	mg/kg dw	0.008	0.04	0.34	0.59	38	54	0.26	0.28	4.0	5.6	0.55	0.43	17	24
Nickel	mg/kg dw	0.013	0.2	7.6	15	48	68	4.5	4.5	0.47	0.66	4.8	9.2	45	63
Phosphorus	mg/kg dw	80	20	9517	10600	7.6	11	12105	10800	8.1	11	10963	9670	8.9	13
Potassium	mg/kg dw	18	20	8536	8950	3.3	4.7	10646	9040	12	16	9577	7540	17	24
Selenium	mg/kg dw	0.24	0.1	2.9	3.5	13	18	6.4	6.4	0.22	0.31	4.5	4.7	3.1	4.3
Silver	mg/kg dw	0.001	-	0.039	-	-	-	0.042	-	-	-	0.2	-	-	-
Sodium	mg/kg dw	2.0	20	3075	3820	15	22	4259	4270	0.18	0.26	3598	3580	0.35	0.5
Strontium	mg/kg dw	0.001	0.1	4.1	6.1	28	39	4.7	6.2	19	27	2.2	2.6	13	18
Thallium	mg/kg dw	0.001	0.002	0.038	0.08	51	72	0.22	0.31	22	31	0.03	0.021	24	33
Tin	mg/kg dw	0.025	0.1	0.14	0.15	7.4	11	0.14	0.2	27	39	0.07	<0.10	-	-
Titanium	mg/kg dw	0.24	-	65	-	-	-	6.8	-	-	-	32	-	-	-
Uranium	mg/kg dw	0.001	0.002	0.043	0.058	21	30	0.027	0.038	23	33	0.048	0.066	22	31
Vanadium	mg/kg dw	0.018	0.1	1.3	3.1	57	81	0.26	0.47	42	59	1.5	1.6	5.9	8.3
Zinc	mg/kg dw	0.75	1.0	139	139	0	0	224	186	13	19	164	150	6.3	8.9

Note: RPD was calculated as the difference between Trich and ALS results divided by the average. RPD was only calculated if one results was greater than five times the detection limit.

Grey cells represent values with RPDs greater than 40%

mg/kg dw = milligrams per kilogram dry weight; RPD = relative percent difference; Trich = TrichAnalytics Inc.; ALS = ALS Laboratories; < = less than; - = not calculated or not measured; %CV = percent coefficient of va

Table B-1: Inter-lab Comparison of Benthic Invertebrate Tissue Concentrations, 2020

Location		Trich Detection Limit	ALS Detection Limit	Mine-Influenced Sites																			
Watercourse				Michel Creek				Corbin Creek				Michel Creek				Michel Creek				Michel Creek			
Station				MIUCO				CORCK				MIDCO				CM_MC2				MIDAG-S1			
Client Sample ID				RG_MIUCO_INV-1_2020-09-12				RG_CORCK_INV-1_2020-09-12				RG_MIDCO_INV-1_2020-09-15				CM_MC2_INV-1_2020-09-18				RG_MIDAG-S1_INV-1_2020-09-18			
Laboratory				Trich	ALS	%CV	RPD	Trich	ALS	%CV	RPD	Trich	ALS	%CV	RPD	Trich	ALS	%CV	RPD	Trich	ALS	%CV	RPD
Laboratory Sample ID				013	VA20C2303-005			010	VA20C2303-004			016	VA20C2303-006			030	VA20C2519-001			033	VA20C2519-002		
Parameter	Unit																						
Aluminum	mg/kg dw	0.043	5.0	1006	487	49	70	59	54	6.3	8.8	252	239	3.7	5.3	1292	628	49	69	427	540	17	23
Antimony	mg/kg dw	0.007	0.02	0.021	<0.020	-	-	0.019	0.022	-	-	0.014	<0.020	-	-	0.039	0.033	12	17	0.019	0.03	-	-
Arsenic	mg/kg dw	0.42	0.05	0.66	0.66	0.11	0.15	<0.418	0.23	-	-	<0.418	0.37	-	-	0.81	0.8	0.62	0.87	0.56	1.0	40	57
Barium	mg/kg dw	0.001	0.05	116	31	81	115	6.0	6.9	10	14	12	5.9	48	68	42	31	22	31	17	8.2	49	70
Boron	mg/kg dw	0.1	1.0	1.9	1.9	0	0	0.82	1.4	37	52	0.98	1.2	15	21	3.0	2.6	10	14	0.97	1.6	35	49
Cadmium	mg/kg dw	0.039	0.01	1.8	2.0	7.8	11	0.45	0.56	15	21	0.37	0.32	11	15	0.43	0.42	2.2	3.1	0.68	1.5	54	77
Calcium	mg/kg dw	24	20	2208	1810	14	20	3433	18900	98	139	2379	4290	41	57	8420	53100	103	145	1237	2980	58	83
Chromium	mg/kg dw	0.32	0.2	4.2	47	118	167	2.4	14	100	141	2.2	11	92	131	5.7	49	112	158	3.3	22	104	147
Cobalt	mg/kg dw	0.005	0.02	1.2	1.6	18	25	8.2	12	29	41	25	20	14	20	52	51	1.7	2.3	17	31	42	59
Copper	mg/kg dw	0.005	0.2	18	15	13	18	9.9	9.9	0.14	0.2	15	12	15	21	12	9.0	20	29	9.3	11	14	20
Iron	mg/kg dw	6.1	5.0	635	920	26	37	109	210	45	63	157	312	47	66	703	928	20	28	270	801	70	99
Lead	mg/kg dw	0.001	0.05	0.33	0.39	13	19	0.019	0.061	74	105	0.083	0.15	39	56	0.31	0.34	5.8	8.3	0.14	0.34	59	84
Lithium	mg/kg dw	0.004	0.5	0.46	0.76	35	49	0.18	<0.50	-	-	0.24	<0.50	-	-	0.71	1.2	36	51	0.28	0.8	69	98
Magnesium	mg/kg dw	0.044	2.0	1539	1150	20	29	1670	1520	6.6	9.4	1530	1560	1.4	1.9	1512	1770	11	16	1186	1390	11	16
Manganese	mg/kg dw	0.013	0.05	213	206	2.4	3.3	51	102	47	67	41	67	34	49	134	197	27	38	54	116	52	73
Mercury	mg/kg dw	0.03	0.01	0.051	0.03	-	-	0.034	0.021	-	-	0.045	<0.010	-	-	<0.023	<0.010	-	-	0.058	0.022	-	-
Molybdenum	mg/kg dw	0.008	0.04	0.74	0.62	12	17	0.17	0.22	16	22	0.18	0.18	0	0	0.3	0.31	2.3	3.3	0.21	0.35	36	50
Nickel	mg/kg dw	0.013	0.2	10	23	55	78	11	19	37	52	11	11	2.5	3.6	53	56	4.4	6.2	16	22	24	33
Phosphorus	mg/kg dw	80	20	11554	8360	23	32	8695	7460	11	15	10232	9100	8.3	12	8756	7810	8.1	11	7725	10900	24	34
Potassium	mg/kg dw	18	20	9698	7340	20	28	7504	6140	14	20	9084	7300	15	22	9035	7220	16	22	7242	8540	12	16
Selenium	mg/kg dw	0.24	0.1	5.3	4.8	6.9	9.7	2.7	3.1	10	14	2.0	2.5	16	23	4.0	4.1	1.4	2.0	4.0	5.9	27	38
Silver	mg/kg dw	0.001	-	0.054	-	-	-	0.03	-	-	-	0.069	-	-	-	0.049	-	-	-	0.049	-	-	-
Sodium	mg/kg dw	2.0	20	4406	3690	13	18	3465	3280	3.9	5.5	4630	4240	6.2	8.8	3869	3460	7.9	11	3247	5040	31	43
Strontium	mg/kg dw	0.001	0.1	5.3	4.1	18	26	15	33	53	74	6.2	9.4	29	41	16	66	86	122	3.7	7.0	44	62
Thallium	mg/kg dw	0.001	0.002	0.036	0.036	0.59	0.83	0.017	0.029	37	52	0.033	0.033	0.65	0.91	0.071	0.058	14	20	0.083	0.091	6.8	9.6
Tin	mg/kg dw	0.025	0.1	0.29	0.21	23	33	0.07	0.14	-	-	0.11	0.1	-	-	0.14	0.1	22	31	0.12	0.22	-	-
Titanium	mg/kg dw	0.24	-	62	-	-	-	2.9	-	-	-	16	-	-	-	89	-	-	-	34	-	-	-
Uranium	mg/kg dw	0.001	0.002	0.052	0.045	11	15	0.031	0.16	95	135	0.025	0.033	20	29	0.13	0.29	54	76	0.025	0.061	59	83
Vanadium	mg/kg dw	0.018	0.1	1.4	1.5	3.0	4.2	0.11	0.25	53	75	0.37	0.58	32	45	1.7	1.9	6.7	9.5	0.72	1.9	65	92
Zinc	mg/kg dw	0.75	1.0	171	148	10	14	132	151	9.5	13	195	179	6.1	8.6	168	122	22	32	177	178	0.4	0.56

Note: RPD was calculated as the difference between Trich and ALS results divided by the average. RPD was only calculated if one results was greater than five times the detection limit.

Grey cells represent values with RPDs greater than 40%

mg/kg dw = milligrams per kilogram dry weight; RPD = relative percent difference; Trich = TrichAnalytics Inc.; ALS = ALS Laboratories; < = less than; - = not calculated or not measured; %CV = percent coefficient of va

Table B-1: Inter-lab Comparison of Benthic Invertebrate Tissue Concentrations, 2020

Location		Trich Detection Limit	ALS Detection Limit	Mine-Influenced Sites															
Watercourse				Michel Creek				Michel Creek				Michel Creek				Michel Creek			
Station				MIDAG-S2				MIDAG				MIULE				MI5			
Client Sample ID				RG_MIDAG-S2_INV-1_2020-09-17				RG_MIDAG_INV-1_2020-09-16				RG_MIULE_INV-1_2020-09-16				RG_MI5_INV-1_2020-09-17			
Laboratory				Trich	ALS	%CV	RPD	Trich	ALS	%CV	RPD	Trich	ALS	%CV	RPD	Trich	ALS	%CV	RPD
Laboratory Sample ID				036	VA20C2519-003			021	VA20C2303-007			024	VA20C2303-008			027	VA20C2303-009		
Parameter	Unit																		
Aluminum	mg/kg dw	0.043	5.0	597	489	14	20	2717	1260	52	73	107	83	18	26	97	89	5.8	8.3
Antimony	mg/kg dw	0.007	0.02	0.027	0.03	-	-	0.051	0.046	7.3	10	0.015	<0.020	-	-	0.018	0.023	-	-
Arsenic	mg/kg dw	0.42	0.05	1.0	1.2	9.9	14	1.4	1.6	11	15	0.61	0.47	18	26	<0.418	0.4	-	-
Barium	mg/kg dw	0.001	0.05	30	12	61	86	46	20	56	79	21	7.4	68	96	37	18	48	68
Boron	mg/kg dw	0.1	1.0	1.2	1.6	20	29	4.3	3.3	19	26	0.81	1.1	22	31	0.47	<1.0	-	-
Cadmium	mg/kg dw	0.039	0.01	0.52	0.51	1.9	2.7	1.1	0.97	8.8	12	1.2	1.0	11	15	0.72	1.0	23	32
Calcium	mg/kg dw	24	20	1289	3760	69	98	3514	12100	78	110	2501	3420	22	31	1493	3120	50	71
Chromium	mg/kg dw	0.32	0.2	3.5	16	92	130	13	114	112	159	2.6	12	90	127	2.6	41	125	176
Cobalt	mg/kg dw	0.005	0.02	18	19	2.3	3.3	37	27	21	30	6.6	6.0	6.9	9.7	1.6	2.5	31	44
Copper	mg/kg dw	0.005	0.2	13	11	14	19	17	12	26	36	14	11	15	21	12	12	1.8	2.5
Iron	mg/kg dw	6.1	5.0	355	630	39	56	1202	1930	33	46	130	194	28	40	134	316	57	81
Lead	mg/kg dw	0.001	0.05	0.21	0.33	32	45	0.59	0.84	24	35	0.048	0.069	25	36	0.063	0.12	43	61
Lithium	mg/kg dw	0.004	0.5	0.28	0.66	58	82	1.5	2.0	20	28	0.14	<0.50	-	-	0.087	<0.50	-	-
Magnesium	mg/kg dw	0.044	2.0	1186	1170	0.96	1.4	1905	2100	6.9	9.7	1316	1070	15	21	1148	1040	7.0	9.9
Manganese	mg/kg dw	0.013	0.05	76	117	30	42	131	163	15	22	29	31	4.0	5.7	34	59	38	53
Mercury	mg/kg dw	0.03	0.01	0.032	0.012	-	-	0.067	0.016	-	-	0.037	0.012	-	-	0.061	0.021	-	-
Molybdenum	mg/kg dw	0.008	0.04	0.29	0.36	15	22	0.57	0.54	3.5	4.9	0.28	0.27	2.0	2.9	0.21	0.18	9.3	13
Nickel	mg/kg dw	0.013	0.2	20	19	4.0	5.7	66	85	18	25	7.4	9.1	14	20	9.9	24	58	81
Phosphorus	mg/kg dw	80	20	10502	10100	2.8	3.9	11016	8880	15	21	10890	7780	24	33	9836	8070	14	20
Potassium	mg/kg dw	18	20	10601	8900	12	17	12328	9440	19	27	11203	6550	37	52	10551	7700	22	31
Selenium	mg/kg dw	0.24	0.1	4.5	5.3	12	17	7.5	6.9	5.7	8.0	6.0	7.2	13	18	4.8	6.3	19	27
Silver	mg/kg dw	0.001	-	0.065	-	-	-	0.097	-	-	-	0.081	-	-	-	0.14	-	-	-
Sodium	mg/kg dw	2.0	20	3141	3260	2.6	3.7	8633	8930	2.4	3.4	3018	2600	11	15	3277	3120	3.5	4.9
Strontium	mg/kg dw	0.001	0.1	4.8	8.1	36	51	9.6	18	44	62	6.6	7.0	4.4	6.2	4.7	6.5	23	32
Thallium	mg/kg dw	0.001	0.002	0.059	0.054	6.8	9.6	0.17	0.12	26	37	0.054	0.037	27	38	0.035	0.031	8.1	11
Tin	mg/kg dw	0.025	0.1	0.17	0.2	12	17	0.38	0.28	21	30	0.25	0.21	12	17	0.058	0.14	-	-
Titanium	mg/kg dw	0.24	-	44	-	-	-	198	-	-	-	5.7	-	-	-	4.7	-	-	-
Uranium	mg/kg dw	0.001	0.002	0.047	0.061	19	26	0.12	0.12	1.2	1.7	0.024	0.031	18	25	0.023	0.045	45	64
Vanadium	mg/kg dw	0.018	0.1	0.89	1.4	33	47	4.2	4.2	0.5	0.71	0.2	0.32	34	49	0.25	0.66	63	89
Zinc	mg/kg dw	0.75	1.0	169	141	13	18	171	129	20	28	192	173	7.4	10	216	167	18	26

Note: RPD was calculated as the difference between Trich and ALS results divided by the average. RPD was only calculated if one results was greater than five times the detection limit.

Grey cells represent values with RPDs greater than 40%

mg/kg dw = milligrams per kilogram dry weight; RPD = relative percent difference; Trich = TrichAnalytics Inc.; ALS = ALS Laboratories; < = less than; - = not calculated or not measured; %CV = percent coefficient of va

Table B-2. Certified Reference Material Results

CRM	Matrix	Certified Value (mg/kg)	Laboratory	Sample ID	Result (mg/kg)	Accuracy (%)
TORT-3	Lobster	5.3	Trich	001 R1	4.5	85
				002 R2	4.6	87
				001 R3	4.4	83
				001 R4	4.8	91
				001 R5	4.5	85
			ALS	001	4.9	93
				002	4.9	93
BCR-414	Plankton	18.8	Trich	003 R1	18.0	96
				003 R2	20.0	106
				003 R3	20.0	106
				003 R4	21.0	112
				003 R5	21.0	112
			ALS	003	15.3	81
				004	15.2	81

CRM = certified reference material; mg/kg = milligrams per kilogram; Trich = TrichAnalytics Inc.; ALS = ALS Laboratories.

TrichAnalytics Inc.

Tissue Microchemistry Analysis Report

Client: Cybele Heddle
Aquatic Scientist
Teck Coal Limited
Phone: 250-425-3331 (O)
Email: Cybele.Heddle@teck.com

Date Received:	15 Mar 2021
Date of Analysis:	22 Mar 2021
Final Report Date:	24 Mar 2021
Project No.:	2020-131
Method No.:	MET-002.05

Client Project: Assessment of Certified Reference Materials for Use in the Quantification of Nickel in Biological Tissues

Analytical Request: Analysis of Three Certified Reference Materials for Nickel as per scope of work dated 03 Feb 2021
See chain of custody form provided for sample identification numbers that correspond to the samples sent to ALS Environmental for additional testing.

Notes:

Analytical results are expressed in part per million (ppm) dry weight (equivalent to mg/kg).
Samples quantified using DORM-4, NIST-1566b, and NIST-2976 certified reference standards.
Certified Reference Material BCR-670 could not be quanified because it was not a suitable matrix match.

This report provides the analytical results only for certified reference material noted above as procured by TrichAnalytics Inc.

Reviewed and Approved by Jennie Christensen, PhD, RPBio

24 Mar 2021
Date

TrichAnalytics Inc.
207-1753 Sean Heights
Saanichton, BC V8M 0B3
www.trichanalytics.com

CALA Testing Accreditation No. A4196

Teck Coal Limited

Certified Reference Material Analysis Results

		Client ID	TORT-3				
		Matrix	Lobster				
		Certified Value (ppm)	5.3				
		Lab ID	001 R1	001 R2	001 R3	001 R4	001 R5
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
60Ni	0.007	0.023	4.5	4.6	4.4	4.8	4.5

		Client ID	BCR-414				
		Matrix	Plankton				
		Certified Value (ppm)	18.8				
		Lab ID	003 R1	003 R2	003 R3	003 R4	003 R5
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
60Ni	0.007	0.023	18	20	20	21	21

Notes:

ppm = parts per million

ppm is equivalent to mg/kg

DL = detection limit

LOQ = limit of quantitation

R = sample replicate

Teck Coal Limited

Tissue QA/QC Accuracy and Precision Results

Sample Group ID: 01

Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
60Ni	0.007	1.34	1.6	123	7.2

Notes:

ppm = parts per million; % = percent; DL = detection limit; RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 70 - 130%.

Precision: DQO of ≤20%.

DORM-4 used for accuracy and precision.

Teck Coal Limited
Sample Group Information

Sample Group ID	Client ID	Lab ID	Date of Analysis
01	TORT-3	001	22 Mar 2021
	BCR-414	003	

TrichAnalytics Inc.
207-1753 Sean Heights, Saanichton, BC, V8M 0B3
Ph: (250) 532-1084

Chain of Custody (COC)

Project: 2020-131 Total Nickel Analysis

Project Contact		**Project Invoicing if Different from Contact**	
Company Name:	Teck Coal Limited	Company Name:	Teck Coal Limited
Contact Name:	Cybele Heddle	Contact Name:	Teck Accounts Payable - Shaun McNaughton
Address:	421 Pine Avenue	Address:	421 Pine Avenue, Bag 2000
City, Province:	Sparwood, BC	City, Province:	Sparwood, BC
Postal Code:	VOB 2G0	Postal Code:	VOB 2G0
Phone:		Phone:	250-425-8020
Email:	cybele.heddle@teck.com	Email:	DLTeckCoalAccountsPayable@teck.com

Sample Analysis Requested

Lab Sample ID	**Sample ID**	**Sample Type:**	
		Species	Sample type
001	TORT-3	Lobster	Homongenized dry powder
002	TORT-3	Lobster	Homongenized dry powder
003	BCR-414	Plankton	Homongenized dry powder
004	BCR-414	Plankton	Homongenized dry powder
005	BCR-670	Duckweed	Homongenized dry powder
006	BCR-670	Duckweed	Homongenized dry powder

Sample(s) Released By:	**Sample(s) Received By:** Geriene LaBine
Signature:	**Signature:** Geriene LaBine
Date Sent:	**Date Received:** 15-Mar-21 (Project # 2020-131)
Sample(s) Returned to Client By:	**Shipping Conditions:**
	Shipping Container:
Signature:	**Date Sent:**

COM-011.01

CERTIFICATE OF ANALYSIS

Work Order	: **VA20C2303**	Page	: 1 of 6
Client	: **Teck Coal Limited**	Laboratory	: Vancouver - Environmental
Contact	: Accounts Payable	Account Manager	: Can Dang
Address	: Bag 2000 Sparwood BC Canada V0B 2G0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250 425 2555	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 02-Dec-2020 09:20
PO	: ----	Date Analysis Commenced	: 14-Dec-2020
C-O-C number	: ----	Issue Date	: 24-Dec-2020 09:45
Sampler	: ----		
Site	: ----		
Quote number	: ----		
No. of samples received	: 10		
No. of samples analysed	: 10		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
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

<: 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 in reports identified as "Preliminary Report" are considered authorized for use.

Qualifiers

Qualifier	*Description*
DLA	*Detection Limit adjusted for required dilution.*

Analytical Results

Sub-Matrix: Tissue (Matrix: Biota)				Client sample ID	RG_AGCK_INV-1_2020-09-10	RG_LE1_INV-1_2020-09-17	RG_MI25_INV-1_2020-09-11	RG_CORCK_INV-1_2020-09-12	RG_MIUCO_INV-1_2020-09-12
				Client sampling date / time	10-Sep-2020	17-Sep-2020	11-Sep-2020	12-Sep-2020	12-Sep-2020
Analyte	CAS Number	Method	LOR	Unit	VA20C2303-001	VA20C2303-002	VA20C2303-003	VA20C2303-004	VA20C2303-005
					Result	Result	Result	Result	Result
Physical Tests									
moisture	----	E144A	2.0	%	5.5	4.3	3.9	2.1	3.9
Metals									
aluminum	7429-90-5	E475	5.0	mg/kg	112	275	1210	54.0	487
antimony	7440-36-0	E475	0.020	mg/kg	<0.020	0.061	0.050	0.022	<0.020
arsenic	7440-38-2	E475	0.050	mg/kg	1.52	0.508	1.36	0.228	0.656
barium	7440-39-3	E475	0.050	mg/kg	4.96	25.4	38.0	6.93	31.2
beryllium	7440-41-7	E475	0.010	mg/kg	0.013	0.021	0.067	0.013	0.027
bismuth	7440-69-9	E475	0.010	mg/kg	<0.010	<0.010	0.014	<0.010	<0.010
boron	7440-42-8	E475	1.0	mg/kg	<1.0	1.1	4.2	1.4	1.9
cadmium	7440-43-9	E475	0.010	mg/kg	0.540	2.29	1.26	0.555	2.01
calcium	7440-70-2	E475	20	mg/kg	4370	942	2350	18900	1810
cesium	7440-46-2	E475	0.0050	mg/kg	0.0205	0.0295	0.157	0.0189	0.0856
chromium	7440-47-3	E475	0.20	mg/kg	4.23	19.0	32.3	13.8	47.3
cobalt	7440-48-4	E475	0.020	mg/kg	0.156	0.724	1.35	12.4	1.55
copper	7440-50-8	E475	0.20	mg/kg	7.94	17.0	13.9	9.88	15.0
iron	7439-89-6	E475	5.0	mg/kg	165	510	1490	210	920
lead	7439-92-1	E475	0.050	mg/kg	0.106	0.244	1.28	0.061	0.393
lithium	7439-93-2	E475	0.50	mg/kg	<0.50	<0.50	1.49	<0.50	0.76
magnesium	7439-95-4	E475	2.0	mg/kg	1140	905	1240	1520	1150
manganese	7439-96-5	E475	0.050	mg/kg	15.9	106	102	102	206
mercury	7439-97-6	E512	0.010	mg/kg	0.016	0.034	0.028	0.021	0.030
molybdenum	7439-98-7	E475	0.040	mg/kg	0.276	0.433	0.593	0.218	0.621
nickel	7440-02-0	E475	0.20	mg/kg	4.53	9.24	15.4	18.8	22.8
phosphorus	7723-14-0	E475	20	mg/kg	10800	9670	10600	7460	8360
potassium	7440-09-7	E475	20	mg/kg	9040	7540	8950	6140	7340
rubidium	7440-17-7	E475	0.050	mg/kg	3.22	2.02	3.47	1.59	2.48
selenium	7782-49-2	E475	0.10	mg/kg	6.38	4.70	3.48	3.12	4.81
sodium	7440-23-5	E475	20	mg/kg	4270	3580	3820	3280	3690
strontium	7440-24-6	E475	0.10	mg/kg	6.16	2.64	6.08	32.8	4.10
tellurium	13494-80-9	E475	0.020	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E475	0.0020	mg/kg	0.305	0.0214	0.0803	0.0290	0.0363

Work Order : VA20C2303

Client : Teck Coal Limited

Project : ----

Analytical Results

Sub-Matrix: **Tissue**

(Matrix: **Biota)**

				Client sample ID	RG_AGCK_INV-1_2020-09-10	RG_LE1_INV-1_2020-09-17	RG_MI25_INV-1_2020-09-11	RG_CORCK_INV-1_2020-09-12	RG_MIUCO_INV-1_2020-09-12
				Client sampling date / time	10-Sep-2020	17-Sep-2020	11-Sep-2020	12-Sep-2020	12-Sep-2020
Analyte	CAS Number	Method	LOR	Unit	VA20C2303-001	VA20C2303-002	VA20C2303-003	VA20C2303-004	VA20C2303-005
					Result	Result	Result	Result	Result
Metals									
tin	7440-31-5	E475	0.10	mg/kg	0.20	<0.10	0.15	0.14	0.21
uranium	7440-61-1	E475	0.0020	mg/kg	0.0375	0.0658	0.0580	0.159	0.0446
vanadium	7440-62-2	E475	0.10	mg/kg	0.47	1.63	3.07	0.25	1.46
zinc	7440-66-6	E475	1.0	mg/kg	186	150	139	151	148
zirconium	7440-67-7	E475	0.20	mg/kg	<0.20	0.28	0.58	<0.20	0.24

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_MIDCO_INV-1_2020-09-15	RG_MIDAG_INV-1_2020-09-16	RG_MIULE_INV-1_2020-09-16	RG_MI5_INV-1_2020-09-17	RG_INVERT_C
Client sampling date / time					15-Sep-2020	16-Sep-2020	16-Sep-2020	17-Sep-2020	[17-Sep-2020]
					VA20C2303-006	VA20C2303-007	VA20C2303-008	VA20C2303-009	VA20C2303-010
					Result	Result	Result	Result	Result
Physical Tests									
moisture	----	E144A	2.0	%	3.8	4.7	2.9	3.7	<2.0
Metals									
aluminum	7429-90-5	E475	5.0	mg/kg	239	1260	82.7	89.3	17600
antimony	7440-36-0	E475	0.020	mg/kg	<0.020	0.046	<0.020	0.023	0.277
arsenic	7440-38-2	E475	0.050	mg/kg	0.371	1.63	0.467	0.400	25.9
barium	7440-39-3	E475	0.050	mg/kg	5.89	19.9	7.39	18.2	71.0
beryllium	7440-41-7	E475	0.010	mg/kg	0.015	0.085	<0.010	<0.010	0.411
bismuth	7440-69-9	E475	0.010	mg/kg	<0.010	0.016	<0.010	<0.010	0.322
boron	7440-42-8	E475	1.0	mg/kg	1.2	3.3	1.1	<1.0	31.7
cadmium	7440-43-9	E475	0.010	mg/kg	0.320	0.971	1.03	1.00	2.07
calcium	7440-70-2	E475	20	mg/kg	4290	12100	3420	3120	7770
cesium	7440-46-2	E475	0.0050	mg/kg	0.0484	0.194	0.0167	0.0148	0.795
chromium	7440-47-3	E475	0.20	mg/kg	10.5	114	11.7	40.9	51.7
cobalt	7440-48-4	E475	0.020	mg/kg	20.4	27.4	5.99	2.51	8.52
copper	7440-50-8	E475	0.20	mg/kg	12.1	11.8	11.3	11.7	285
iron	7439-89-6	E475	5.0	mg/kg	312	1930	194	316	30600
lead	7439-92-1	E475	0.050	mg/kg	0.147	0.835	0.069	0.118	154
lithium	7439-93-2	E475	0.50	mg/kg	<0.50	1.98	<0.50	<0.50	25.7
magnesium	7439-95-4	E475	2.0	mg/kg	1560	2100	1070	1040	10000
manganese	7439-96-5	E475	0.050	mg/kg	67.3	163	30.7	58.8	264
mercury	7439-97-6	E512	0.010	mg/kg	<0.010	0.016	0.012	0.021	2.88 DLA
molybdenum	7439-98-7	E475	0.040	mg/kg	0.182	0.538	0.272	0.184	4.32
nickel	7440-02-0	E475	0.20	mg/kg	11.4	84.8	9.08	23.5	28.3
phosphorus	7723-14-0	E475	20	mg/kg	9100	8880	7780	8070	885
potassium	7440-09-7	E475	20	mg/kg	7300	9440	6550	7700	3130
rubidium	7440-17-7	E475	0.050	mg/kg	3.28	4.33	2.07	1.94	11.4
selenium	7782-49-2	E475	0.10	mg/kg	2.51	6.92	7.22	6.32	0.94
sodium	7440-23-5	E475	20	mg/kg	4240	8930	2600	3120	18400
strontium	7440-24-6	E475	0.10	mg/kg	9.36	18.2	7.02	6.48	65.5
tellurium	13494-80-9	E475	0.020	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.100 DLA
thallium	7440-28-0	E475	0.0020	mg/kg	0.0327	0.120	0.0366	0.0312	0.387
tin	7440-31-5	E475	0.10	mg/kg	0.10	0.28	0.21	0.14	12.6

Analytical Results

Sub-Matrix: **Tissue**

(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	RG_MIDCO_INV-1_2020-09-15	RG_MIDAG_INV-1_2020-09-16	RG_MIULE_INV-1_2020-09-16	RG_MI5_INV-1_2020-09-17	RG_INVERT_C
				Client sampling date / time	15-Sep-2020	16-Sep-2020	16-Sep-2020	17-Sep-2020	[17-Sep-2020]
					VA20C2303-006	VA20C2303-007	VA20C2303-008	VA20C2303-009	VA20C2303-010
					Result	Result	Result	Result	Result
Metals									
uranium	7440-61-1	E475	0.0020	mg/kg	0.0334	0.120	0.0309	0.0446	1.57
vanadium	7440-62-2	E475	0.10	mg/kg	0.58	4.23	0.32	0.66	69.1
zinc	7440-66-6	E475	1.0	mg/kg	179	129	173	167	339
zirconium	7440-67-7	E475	0.20	mg/kg	<0.20	0.76	<0.20	<0.20	13.3

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA20C2303**	Laboratory	: Vancouver - Environmental
Client	: **Teck Coal Limited**	Account Manager	: Can Dang
Contact	: Accounts Payable	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Address	: Bag 2000 Sparwood BC Canada V0B 2G0	Telephone	: +1 604 253 4188
Telephone	: 250 425 2555	Date Samples Received	: 02-Dec-2020 09:20
Project	: ----	Issue Date	: 24-Dec-2020 09:45
PO	: ----		
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: ----		
No. of samples received	: 10		
No. of samples analysed	: 10		

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)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Work Order : VA20C2303
Client : Teck Coal Limited
Project : ----

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 15:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 15:00 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 : Mercury in Biota by CVAAS (DRY units, Biopsy)										
Compliant container RG_MI25_INV-1_2020-09-11	E512	11-Sep-2020	20-Dec-2020	365 days	100 days	✓	23-Dec-2020	264 days	3 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
Compliant container RG_AGCK_INV-1_2020-09-10	E512	10-Sep-2020	20-Dec-2020	365 days	101 days	✓	23-Dec-2020	263 days	3 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
Compliant container RG_INVERT_C	E512	17-Sep-2020	20-Dec-2020	365 days	94 days	✓	23-Dec-2020	270 days	3 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
Compliant container RG_LE1_INV-1_2020-09-17	E512	17-Sep-2020	20-Dec-2020	365 days	94 days	✓	23-Dec-2020	270 days	3 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
Compliant container RG_MI5_INV-1_2020-09-17	E512	17-Sep-2020	20-Dec-2020	365 days	94 days	✓	23-Dec-2020	270 days	3 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
Compliant container RG_MIDAG_INV-1_2020-09-16	E512	16-Sep-2020	20-Dec-2020	365 days	95 days	✓	23-Dec-2020	269 days	3 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
Compliant container RG_MIULE_INV-1_2020-09-16	E512	16-Sep-2020	20-Dec-2020	365 days	95 days	✓	23-Dec-2020	269 days	3 days	✓

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 : Mercury in Biota by CVAAS (DRY units, Biopsy)										
Compliant container RG_MIDCO_INV-1_2020-09-15	E512	15-Sep-2020	20-Dec-2020	365 days	96 days	✓	23-Dec-2020	268 days	3 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
Compliant container RG_CORCK_INV-1_2020-09-12	E512	12-Sep-2020	20-Dec-2020	365 days	99 days	✓	23-Dec-2020	265 days	3 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
Compliant container RG_MIUCO_INV-1_2020-09-12	E512	12-Sep-2020	20-Dec-2020	365 days	99 days	✓	23-Dec-2020	265 days	3 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
Compliant container RG_MI25_INV-1_2020-09-11	E475	11-Sep-2020	20-Dec-2020	730 days	100 days	✓	22-Dec-2020	629 days	1 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
Compliant container RG_AGCK_INV-1_2020-09-10	E475	10-Sep-2020	20-Dec-2020	730 days	101 days	✓	22-Dec-2020	628 days	1 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
Compliant container RG_INVERT_C	E475	17-Sep-2020	20-Dec-2020	730 days	94 days	✓	22-Dec-2020	635 days	1 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
Compliant container RG_LE1_INV-1_2020-09-17	E475	17-Sep-2020	20-Dec-2020	730 days	94 days	✓	22-Dec-2020	635 days	1 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
Compliant container RG_MI5_INV-1_2020-09-17	E475	17-Sep-2020	20-Dec-2020	730 days	94 days	✓	22-Dec-2020	635 days	1 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
Compliant container RG_MIDAG_INV-1_2020-09-16	E475	16-Sep-2020	20-Dec-2020	730 days	95 days	✓	22-Dec-2020	634 days	1 days	✓

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 by CRC ICPMS (DRY units, Biopsy)										
Compliant container RG_MIULE_INV-1_2020-09-16	E475	16-Sep-2020	20-Dec-2020	730 days	95 days	✓	22-Dec-2020	634 days	1 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
Compliant container RG_MIDCO_INV-1_2020-09-15	E475	15-Sep-2020	20-Dec-2020	730 days	96 days	✓	22-Dec-2020	633 days	1 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
Compliant container RG_CORCK_INV-1_2020-09-12	E475	12-Sep-2020	20-Dec-2020	730 days	99 days	✓	22-Dec-2020	630 days	1 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
Compliant container RG_MIUCO_INV-1_2020-09-12	E475	12-Sep-2020	20-Dec-2020	730 days	99 days	✓	22-Dec-2020	630 days	1 days	✓
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
Compliant container RG_AGCK_INV-1_2020-09-10	E144A	10-Sep-2020	----	----	----		14-Dec-2020	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
Compliant container RG_CORCK_INV-1_2020-09-12	E144A	12-Sep-2020	----	----	----		14-Dec-2020	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
Compliant container RG_INVERT_C	E144A	17-Sep-2020	----	----	----		14-Dec-2020	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
Compliant container RG_LE1_INV-1_2020-09-17	E144A	17-Sep-2020	----	----	----		14-Dec-2020	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
Compliant container RG_MI25_INV-1_2020-09-11	E144A	11-Sep-2020	----	----	----		14-Dec-2020	----	----	

Matrix: **Biota**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
Compliant container RG_MI5_INV-1_2020-09-17	E144A	17-Sep-2020	----	----	----		14-Dec-2020	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
Compliant container RG_MIDAG_INV-1_2020-09-16	E144A	16-Sep-2020	----	----	----		14-Dec-2020	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
Compliant container RG_MIDCO_INV-1_2020-09-15	E144A	15-Sep-2020	----	----	----		14-Dec-2020	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
Compliant container RG_MIUCO_INV-1_2020-09-12	E144A	12-Sep-2020	----	----	----		14-Dec-2020	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
Compliant container RG_MIULE_INV-1_2020-09-16	E144A	16-Sep-2020	----	----	----		14-Dec-2020	----	----	

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 Control Samples (LCS)							
Mercury in Biota by CVAAS (DRY units, Biopsy)	E512	130543	2	13	15.3	10.0	✓
Metals by CRC ICPMS (DRY units, Biopsy)	E475	130544	2	13	15.3	10.0	✓
Moisture Content by Gravimetry (Biopsy)	E144A	130545	1	13	7.6	5.0	✓
Method Blanks (MB)							
Mercury in Biota by CVAAS (DRY units, Biopsy)	E512	130543	1	13	7.6	5.0	✓
Metals by CRC ICPMS (DRY units, Biopsy)	E475	130544	1	13	7.6	5.0	✓
Moisture Content by Gravimetry (Biopsy)	E144A	130545	1	13	7.6	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Moisture Content by Gravimetry (Biopsy)	E144A Vancouver - Environmental	Biota	Puget Sound Water Quality Authority/CCME PHC in Soil - Tier 1	This analysis is carried out gravimetrically by drying the sample at <60 deg. C for a minimum of three days.
Metals by CRC ICPMS (DRY units, Biopsy)	E475 Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Samples are digested with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by Collision/Reaction Cell ICPMS: 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.
Mercury in Biota by CVAAS (DRY units, Biopsy)	E512 Vancouver - Environmental	Biota	EPA 200.3/1631E (mod)	Samples are digested with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by CVAAS.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Metals and Mercury Biota Digestion (Biopsy)	EP475 Vancouver - Environmental	Biota	EPA 200.3/200.8 (mod)	Samples are digested with nitric acid, hydrochloric acid, and hydrogen peroxide. 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.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **VA20C2303**	Page	: 1 of 8
Client	: Teck Coal Limited	Laboratory	: Vancouver - Environmental
Contact	: Accounts Payable	Account Manager	: Can Dang
Address	: Bag 2000 Sparwood BC Canada V0B 2G0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250 425 2555	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 02-Dec-2020 09:20
PO	: ----	Date Analysis Commenced	: 14-Dec-2020
C-O-C number	: ----	Issue Date	: 24-Dec-2020 09:45
Sampler	: ----		
Site	: ----		
Quote number	: ----		
No. of samples received	: 10		
No. of samples analysed	: 10		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
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.

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: 130545)						
moisture	----	E144A	2	%	<2.0	----
Metals (QCLot: 130543)						
mercury	7439-97-6	E512	0.01	mg/kg	<0.010	----
Metals (QCLot: 130544)						
aluminum	7429-90-5	E475	5	mg/kg	<5.0	----
antimony	7440-36-0	E475	0.02	mg/kg	<0.020	----
arsenic	7440-38-2	E475	0.05	mg/kg	<0.050	----
barium	7440-39-3	E475	0.05	mg/kg	<0.050	----
beryllium	7440-41-7	E475	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E475	0.01	mg/kg	<0.010	----
boron	7440-42-8	E475	1	mg/kg	<1.0	----
cadmium	7440-43-9	E475	0.01	mg/kg	<0.010	----
calcium	7440-70-2	E475	20	mg/kg	<20	----
cesium	7440-46-2	E475	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E475	0.2	mg/kg	<0.20	----
cobalt	7440-48-4	E475	0.02	mg/kg	<0.020	----
copper	7440-50-8	E475	0.2	mg/kg	<0.20	----
iron	7439-89-6	E475	5	mg/kg	<5.0	----
lead	7439-92-1	E475	0.05	mg/kg	<0.050	----
lithium	7439-93-2	E475	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E475	2	mg/kg	<2.0	----
manganese	7439-96-5	E475	0.05	mg/kg	<0.050	----
molybdenum	7439-98-7	E475	0.04	mg/kg	<0.040	----
nickel	7440-02-0	E475	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E475	20	mg/kg	<20	----
potassium	7440-09-7	E475	20	mg/kg	<20	----
rubidium	7440-17-7	E475	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E475	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E475	20	mg/kg	<20	----
strontium	7440-24-6	E475	0.1	mg/kg	<0.10	----
tellurium	13494-80-9	E475	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E475	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E475	0.1	mg/kg	<0.10	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 130544) - continued						
uranium	7440-61-1	E475	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E475	0.1	mg/kg	<0.10	----
zinc	7440-66-6	E475	1	mg/kg	<1.0	----
zirconium	7440-67-7	E475	0.2	mg/kg	<0.20	----

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**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 130545)									
moisture	----	E144A	2	%	100 %	100.0	90.0	110	----
Metals (QCLot: 130543)									
mercury	7439-97-6	E512	0.01	mg/kg	0.05 mg/kg	102	80.0	120	----
Metals (QCLot: 130544)									
aluminum	7429-90-5	E475	5	mg/kg	50 mg/kg	96.8	80.0	120	----
antimony	7440-36-0	E475	0.02	mg/kg	25 mg/kg	90.3	80.0	120	----
arsenic	7440-38-2	E475	0.05	mg/kg	25 mg/kg	91.6	80.0	120	----
barium	7440-39-3	E475	0.05	mg/kg	6.25 mg/kg	91.5	80.0	120	----
beryllium	7440-41-7	E475	0.01	mg/kg	2.5 mg/kg	95.0	80.0	120	----
bismuth	7440-69-9	E475	0.01	mg/kg	25 mg/kg	91.7	80.0	120	----
boron	7440-42-8	E475	1	mg/kg	25 mg/kg	90.4	80.0	120	----
cadmium	7440-43-9	E475	0.01	mg/kg	2.5 mg/kg	87.0	80.0	120	----
calcium	7440-70-2	E475	20	mg/kg	1250 mg/kg	93.2	80.0	120	----
cesium	7440-46-2	E475	0.005	mg/kg	1.25 mg/kg	95.9	80.0	120	----
chromium	7440-47-3	E475	0.2	mg/kg	6.25 mg/kg	96.4	80.0	120	----
cobalt	7440-48-4	E475	0.02	mg/kg	6.25 mg/kg	97.0	80.0	120	----
copper	7440-50-8	E475	0.2	mg/kg	6.25 mg/kg	90.6	80.0	120	----
iron	7439-89-6	E475	5	mg/kg	25 mg/kg	99.1	80.0	120	----
lead	7439-92-1	E475	0.05	mg/kg	12.5 mg/kg	90.7	80.0	120	----
lithium	7439-93-2	E475	0.5	mg/kg	6.25 mg/kg	102	80.0	120	----
magnesium	7439-95-4	E475	2	mg/kg	1250 mg/kg	94.4	80.0	120	----
manganese	7439-96-5	E475	0.05	mg/kg	6.25 mg/kg	98.1	80.0	120	----
molybdenum	7439-98-7	E475	0.04	mg/kg	6.25 mg/kg	96.7	80.0	120	----
nickel	7440-02-0	E475	0.2	mg/kg	12.5 mg/kg	93.0	80.0	120	----
phosphorus	7723-14-0	E475	20	mg/kg	250 mg/kg	98.0	80.0	120	----
potassium	7440-09-7	E475	20	mg/kg	1250 mg/kg	97.0	80.0	120	----
rubidium	7440-17-7	E475	0.05	mg/kg	2.5 mg/kg	98.6	80.0	120	----
selenium	7782-49-2	E475	0.1	mg/kg	25 mg/kg	90.5	80.0	120	----
sodium	7440-23-5	E475	20	mg/kg	1250 mg/kg	98.0	80.0	120	----
strontium	7440-24-6	E475	0.1	mg/kg	6.25 mg/kg	98.4	80.0	120	----
tellurium	13494-80-9	E475	0.02	mg/kg	2.5 mg/kg	89.4	80.0	120	----
thallium	7440-28-0	E475	0.002	mg/kg	25 mg/kg	90.9	80.0	120	----
tin	7440-31-5	E475	0.1	mg/kg	12.5 mg/kg	91.2	80.0	120	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Metals (QCLot: 130544) - continued									
uranium	7440-61-1	E475	0.002	mg/kg	0.125 mg/kg	97.5	80.0	120	----
vanadium	7440-62-2	E475	0.1	mg/kg	12.5 mg/kg	97.5	80.0	120	----
zinc	7440-66-6	E475	1	mg/kg	12.5 mg/kg	87.4	80.0	120	----
zirconium	7440-67-7	E475	0.2	mg/kg	2.5 mg/kg	97.3	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: 130543)									
QC-130543-003	RM	mercury	7439-97-6	E512	0.332 mg/kg	105	70.0	130	----
Metals (QCLot: 130544)									
QC-130544-003	RM	aluminum	7429-90-5	E475	1280 mg/kg	106	70.0	130	----
QC-130544-003	RM	arsenic	7440-38-2	E475	6.87 mg/kg	91.9	70.0	130	----
QC-130544-003	RM	barium	7440-39-3	E475	4.4 mg/kg	99.9	70.0	130	----
QC-130544-003	RM	boron	7440-42-8	E475	9.24 mg/kg	92.9	70.0	130	----
QC-130544-003	RM	cadmium	7440-43-9	E475	0.299 mg/kg	87.0	70.0	130	----
QC-130544-003	RM	calcium	7440-70-2	E475	2360 mg/kg	98.4	70.0	130	----
QC-130544-003	RM	cesium	7440-46-2	E475	0.078 mg/kg	90.0	70.0	130	----
QC-130544-003	RM	chromium	7440-47-3	E475	1.58 mg/kg	98.6	70.0	130	----
QC-130544-003	RM	cobalt	7440-48-4	E475	0.25 mg/kg	97.1	70.0	130	----
QC-130544-003	RM	copper	7440-50-8	E475	15.7 mg/kg	88.0	70.0	130	----
QC-130544-003	RM	iron	7439-89-6	E475	318 mg/kg	95.7	70.0	130	----
QC-130544-003	RM	lead	7439-92-1	E475	0.231 mg/kg	101	70.0	130	----
QC-130544-003	RM	lithium	7439-93-2	E475	1.21 mg/kg	96.4	50.0	150	----
QC-130544-003	RM	magnesium	7439-95-4	E475	910 mg/kg	96.1	70.0	130	----
QC-130544-003	RM	manganese	7439-96-5	E475	3.17 mg/kg	94.6	70.0	130	----
QC-130544-003	RM	molybdenum	7439-98-7	E475	0.29 mg/kg	92.4	70.0	130	----
QC-130544-003	RM	nickel	7440-02-0	E475	1.34 mg/kg	91.2	70.0	130	----
QC-130544-003	RM	phosphorus	7723-14-0	E475	8000 mg/kg	97.8	70.0	130	----
QC-130544-003	RM	potassium	7440-09-7	E475	12840 mg/kg	100.0	70.0	130	----
QC-130544-003	RM	rubidium	7440-17-7	E475	5.59 mg/kg	97.2	70.0	130	----
QC-130544-003	RM	selenium	7782-49-2	E475	3.45 mg/kg	99.0	70.0	130	----
QC-130544-003	RM	sodium	7440-23-5	E475	14000 mg/kg	100	70.0	130	----
QC-130544-003	RM	strontium	7440-24-6	E475	10.1 mg/kg	91.5	70.0	130	----
QC-130544-003	RM	thallium	7440-28-0	E475	0.0093 mg/kg	102	70.0	130	----
QC-130544-003	RM	uranium	7440-61-1	E475	0.0481 mg/kg	91.4	70.0	130	----
QC-130544-003	RM	vanadium	7440-62-2	E475	1.48 mg/kg	98.2	70.0	130	----
QC-130544-003	RM	zinc	7440-66-6	E475	46.2 mg/kg	99.4	70.0	130	----

TrichAnalytics Inc.
207-1753 Sean Heights, Saanichton, BC, V8M 0B3
Ph: (250) 532-1084

Chain of Custody (COC)

Teck Project: CMO LAEMP (20-07); TrichAnalytics Project: 2020-144

Project Contact		**Sample Receipt Contact**	
Company Name:	Teck Coal Limited	Company Name:	ALS Environmental
Contact Name:	Carlie Meyer	Contact Name:	Can Dang
Address:	421 Pine Ave	Address:	8081 Lougheed Hwy
City, Province:	Sparwood	City, Province:	Burnaby, BC
Postal Code:	VOB 2G0	Postal Code:	V5A 1W9
Phone:	250-425-8202	Phone:	604-253-4188
Email:	Carlie.Meyer@teck.com	Email:	can.dang@alsglobal.com

Sample Analysis Requested

TrichAnalytics Laboratory ID	**Minnow Environmental Inc. Sample ID**	**Sample Type:** Species	Sample type
001	RG_AGCK_INV-1_2020-09-10	Benthic Invertebrate	Homongenized dry powder
004	RG_LE1_INV-1_2020-09-17	Benthic Invertebrate	Homongenized dry powder
007	RG_MI25_INV-1_2020-09-11	Benthic Invertebrate	Homongenized dry powder
010	RG_CORCK_INV-1_2020-09-12	Benthic Invertebrate	Homongenized dry powder
013	RG_MIUCO_INV-1_2020-09-12	Benthic Invertebrate	Homongenized dry powder
016	RG_MIDCO_INV-1_2020-09-15	Benthic Invertebrate	Homongenized dry powder
021	RG_MIDAG_INV-1_2020-09-16	Benthic Invertebrate	Homongenized dry powder
024	RG_MIULE_INV-1_2020-09-16	Benthic Invertebrate	Homongenized dry powder
027	RG_MI5_INV-1_2020-09-17	Benthic Invertebrate	Homongenized dry powder
039	RG_INVERT_C	-	Homongenized dry powder

Environmental Division
Vancouver
Work Order Reference
VA20C2303
Telephone : +1 604 253 4188

Sample(s) Released By: Dwayne Smith	**Sample(s) Received By:** RK , 19.4°C
Signature:	**Signature:**
Date Sent: 27-Nov-20	**Date Received:** 2/12/20, 9:20am
Sample(s) Returned to Client By:	**Shipping Conditions:**
	Shipping Container:
Signature:	**Date Sent:**

CERTIFICATE OF ANALYSIS

Work Order	: **VA20C2519**	Page	: 1 of 4
Client	: **Teck Coal Limited**	Laboratory	: Vancouver - Environmental
Contact	: Accounts Payable	Account Manager	: Can Dang
Address	: Bag 2000 Sparwood BC Canada V0B 2G0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250 425 2555	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 02-Dec-2020 09:20
PO	: ----	Date Analysis Commenced	: 14-Dec-2020
C-O-C number	: ----	Issue Date	: 24-Dec-2020 09:44
Sampler	: ----		
Site	: ----		
Quote number	: ----		
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
Dee Lee	Analyst	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

<: 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 in reports identified as “Preliminary Report” are considered authorized for use.

Analytical Results

Sub-Matrix: **Tissue**

(Matrix: **Biota**)

				Client sample ID	CM_MC2_INV-1_2020-09-18	RG_MIDAG-S1_INV-1_2020-09-18	RG_MIDAG-S2_INV-1_2020-09-17	----	----
				Client sampling date / time	19-Sep-2020	19-Sep-2020	18-Sep-2020	----	----
Analyte	CAS Number	Method	LOR	Unit	VA20C2519-001	VA20C2519-002	VA20C2519-003	--------	--------
					Result	Result	Result	----	----
Physical Tests									
moisture	----	E144A	2.0	%	2.2	2.7	4.3	----	----
Metals									
aluminum	7429-90-5	E475	5.0	mg/kg	628	540	489	----	----
antimony	7440-36-0	E475	0.020	mg/kg	0.033	0.030	0.030	----	----
arsenic	7440-38-2	E475	0.050	mg/kg	0.798	1.01	1.15	----	----
barium	7440-39-3	E475	0.050	mg/kg	30.7	8.20	12.0	----	----
beryllium	7440-41-7	E475	0.010	mg/kg	0.044	0.035	0.033	----	----
bismuth	7440-69-9	E475	0.010	mg/kg	<0.010	<0.010	<0.010	----	----
boron	7440-42-8	E475	1.0	mg/kg	2.6	1.6	1.6	----	----
cadmium	7440-43-9	E475	0.010	mg/kg	0.418	1.53	0.506	----	----
calcium	7440-70-2	E475	20	mg/kg	53100	2980	3760	----	----
cesium	7440-46-2	E475	0.0050	mg/kg	0.125	0.0874	0.0695	----	----
chromium	7440-47-3	E475	0.20	mg/kg	48.8	21.5	16.4	----	----
cobalt	7440-48-4	E475	0.020	mg/kg	50.8	31.3	18.6	----	----
copper	7440-50-8	E475	0.20	mg/kg	8.99	11.4	10.7	----	----
iron	7439-89-6	E475	5.0	mg/kg	928	801	630	----	----
lead	7439-92-1	E475	0.050	mg/kg	0.340	0.339	0.325	----	----
lithium	7439-93-2	E475	0.50	mg/kg	1.20	0.80	0.66	----	----
magnesium	7439-95-4	E475	2.0	mg/kg	1770	1390	1170	----	----
manganese	7439-96-5	E475	0.050	mg/kg	197	116	117	----	----
mercury	7439-97-6	E512	0.010	mg/kg	<0.010	0.022	0.012	----	----
molybdenum	7439-98-7	E475	0.040	mg/kg	0.310	0.346	0.361	----	----
nickel	7440-02-0	E475	0.20	mg/kg	56.4	22.4	18.9	----	----
phosphorus	7723-14-0	E475	20	mg/kg	7810	10900	10100	----	----
potassium	7440-09-7	E475	20	mg/kg	7220	8540	8900	----	----
rubidium	7440-17-7	E475	0.050	mg/kg	4.22	3.82	2.93	----	----
selenium	7782-49-2	E475	0.10	mg/kg	4.08	5.88	5.34	----	----
sodium	7440-23-5	E475	20	mg/kg	3460	5040	3260	----	----
strontium	7440-24-6	E475	0.10	mg/kg	65.8	7.01	8.07	----	----
tellurium	13494-80-9	E475	0.020	mg/kg	<0.020	<0.020	<0.020	----	----

Analytical Results

Sub-Matrix: **Tissue**

(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	CM_MC2_INV-1_2020-09-18	RG_MIDAG-S1_INV-1_2020-09-18	RG_MIDAG-S2_INV-1_2020-09-17	----	----
Client sampling date / time					19-Sep-2020	19-Sep-2020	18-Sep-2020	----	----
					VA20C2519-001	**VA20C2519-002**	**VA20C2519-003**	--------	--------
					Result	Result	Result	----	----
Metals									
thallium	7440-28-0	E475	0.0020	mg/kg	0.0582	0.0914	0.0536	----	----
tin	7440-31-5	E475	0.10	mg/kg	0.10	0.22	0.20	----	----
uranium	7440-61-1	E475	0.0020	mg/kg	0.286	0.0608	0.0613	----	----
vanadium	7440-62-2	E475	0.10	mg/kg	1.87	1.93	1.44	----	----
zinc	7440-66-6	E475	1.0	mg/kg	122	178	141	----	----
zirconium	7440-67-7	E475	0.20	mg/kg	0.39	0.26	0.27	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA20C2519**	Page	: 1 of 6
Client	: **Teck Coal Limited**	Laboratory	: Vancouver - Environmental
Contact	: Accounts Payable	Account Manager	: Can Dang
Address	: Bag 2000 Sparwood BC Canada V0B 2G0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250 425 2555	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 02-Dec-2020 09:20
PO	: ----	Issue Date	: 24-Dec-2020 09:44
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: ----		
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)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 15:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 15:00 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	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
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
Compliant container CM_MC2_INV-1_2020-09-18	E512	19-Sep-2020	20-Dec-2020	365 days	92 days	✓	23-Dec-2020	272 days	3 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
Compliant container RG_MIDAG-S1_INV-1_2020-09-18	E512	19-Sep-2020	20-Dec-2020	365 days	92 days	✓	23-Dec-2020	272 days	3 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
Compliant container RG_MIDAG-S2_INV-1_2020-09-17	E512	18-Sep-2020	20-Dec-2020	365 days	93 days	✓	23-Dec-2020	271 days	3 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
Compliant container CM_MC2_INV-1_2020-09-18	E475	19-Sep-2020	20-Dec-2020	730 days	92 days	✓	22-Dec-2020	637 days	1 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
Compliant container RG_MIDAG-S1_INV-1_2020-09-18	E475	19-Sep-2020	20-Dec-2020	730 days	92 days	✓	22-Dec-2020	637 days	1 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
Compliant container RG_MIDAG-S2_INV-1_2020-09-17	E475	18-Sep-2020	20-Dec-2020	730 days	93 days	✓	22-Dec-2020	636 days	1 days	✓
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
Compliant container CM_MC2_INV-1_2020-09-18	E144A	19-Sep-2020	----	----	----		14-Dec-2020	----	----	

Matrix: **Biota**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
Compliant container RG_MIDAG-S1_INV-1_2020-09-18	E144A	19-Sep-2020	----	----	----		14-Dec-2020	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
Compliant container RG_MIDAG-S2_INV-1_2020-09-17	E144A	18-Sep-2020	----	----	----		14-Dec-2020	----	----	

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 Control Samples (LCS)							
Mercury in Biota by CVAAS (DRY units, Biopsy)	E512	130543	2	13	15.3	10.0	✓
Metals by CRC ICPMS (DRY units, Biopsy)	E475	130544	2	13	15.3	10.0	✓
Moisture Content by Gravimetry (Biopsy)	E144A	130545	1	13	7.6	5.0	✓
Method Blanks (MB)							
Mercury in Biota by CVAAS (DRY units, Biopsy)	E512	130543	1	13	7.6	5.0	✓
Metals by CRC ICPMS (DRY units, Biopsy)	E475	130544	1	13	7.6	5.0	✓
Moisture Content by Gravimetry (Biopsy)	E144A	130545	1	13	7.6	5.0	✓

Methodology References and Summaries

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

Analytical Methods	*Method / Lab*	*Matrix*	*Method Reference*	*Method Descriptions*
Moisture Content by Gravimetry (Biopsy)	E144A Vancouver - Environmental	Biota	Puget Sound Water Quality Authority/CCME PHC in Soil - Tier 1	This analysis is carried out gravimetrically by drying the sample at <60 deg. C for a minimum of three days.
Metals by CRC ICPMS (DRY units, Biopsy)	E475 Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Samples are digested with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by Collision/Reaction Cell ICPMS: 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.
Mercury in Biota by CVAAS (DRY units, Biopsy)	E512 Vancouver - Environmental	Biota	EPA 200.3/1631E (mod)	Samples are digested with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by CVAAS.

Preparation Methods	*Method / Lab*	*Matrix*	*Method Reference*	*Method Descriptions*
Metals and Mercury Biota Digestion (Biopsy)	EP475 Vancouver - Environmental	Biota	EPA 200.3/200.8 (mod)	Samples are digested with nitric acid, hydrochloric acid, and hydrogen peroxide. 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.

QUALITY CONTROL REPORT

Work Order	: **VA20C2519**	Page	: 1 of 8
Client	: Teck Coal Limited	Laboratory	: Vancouver - Environmental
Contact	: Accounts Payable	Account Manager	: Can Dang
Address	: Bag 2000 Sparwood BC Canada V0B 2G0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250 425 2555	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 02-Dec-2020 09:20
PO	: ----	Date Analysis Commenced	: 14-Dec-2020
C-O-C number	: ----	Issue Date	: 24-Dec-2020 09:44
Sampler	: ----		
Site	: ----		
Quote number	: ----		
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
Dee Lee	Analyst	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.

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: 130545)						
moisture	----	E144A	2	%	<2.0	----
Metals (QCLot: 130543)						
mercury	7439-97-6	E512	0.01	mg/kg	<0.010	----
Metals (QCLot: 130544)						
aluminum	7429-90-5	E475	5	mg/kg	<5.0	----
antimony	7440-36-0	E475	0.02	mg/kg	<0.020	----
arsenic	7440-38-2	E475	0.05	mg/kg	<0.050	----
barium	7440-39-3	E475	0.05	mg/kg	<0.050	----
beryllium	7440-41-7	E475	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E475	0.01	mg/kg	<0.010	----
boron	7440-42-8	E475	1	mg/kg	<1.0	----
cadmium	7440-43-9	E475	0.01	mg/kg	<0.010	----
calcium	7440-70-2	E475	20	mg/kg	<20	----
cesium	7440-46-2	E475	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E475	0.2	mg/kg	<0.20	----
cobalt	7440-48-4	E475	0.02	mg/kg	<0.020	----
copper	7440-50-8	E475	0.2	mg/kg	<0.20	----
iron	7439-89-6	E475	5	mg/kg	<5.0	----
lead	7439-92-1	E475	0.05	mg/kg	<0.050	----
lithium	7439-93-2	E475	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E475	2	mg/kg	<2.0	----
manganese	7439-96-5	E475	0.05	mg/kg	<0.050	----
molybdenum	7439-98-7	E475	0.04	mg/kg	<0.040	----
nickel	7440-02-0	E475	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E475	20	mg/kg	<20	----
potassium	7440-09-7	E475	20	mg/kg	<20	----
rubidium	7440-17-7	E475	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E475	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E475	20	mg/kg	<20	----
strontium	7440-24-6	E475	0.1	mg/kg	<0.10	----
tellurium	13494-80-9	E475	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E475	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E475	0.1	mg/kg	<0.10	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 130544) - continued						
uranium	7440-61-1	E475	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E475	0.1	mg/kg	<0.10	----
zinc	7440-66-6	E475	1	mg/kg	<1.0	----
zirconium	7440-67-7	E475	0.2	mg/kg	<0.20	----

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**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 130545)									
moisture	----	E144A	2	%	100 %	100.0	90.0	110	----
Metals (QCLot: 130543)									
mercury	7439-97-6	E512	0.01	mg/kg	0.05 mg/kg	102	80.0	120	----
Metals (QCLot: 130544)									
aluminum	7429-90-5	E475	5	mg/kg	50 mg/kg	96.8	80.0	120	----
antimony	7440-36-0	E475	0.02	mg/kg	25 mg/kg	90.3	80.0	120	----
arsenic	7440-38-2	E475	0.05	mg/kg	25 mg/kg	91.6	80.0	120	----
barium	7440-39-3	E475	0.05	mg/kg	6.25 mg/kg	91.5	80.0	120	----
beryllium	7440-41-7	E475	0.01	mg/kg	2.5 mg/kg	95.0	80.0	120	----
bismuth	7440-69-9	E475	0.01	mg/kg	25 mg/kg	91.7	80.0	120	----
boron	7440-42-8	E475	1	mg/kg	25 mg/kg	90.4	80.0	120	----
cadmium	7440-43-9	E475	0.01	mg/kg	2.5 mg/kg	87.0	80.0	120	----
calcium	7440-70-2	E475	20	mg/kg	1250 mg/kg	93.2	80.0	120	----
cesium	7440-46-2	E475	0.005	mg/kg	1.25 mg/kg	95.9	80.0	120	----
chromium	7440-47-3	E475	0.2	mg/kg	6.25 mg/kg	96.4	80.0	120	----
cobalt	7440-48-4	E475	0.02	mg/kg	6.25 mg/kg	97.0	80.0	120	----
copper	7440-50-8	E475	0.2	mg/kg	6.25 mg/kg	90.6	80.0	120	----
iron	7439-89-6	E475	5	mg/kg	25 mg/kg	99.1	80.0	120	----
lead	7439-92-1	E475	0.05	mg/kg	12.5 mg/kg	90.7	80.0	120	----
lithium	7439-93-2	E475	0.5	mg/kg	6.25 mg/kg	102	80.0	120	----
magnesium	7439-95-4	E475	2	mg/kg	1250 mg/kg	94.4	80.0	120	----
manganese	7439-96-5	E475	0.05	mg/kg	6.25 mg/kg	98.1	80.0	120	----
molybdenum	7439-98-7	E475	0.04	mg/kg	6.25 mg/kg	96.7	80.0	120	----
nickel	7440-02-0	E475	0.2	mg/kg	12.5 mg/kg	93.0	80.0	120	----
phosphorus	7723-14-0	E475	20	mg/kg	250 mg/kg	98.0	80.0	120	----
potassium	7440-09-7	E475	20	mg/kg	1250 mg/kg	97.0	80.0	120	----
rubidium	7440-17-7	E475	0.05	mg/kg	2.5 mg/kg	98.6	80.0	120	----
selenium	7782-49-2	E475	0.1	mg/kg	25 mg/kg	90.5	80.0	120	----
sodium	7440-23-5	E475	20	mg/kg	1250 mg/kg	98.0	80.0	120	----
strontium	7440-24-6	E475	0.1	mg/kg	6.25 mg/kg	98.4	80.0	120	----
tellurium	13494-80-9	E475	0.02	mg/kg	2.5 mg/kg	89.4	80.0	120	----
thallium	7440-28-0	E475	0.002	mg/kg	25 mg/kg	90.9	80.0	120	----
tin	7440-31-5	E475	0.1	mg/kg	12.5 mg/kg	91.2	80.0	120	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Metals (QCLot: 130544) - continued									
uranium	7440-61-1	E475	0.002	mg/kg	0.125 mg/kg	97.5	80.0	120	----
vanadium	7440-62-2	E475	0.1	mg/kg	12.5 mg/kg	97.5	80.0	120	----
zinc	7440-66-6	E475	1	mg/kg	12.5 mg/kg	87.4	80.0	120	----
zirconium	7440-67-7	E475	0.2	mg/kg	2.5 mg/kg	97.3	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**

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	RM Target Concentration	Recovery (%) RM	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Metals (QCLot: 130543)									
QC-130543-003	RM	mercury	7439-97-6	E512	0.332 mg/kg	105	70.0	130	----
Metals (QCLot: 130544)									
QC-130544-003	RM	aluminum	7429-90-5	E475	1280 mg/kg	106	70.0	130	----
QC-130544-003	RM	arsenic	7440-38-2	E475	6.87 mg/kg	91.9	70.0	130	----
QC-130544-003	RM	barium	7440-39-3	E475	4.4 mg/kg	99.9	70.0	130	----
QC-130544-003	RM	boron	7440-42-8	E475	9.24 mg/kg	92.9	70.0	130	----
QC-130544-003	RM	cadmium	7440-43-9	E475	0.299 mg/kg	87.0	70.0	130	----
QC-130544-003	RM	calcium	7440-70-2	E475	2360 mg/kg	98.4	70.0	130	----
QC-130544-003	RM	cesium	7440-46-2	E475	0.078 mg/kg	90.0	70.0	130	----
QC-130544-003	RM	chromium	7440-47-3	E475	1.58 mg/kg	98.6	70.0	130	----
QC-130544-003	RM	cobalt	7440-48-4	E475	0.25 mg/kg	97.1	70.0	130	----
QC-130544-003	RM	copper	7440-50-8	E475	15.7 mg/kg	88.0	70.0	130	----
QC-130544-003	RM	iron	7439-89-6	E475	318 mg/kg	95.7	70.0	130	----
QC-130544-003	RM	lead	7439-92-1	E475	0.231 mg/kg	101	70.0	130	----
QC-130544-003	RM	lithium	7439-93-2	E475	1.21 mg/kg	96.4	50.0	150	----
QC-130544-003	RM	magnesium	7439-95-4	E475	910 mg/kg	96.1	70.0	130	----
QC-130544-003	RM	manganese	7439-96-5	E475	3.17 mg/kg	94.6	70.0	130	----
QC-130544-003	RM	molybdenum	7439-98-7	E475	0.29 mg/kg	92.4	70.0	130	----
QC-130544-003	RM	nickel	7440-02-0	E475	1.34 mg/kg	91.2	70.0	130	----
QC-130544-003	RM	phosphorus	7723-14-0	E475	8000 mg/kg	97.8	70.0	130	----
QC-130544-003	RM	potassium	7440-09-7	E475	12840 mg/kg	100.0	70.0	130	----
QC-130544-003	RM	rubidium	7440-17-7	E475	5.59 mg/kg	97.2	70.0	130	----
QC-130544-003	RM	selenium	7782-49-2	E475	3.45 mg/kg	99.0	70.0	130	----
QC-130544-003	RM	sodium	7440-23-5	E475	14000 mg/kg	100	70.0	130	----
QC-130544-003	RM	strontium	7440-24-6	E475	10.1 mg/kg	91.5	70.0	130	----
QC-130544-003	RM	thallium	7440-28-0	E475	0.0093 mg/kg	102	70.0	130	----
QC-130544-003	RM	uranium	7440-61-1	E475	0.0481 mg/kg	91.4	70.0	130	----
QC-130544-003	RM	vanadium	7440-62-2	E475	1.48 mg/kg	98.2	70.0	130	----
QC-130544-003	RM	zinc	7440-66-6	E475	46.2 mg/kg	99.4	70.0	130	----

TrichAnalytics Inc.
207-1753 Sean Heights, Saanichton, BC, V8M 0B3
Ph: (250) 532-1084

Chain of Custody

Teck Project: CMO Supplemental Sampling (20-83); TrichAnalytics Project: 2020-145

Project Contact		Sample Receipt Contact	
Company Name:	Teck Coal Limited	Company Name:	ALS Environmental
Contact Name:	Carlie Meyer	Contact Name:	Can Dang
Address:	421 Pine Ave	Address:	8081 Lougheed Hwy
City, Province:	Sparwood	City, Province:	Burnaby, BC
Postal Code:	VOB 2G0	Postal Code:	V5A 1W9
Phone:	250-425-8202	Phone:	604-253-4188
Email:	Carlie.Meyer@teck.com	Email:	can.dang@alsglobal.com

Sample Analysis Requested

TrichAnalytics Laboratory ID	Minnow Environmental Inc. Sample ID	Sample Type: Species	Sample type
030	CM_MC2_INV-1_2020-09-18	Benthic Invertebrate	Homongenized dry powder
033	RG_MIDAG-S1_INV-1_2020-09-18	Benthic Invertebrate	Homongenized dry powder
036	RG_MIDAG-S2_INV-1_2020-09-17	Benthic Invertebrate	Homongenized dry powder

Environmental Division
Vancouver
Work Order Reference
VA20C2519

Telephone : +1 604 253 4188

Sample(s) Released By: Dwayne Smith		**Sample(s) Received By:**	RK, 19.4°C
Signature:		**Signature:**	
Date Sent:	27-Nov-20	**Date Received:**	2/12/20, 9:20am
Sample(s) Returned to Client By:		**Shipping Conditions:**	
		Shipping Container:	
Signature:		**Date Sent:**	

APPENDIX C

Quality Assurance and Quality Control

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TABLES

C QUALITY ASSURANCE AND QUALITY CONTROL

C.1 Quality Assurance

Quality assurance practices were implemented to assure the quality and integrity of the data produced by both the CMO LAEMP and the RAEMP (Minnow 2018). Detailed quality assurances procedures are presented in the RAEMP study design (Minnow 2018). Study personnel were appropriately educated, trained, and experienced for their respective technical responsibilities, whether in the field, laboratory, or office. To minimize errors and to maintain comparability of data over time, standard operating procedures (SOPs) were developed and followed for sample collection methods, calibration, and maintenance of field instruments, and proper sample handling and laboratory sample submission procedures; each SOP described, in detail, the routine procedures to be followed (Minnow 2018).

C.2 Quality Control

Quality control samples were collected for the water quality, sediment quality and tissue chemistry components of the CMO LAEMP. Quality control procedures and results are discussed for each component in Sections C.2.1 to C.2.4. The data quality objectives for the water quality, sediment quality, and tissue chemistry data are presented in Table C-1.

C.2.1 Water Quality

Laboratory Reporting Limits

The analytical reports from ALS Environmental (ALS) (Appendix D) were examined to provide an inventory of analytes for which the sample results were less than the laboratory reporting limit (LRL). The LRLs for water quality analytes were assessed relative to working (BC ENV 2021) and approved (BC ENV 2019) British Columbia Water Quality Guidelines (BC WQG) for the protection of freshwater aquatic life, EVWQP Level 1 Benchmarks for water quality (Teck 2014), and relevant site-specific benchmarks.

Constituents with reported concentrations consistently less than the LRL in one or more samples in 2020 were: total acidity, bromide, total and dissolved beryllium, total and dissolved bismuth, total copper, dissolved iron, total and dissolved lead, total and dissolved mercury, silver, tin, titanium, and dissolved vanadium (Appendix D). Hydroxide, dissolved aluminum, and total zinc in 2020 were also consistently below the LRL (i.e., in all but one sample). Bicarbonate, nitrate, total aluminum, and total manganese concentrations were detectable in all but one sample in 2020. The LRLs achieved for water samples were lower than the BC WQG and the lowest level 1 benchmark for all analytes. In summary, the achieved LRLs were appropriate for this study.

Table C-1: Data Quality Objectives for the Water Quality, Sediment Quality and Tissue Chemistry Components of the CMO LAEMP, 2020

Quality Control Measure	Sample Type	Component		
		Water Quality	Sediment Quality	Tissue Chemistry
		ALS	ALS	Trich
Analytical laboratory LRLs	Comparison of actual LRL to target LRL	LRL for each parameter should be at least as low as the applicable guidelines, benchmarks, and screening values	LRL for each parameter should be at least as low as the applicable guidelines and benchmarks	
Blank analysis	Field or laboratory blanks	Concentrations measured in blank samples should be <LRL	-	-
Laboratory precision	Laboratory duplicates	RPDs ≤ 20%, when at least one result is greater than five times the LRL		RPDs ≤ 40% for all elements except calcium and strontium for which the DQO is RPD ≤ 60%, when at least one result is greater than five times the LRL
Accuracy	Recovery of Laboratory Control Samples	The result should lie within ± 1 of the LOR for the target concentration		-
	Recovery of Method Blank	Concentrations measured in method blank samples should be <LOR		-
	Recovery Matrix Spike	Calculated recovery results of matrix spikes should lie within accuracy DQO percentages for the given sample		-
	Recovery of certified reference material	Calculated recovery results of CRMs should lie within accuracy DQO specified limits for the given test		DQO of 60 to 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba; 90 to 110% of the certified values for Se, and 70 to 130% of the certified values for all other elements including Ni

ALS = ALS Laboratories; Trich = TrichAnalytics Inc.; LRL = laboratory reporting limit; <= less than; LOR = limit of reporting; ≤ = less than or equal to; DQO = data quality objective; CRM = certified reference materials; B = boron; Ti = titanium; Ag = silver; Sn = tin; Sb = antimony; Ba = barium; Se = selenium; Ni = nickel.

Laboratory and Field Blanks

A total of 156 method blank samples were analyzed by ALS (see Appendix D for applicable laboratory reports). Of the reported method blank results, five had reportable concentrations greater than the LRL, but all detectable concentrations were less than five times the LRL:

- dissolved calcium in one sample
- total manganese in two samples
- total silver in two samples

Overall, the number of detectable concentrations was low and within five times the LRL; therefore, the results are expected to have a negligible impact on overall data quality.

A total of two trip blank and two field blank samples were used to assess field sampling contamination (Appendix D). The same DQOs that were used for laboratory blanks were used for trip and field blanks (Table C-1).

All results in the trip blank samples were below the LRL. For the field blanks, six analytes were greater than the LRL in one sample:

- total barium
- total copper
- total manganese
- total and dissolved molybdenum
- total sodium

Of the reported concentrations that were greater than the LRL, total and dissolved molybdenum in the field blanks under report number L2505602 had concentrations greater than five-times the LRL. The number of detectable concentrations was relatively low among lab, trip, and field blank samples. Detectable concentrations in the blank samples were not reported for selenium, sulphate, or cadmium, which have long-term water quality targets as part of the EVWQP (Teck 2014). Overall, these results are expected to have a negligible impact on data quality for this study.

Data Precision

A total of 27 laboratory duplicate samples were used to evaluate analytical precision in 2020 (Appendix D). For all paired samples, comparisons were within the DQO set by the analytical laboratory (Table C-1). The laboratory analytical precision can, therefore, be considered excellent.

Two field duplicate samples were collected to assess field sampling precision (Table C-2). Field precision and reproducibility were considered good for all parameters except for turbidity and total ammonia in the duplicate samples collected at CM_MC2 and MI25, respectively, where the RPDs between the concentration in the parent and duplicate samples exceeded 20%. Overall, the field sampling precision was considered acceptable for the purposes of this study.

Table C-2: Water Quality Field Duplicate Results for the CMO LAEMP, 2020

Location		MDL	Reference Station				Mine-Influenced Station			
Watercourse			Michel Creek				Michel Creek			
Station			MI25				CM_CM2			
Date			11-Sep-20				17-Sep-20			
Sample ID			RG_MI25_WS_2020-09-11_0917	RG_RIVER1_WS_LAEMP_CMO_202009_NP	Mean	RPD (%)	CM_MC2_WS_2020-09-17_1351	RG_RIVER_WS_LAEMP_CMO_2020-09_NP	Mean	RPD (%)
Parameter	Unit									
Conventional Parameters										
pH	-	0.1	8.2	8.2	8.2	0	8.3	8.3	8.3	0
Specific conductivity	μS/cm	2.0	278	281	280	1.1	1130	1130	1130	0
Hardness, as $CaCO_3$	mg/L	0.5	152	155	154	2.0	621	657	639	5.6
Total alkalinity, as $CaCO_3$	mg/L	1.0	149	151	150	1.3	232	227	230	2.2
Total dissolved solids	mg/L	10.0	162	171	167	5.4	844	844	844	0
Total suspended solids	mg/L	1.0	<1	<1	1.0	NA	1.2	<1	1.1	NA
Total organic carbon	mg/L	0.5	<0.5	<0.5	0.5	NA	1.0	1.1	1.0	NA
Dissolved organic carbon	mg/L	0.5	<0.5	<0.5	0.5	NA	0.89	0.92	0.91	NA
Turbidity	NTU	0.1	0.14	0.25	0.2	NA	0.55	0.38	0.47	37
Total acidity	mg/L	1.0	<1	<1	1.0	NA	<1	<1	1.0	NA
Major Ions										
Bicarbonate, as $CaCO_3$	mg/L	1.0	149	151	150	1.3	230	227	229	1.3
Bromide	mg/L	0.1	<0.05	<0.05	0.05	NA	<0.05	<0.05	0.05	NA
Calcium	mg/L	50.0	43	44	44	NA	139	154	147	NA
Carbonate, as $CaCO_3$	mg/L	1.0	<1	<1	1.0	NA	2.4	<1	1.7	NA
Chloride	mg/L	0.1	0.35	0.35	0.35	NA	1.9	1.9	1.9	0
Fluoride	mg/L	0.0	0.073	0.072	0.073	NA	0.13	0.13	0.13	3.1
Hydroxide, as $CaCO_3$	mg/L	1.0	<1	<1	1.0	NA	<1	<1	1.0	NA
Magnesium	mg/L	5.0	11	11	11	NA	66	66	66	0.76
Potassium	mg/L	50.0	0.51	0.51	0.51	NA	2.3	2.5	2.4	NA
Sodium	mg/L	50.0	2.9	3.0	3.0	NA	36	38	37	NA
Sulphate	mg/L	0.3	15	15	15	0	453	453	453	0
Ion balance	%	-100	96	97	97	0.72	98	104	101	5.9
Cation - anion balance	%	-	<1.9	<1.5	1.7	-	<1	2.2	1.6	-
Anion sum	meq/L	-	3.3	3.3	3.3	-	14	14	14	-
Cation sum	meq/L	-	3.2	3.2	3.2	-	14	15	14	-
Oxidation-reduction potential	mV	-1000	414	426	420	2.9	473	424	449	11
Nutrients										
Nitrate	mg-N/L	0.0	0.021	0.02	0.021	NA	2.8	2.8	2.8	0.35
Nitrite	mg-N/L	0.0	<0.001	<0.001	0.001	NA	0.0095	0.01	0.0098	6.1
Total ammonia	mg-N/L	0.0	0.035	<0.005	0.02	**150**	0.012	<0.005	0.0085	NA
Total Kjeldahl Nitrogen	mg-N/L	0.1	<0.05	<0.05	0.05	NA	0.21	<0.05	0.13	NA
Total phosphorus	mg-P/L	0.0	0.0057	0.0055	0.0056	NA	<0.002	<0.002	0.002	NA
Orthophosphate	mg-P/L	0.0	0.0046	0.0044	0.0045	NA	0.0011	0.0024	0.0018	NA

Table C-2: Water Quality Field Duplicate Results for the CMO LAEMP, 2020

Location		MDL	Reference Station				Mine-Influenced Station			
Watercourse			Michel Creek				Michel Creek			
Station			MI25				CM_CM2			
Date			11-Sep-20				17-Sep-20			
Sample ID			RG_MI25_WS_2020-09-11_0917	RG_RIVER1_WS_LAEMP_CMO_202009_NP	Mean	RPD (%)	CM_MC2_WS_2020-09-17_1351	RG_RIVER_WS_LAEMP_CMO_2020-09_NP	Mean	RPD (%)
Parameter	Unit									
Total Metals										
Aluminum	µg/L	3.0	4.9	6.3	5.6	NA	3.9	<3	3.5	NA
Antimony	µg/L	0.1	<0.1	<0.1	0.1	NA	0.29	0.29	0.29	NA
Arsenic	µg/L	0.1	0.2	0.21	0.21	NA	0.22	0.2	0.21	NA
Barium	µg/L	0.1	57	56	56	0.53	67	67	67	0.45
Beryllium	µg/L	0.0	<0.02	<0.02	0.02	NA	<0.02	<0.02	0.02	NA
Bismuth	µg/L	0.1	<0.05	<0.05	0.05	NA	<0.05	<0.05	0.05	NA
Boron	µg/L	10.0	16	16	16	NA	66	66	66	0
Cadmium	µg/L	5.0	0.011	0.01	0.011	NA	0.02	0.015	0.017	NA
Calcium	µg/L	50.0	44000	42800	43400	2.8	139000	140000	139500	0.72
Chromium	µg/L	0.1	0.19	0.18	0.19	NA	0.13	0.13	0.13	NA
Cobalt	µg/L	0.1	<0.1	<0.1	0.1	NA	1.7	1.6	1.6	2.4
Copper	µg/L	0.5	<0.5	<0.5	0.5	NA	<0.5	<0.5	0.5	NA
Iron	µg/L	10.0	<10	<10	10	NA	16	16	16	NA
Lead	µg/L	0.1	<0.05	<0.05	0.05	NA	<0.05	<0.05	0.05	NA
Lithium	µg/L	1.0	5.1	5.1	5.1	0	42	42	42	1.4
Magnesium	µg/L	100.0	11700	12000	11850	2.5	62400	62300	62350	0.16
Manganese	µg/L	0.1	0.25	0.28	0.27	NA	3.9	3.8	3.8	2.1
Mercury	µg/L	0.0	<0.0005	<0.0005	0.0005	NA	<0.0005	<0.0005	0.0005	NA
Molybdenum	µg/L	0.1	0.91	0.91	0.91	0.11	1.4	1.3	1.3	8.3
Nickel	µg/L	0.5	<0.5	<0.5	0.5	NA	31	30	31	2.6
Potassium	µg/L	50.0	506	516	511	2.0	2440	2360	2400	3.3
Selenium	µg/L	0.1	0.22	0.23	0.22	NA	11	11	11	2.8
Silicon	µg/L	100.0	2270	2300	2285	1.3	1880	1930	1905	2.6
Silver	µg/L	0.0	<0.01	<0.01	0.01	NA	<0.02	<0.02	0.02	NA
Sodium	µg/L	50.0	3190	3110	3150	2.5	38400	35900	37150	6.7
Strontium	µg/L	0.2	175	174	175	0.57	601	572	587	4.9
Thallium	µg/L	0.0	<0.01	<0.01	0.01	NA	0.029	0.027	0.028	NA
Tin	µg/L	0.1	<0.1	<0.1	0.1	NA	<0.1	<0.1	0.1	NA
Titanium	µg/L	10.0	<10	<10	10	NA	<10	<10	10	NA
Uranium	µg/L	0.0	0.24	0.25	0.24	1.2	4.0	3.9	3.9	4.6
Vanadium	µg/L	0.5	<0.5	<0.5	0.5	NA	<0.5	<0.5	0.5	NA
Zinc	µg/L	3.0	<3	<3	3.0	NA	<3	<3	3.0	NA

Table C-2: Water Quality Field Duplicate Results for the CMO LAEMP, 2020

Location		MDL	Reference Station				Mine-Influenced Station			
Watercourse			Michel Creek				Michel Creek			
Station			MI25				CM_CM2			
Date			11-Sep-20				17-Sep-20			
Sample ID			RG_MI25_WS_2020-09-11_0917	RG_RIVER1_WS_LAEMP_CMO_202009_NP	Mean	RPD (%)	CM_MC2_WS_2020-09-17_1351	RG_RIVER_WS_LAEMP_CMO_2020-09_NP	Mean	RPD (%)
Parameter	Unit									
Dissolved Metals										
Aluminum	µg/L	3.0	<3	<3	3.0	NA	<3	<3	3.0	NA
Antimony	µg/L	0.1	<0.1	<0.1	0.1	NA	0.29	0.27	0.28	NA
Arsenic	µg/L	0.1	0.19	0.17	0.18	NA	0.16	0.14	0.15	NA
Barium	µg/L	0.1	55	55	55	0.36	64	75	70	17
Beryllium	µg/L	0.0	<0.02	<0.02	0.02	NA	<0.02	<0.02	0.02	NA
Bismuth	µg/L	0.1	<0.05	<0.05	0.05	NA	<0.05	<0.05	0.05	NA
Boron	µg/L	10.0	15	16	16	NA	65	64	65	1.6
Cadmium	µg/L	5.0	0.0088	0.01	0.0094	NA	0.014	0.015	0.015	NA
Chromium	µg/L	0.1	0.19	0.18	0.19	NA	0.14	0.11	0.13	NA
Cobalt	µg/L	0.1	<0.1	<0.1	0.1	NA	1.5	1.5	1.5	4.7
Copper	µg/L	0.2	<0.2	<0.2	0.2	NA	<0.2	0.23	0.22	NA
Iron	µg/L	10.0	<10	<10	10	NA	<10	<10	10	NA
Lead	µg/L	0.1	<0.05	<0.05	0.05	NA	<0.05	<0.05	0.05	NA
Lithium	µg/L	1.0	5.3	5.2	5.3	1.9	40	40	40	0.76
Manganese	µg/L	0.1	<0.1	0.12	0.11	NA	2.6	2.8	2.7	7.4
Mercury	µg/L	0.0	<0.005	<0.005	0.005	NA	<0.005	<0.005	0.005	NA
Molybdenum	µg/L	0.1	0.86	0.94	0.9	9.0	1.3	1.3	1.3	0.75
Nickel	µg/L	0.5	<0.5	<0.5	0.5	NA	28	30	29	8.2
Selenium	µg/L	0.1	0.18	0.23	0.21	NA	10	10.0	10	1.3
Silicon	µg/L	50.0	2260	2280	2270	0.88	1820	1850	1835	1.6
Silver	µg/L	0.0	<0.01	<0.01	0.01	NA	<0.01	<0.01	0.01	NA
Strontium	µg/L	0.2	157	159	158	1.3	620	614	617	0.97
Thallium	µg/L	0.0	<0.01	<0.01	0.01	NA	0.027	0.027	0.027	NA
Tin	µg/L	0.1	<0.1	<0.1	0.1	NA	<0.1	<0.1	0.1	NA
Titanium	µg/L	10.0	<10	<10	10	NA	<10	<10	10	NA
Uranium	µg/L	0.0	0.23	0.25	0.24	7.6	3.8	3.9	3.8	3.4
Vanadium	µg/L	0.5	<0.5	<0.5	0.5	NA	<0.5	<0.5	0.5	NA
Zinc	µg/L	1.0	<1	<1	1.0	NA	<1	1.0	1.0	NA

Notes: grey cells represent values with RPDs greater than 20%. Grey cells with bolded values represent values with RPDs greater than 50%.

- = no guideline or no data; °C = degrees Celsius; µs/cm = microsiemens per centimetre; µg/L = micrograms per litre; $CaCO_3$ = calcium carbonate; mg/L = milligrams per litre; mV = millivolts; NTU = Nephelometric Turbidity Units; <= less than; NA = not applicable; MDL = method detection limit; RPD = relative percent difference.

Data Accuracy

Data accuracy was evaluated based on results for Certified Reference Materials (CRM), Laboratory Control Samples (LCS), Internal Reference Material (IRM), and Matrix Spike (MS) samples; 11 CRM samples, 160 LCS samples, 27 IRM samples, and 8 MS samples were analyzed (Appendix D). All CRM, IRM, and MS results met the laboratory DQO. Fours results for total bismuth and total uranium in L2505602 and L2505605, did not meet the DQO in an LCS; the laboratory DQO was exceeded by less than 10%. The overall accuracy achieved by the laboratory was considered good.

Data Quality Statement

Water chemistry data collected for the CMO LAEMP in 2020 were of acceptable quality as characterized by good detectability, concentrations below LRLs in almost all laboratory blank samples, good laboratory precision and accuracy, and good field sampling precision. Therefore, the associated data are considered acceptable for this study.

C.2.2 Sediment Quality

Laboratory Reporting Limits

The analytical reports from ALS for sediment samples collected in 2020 were examined to provide an inventory of analytes for which sample results were less than the LRL (Appendix D). The LRLs for these analytes were assessed relative to existing British Columbia Working Sediment Quality Guidelines (BC WSQG; BCMOECCS 2020) and the alert concentration for selenium (BCMOECCS 2019).

Nine of the 36 metals and most of the polycyclic aromatic hydrocarbons (PAHs) measured in sediment samples from 2020 had at least one reported value below the LRL. Tin, tungsten, benzo(k)fluoranthene, and quinoline were consistently less than the LRL in 2020 (i.e., no detectable concentrations). Additionally, bismuth and zirconium were generally less than the LRL in 2020 (i.e., concentrations less than the LRL in 90% or more of the samples). All samples had detectable concentrations of selenium and nickel in 2020.

The LRLs for metal concentrations measured in sediment samples from 2020 were consistently less than applicable BC WSQG, as well as the alert concentration for selenium. The LRLs for acenaphthene, acenaphthylene, benz(a)anthracene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, fluorene, naphthalene, and phenanthrene exceeded the lower WSQG for one or more samples collected in 2020 (BCMOECCS 2020). The LRLs for acenaphthene, acenaphthylene, and dibenz(a,h)anthracene were above the ISQG in more than 50% of the samples. None of the analytes had LRLs greater than the upper WSQG in 2020 (BCMOECCS 2020). Overall, the LRLs for most analytes were considered appropriate for this study, with the exception of the three PAHs: acenaphthene, acenaphthylene and dibenz(a,h)anthracene.

Laboratory Blanks

A total of 27 laboratory method blank samples were analyzed by ALS (Appendix D). All reported method blank results were within the laboratory DQO (Table C-1). Thus, the method blank results for this study indicated no inadvertent contamination of sediment samples within the laboratory during analysis.

Data Precision

A total of 8 laboratory duplicate samples were used to evaluate laboratory precision (Appendix D). The RPDs between all laboratory duplicate measurements were within the laboratory DQO (Table C-1), indicating that laboratory analytical precision was excellent.

A total of six field duplicate samples were collected to assess the precision of field sampling (Table C-3). Samples were collected as split samples (i.e., a larger sample was homogenized and split into two duplicate sub-samples). Mean RPDs for paired concentrations of analytes was ≤ 30%, except for antimony, where there was an RPD of 135% for the paired samples from RG_MI25 resulting in a mean RPD of 74%. Of the paired comparisons, 22 had an RPD greater than 20%, representing 5% of the overall dataset. Overall, field precision and reproducibility were considered good in sediment samples because some variability is expected, based on the heterogeneous nature of sediments.

Data Accuracy

Data accuracy was evaluated based on the analysis of CRM, IRM, and LCS samples. Specifically 5 CRM, 27 IRM, and 31 LCS were analyzed (see the laboratory reports in Appendix D). All CRM, IRM, and LCS results met the laboratory DQO (Table C-1). Therefore, the accuracy achieved by the laboratory was considered excellent.

Data Quality Statement

Sediment chemistry data collected for the CMO LAEMP in 2020 were of acceptable quality as characterized by good detectability (with the exception of acenaphthene, acenaphthylene, and dibenz(a,h)anthracene), no analyte concentrations in method blanks, good laboratory precision and accuracy, and good field sampling precision. Overall, the associated data were considered acceptable for this study.

C.2.3 Benthic Invertebrate Tissue

Laboratory Reporting Limits

The analytical reports (Appendix D) were examined to provide an inventory of analytes for which the sample results were less than the LRL; arsenic, tin, and mercury had tissue concentrations below the LRL in 3 to 18% of the samples. Selenium concentrations were greater than the LRL in benthic invertebrate tissue (BIT) chemistry samples for all samples and selenium LRLs were above the BCMOECCS (2019) interim selenium guideline for BIT of 4 µg/g dw. Therefore, the achieved LRLs were considered appropriate for the study.

Data Precision

Laboratory precision was evaluated based on duplicate analysis of four BIT samples (Appendix D). The laboratory DQO (Table C-1) was met for all parameters. Furthermore, the RPD of five samples using certified values met the laboratory DQO for all analytes except tin (1 sample) and antimony (three samples); although the DQO was exceeded, the result was accepted by the laboratory as it did not impact the reportable results. Laboratory precision and reproducibility were considered acceptable for the study.

Data Accuracy

Data accuracy was evaluated based on results within the analytical reports from TrichAnalytics Inc. (Trich) associated with certified values; the DQO for all analytes in the five samples was met. The accuracy achieved by the laboratory in this study was considered acceptable.

Data Quality Statement

Benthic invertebrate tissue data collected for the CMO LAEMP were of acceptable quality as characterized by good detectability, appropriate LRLs, and good laboratory precision and accuracy. Therefore, the associated data were considered acceptable for this study.

Table C-3: Sediment Quality Field Duplicate Results for the CMO LAEMP, 2020

Location		MDL	Reference Station				Mine-influenced Stations																			
Watercourse			Michel Creek				Michel Creek				Corbin Creek				Michel Creek											
Station			MI25				MIUCO				CORCK				MIDCO				MIDCO				MIULE			
Date			11-Sep-20				12-Sep-20				13-Sep-20				15-Sep-20				15-Sep-20				16-Sep-20			
Sample ID			RG_MI25_SE-1_2020-09-11_1016	RG_RIVER_SE-1_2020-09-11_1016	Mean	RPD (%)	RG_MIUCO_SE-2_2020-09-12_1137	RG_RIVER_SE-2_2020-09-12_1137	Mean	RPD (%)	RG_CORCK_SE-5_2020-09-13_0946	RG_RIVER_SE-5_2020-09-13_0946	Mean	RPD (%)	RG_MIDCO_SE-2_2020-09-15_0805	RG_RIVER_SE-2_2020-09-15_0805	Mean	RPD (%)	RG_MIDCO_SE-5_2020-09-15_1118	RG_RIVER_SE-5_2020-09-15_1118	Mean	RPD (%)	RG_MIULE_SE-2_2020-09-16_1205	RG_RIVER_SE-2_2020-09-16_1208	Mean	RPD (%)
Parameter	Unit																									
Physical Tests																										
Moisture Content	%	0.25	56	58	57	3.2	70	71	70	1.1	62	65	63	4.7	80	79	79	0.88	58	53	56	9.7	42	40	41	5.6
pH (1:2 soil to water)	pH	0.1	8.0	7.9	8.0	1.1	7.9	7.9	7.9	0.13	8.2	8.1	8.2	0.25	8.0	8.2	8.1	2.1	8.1	8.1	8.1	0.25	8.1	8.1	8.1	0.37
pH (1:9 soil to water)	pH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Texture	-	-	Silt loam	Silt loam	-	-	Silt loam	Silt loam	-	-	Sandy loam	Sandy loam	-	-	Silt loam	Silt loam	-	-	Sandy loam	Sandy loam	-	-	Silt loam	Silt loam	-	-
Particle Size Distribution																										
% Gravel (>2 mm)	%	1.0	<1.0	<1.0	1.0	NA	<1.0	<1.0	1.0	NA	<1.0	1.2	1.1	NA	<1.0	<1.0	1.0	NA	<1.0	<1.0	1.0	NA	<1.0	<1.0	1.0	NA
% Sand (2.00 mm to 1.00 mm)	%	1.0	<1.0	<1.0	1.0	NA	2.8	1.3	2.1	NA	<1.0	3.1	2.1	NA	1.7	3.0	2.4	NA	2.6	3.1	2.9	NA	<1.0	<1.0	1.0	NA
% Sand (1.00 mm to 0.50 mm)	%	1.0	1.5	1.4	1.5	NA	4.9	5.0	5.0	NA	5.2	5.7	5.5	9.2	6.5	6.8	6.7	4.5	8.0	7.1	7.6	12	1.8	<1.0	1.4	NA
% Sand (0.50 mm to 0.25 mm)	%	1.0	3.2	4.4	3.8	NA	6.0	7.5	6.8	22	12	15	13	23	4.4	t	4.4	NA	11	11	11	1.8	2.9	<1.0	2.0	NA
% Sand (0.25 mm to 0.125 mm)	%	1.0	14	11	13	23	6.4	8.1	7.3	23	19	17	18	12	5.9	5.7	5.8	3.4	10	11	10	0.96	11	12	11	11
% Sand (0.125 mm to 0.063 mm)	%	1.0	18	19	19	4.9	13	15	14	14	15	13	14	15	9.5	9.1	9.3	4.3	16	15	16	8.3	20	23	21	12
% Silt (0.063 mm to 0.0312 mm)	%	1.0	27	27	27	0.74	29	26	28	8.7	17	17	17	2.4	29	30	30	2.7	22	23	23	4.8	28	26	27	6.3
% Silt (0.0312 mm to 0.004 mm)	%	1.0	29	30	29	1.7	33	31	32	5.9	25	23	24	7.6	36	36	36	2.5	24	26	25	5.6	30	31	31	2.9
% Clay (<4 µm)	%	1.0	6.9	6.9	6.9	0	5.2	5.8	5.5	11	6.2	5.2	5.7	18	6.3	5.4	5.9	15	5.1	4.4	4.8	15	5.4	7.4	6.4	31
Organic Carbon																										
Total Organic Carbon	%	0.05	3.4	3.5	3.5	1.7	5.2	5.6	5.4	7.0	8.9	8.6	8.8	NA	4.7	4.8	4.8	NA	3.5	3.7	3.6	5.6	3.4	3.3	3.4	2.4

Table C-3: Sediment Quality Field Duplicate Results for the CMO LAEMP, 2020

Location		MDL	Reference Station				Mine-influenced Stations																				
Watercourse			Michel Creek				Michel Creek				Corbin Creek				Michel Creek											
Station			MI25				MIUCO				CORCK				MIDCO				MIDCO				MIULE			
Date			11-Sep-20				12-Sep-20				13-Sep-20				15-Sep-20				15-Sep-20				16-Sep-20			
Sample ID			RG_MI25_SE-1_2020-09-11_1016	RG_RIVER_SE-1_2020-09-11_1016	Mean	RPD (%)	RG_MIUCO_SE-2_2020-09-12_1137	RG_RIVER_SE-2_2020-09-12_1137	Mean	RPD (%)	RG_CORCK_SE-5_2020-09-13_0946	RG_RIVER_SE-5_2020-09-13_0946	Mean	RPD (%)	RG_MIDCO_SE-2_2020-09-15_0805	RG_RIVER_SE-2_2020-09-15_0805	Mean	RPD (%)	RG_MIDCO_SE-5_2020-09-15_1118	RG_RIVER_SE-5_2020-09-15_1118	Mean	RPD (%)	RG_MIULE_SE-2_2020-09-16_1205	RG_RIVER_SE-2_2020-09-16_1208	Mean	RPD (%)
Parameter	Unit																										
Total Metals (<2mm fractions)																											
Aluminum	mg/kg	50	16000	17100	16550	6.6	14100	14200	14150	0.71	3900	3630	3765	7.2	9710	11600	10655	18	15100	14400	14750	4.7	10500	10000	10250	4.9
Antimony	mg/kg	0.1	0.57	3.0	1.8	**135**	0.15	0.39	0.27	NA	0.22	0.32	0.27	NA	0.31	0.24	0.28	NA	0.37	0.39	0.38	NA	0.67	0.59	0.63	13
Arsenic	mg/kg	0.1	10	11	11	8.5	6.4	7.1	6.7	9.2	3.2	3.1	3.1	5.4	5.0	6.0	5.5	18	7.5	7.3	7.4	3.1	8.5	7.6	8.1	11
Barium	mg/kg	0.5	164	192	178	16	229	229	229	0	167	168	168	0.6	147	163	155	10	141	145	143	2.8	249	224	237	11
Beryllium	mg/kg	0.1	0.88	0.92	0.9	4.4	0.85	0.84	0.85	1.2	0.44	0.41	0.43	NA	0.6	0.72	0.66	18	0.8	0.84	0.82	4.9	0.76	0.69	0.73	9.7
Bismuth	mg/kg	0.2	0.24	0.25	0.25	NA	<0.20	<0.20	0.2	NA	<0.20	<0.20	0.2	NA	<0.20	<0.20	0.2	NA	<0.20	<0.20	0.2	NA	<0.20	<0.20	0.2	NA
Boron	mg/kg	5.0	15	17	16	NA	15	15	15	NA	9.2	9.3	9.3	NA	15	17	16	NA	17	17	17	NA	11	12	11	NA
Cadmium	mg/kg	0.02	1.3	1.4	1.4	5.9	0.88	0.87	0.87	1.3	9.1	9.1	9.1	0.55	2.0	2.1	2.0	5.9	1.7	1.7	1.7	0	1.3	1.2	1.3	7.1
Calcium	mg/kg	50	17100	16600	16850	3.0	32600	32400	32500	0.62	216000	218000	217000	0.92	96800	96400	96600	0.41	38400	40400	39400	5.1	44200	42500	43350	3.9
Chromium	mg/kg	0.5	20	22	21	6.2	18	18	18	2.2	5.9	5.7	5.8	3.4	13	16	14	17	19	18	19	7.0	17	15	16	8.1
Cobalt	mg/kg	0.1	8.2	8.6	8.4	5.3	6.6	7.0	6.8	5.9	191	190	191	0.52	73	80	77	9.2	40	39	40	2.8	14	12	13	11
Copper	mg/kg	0.5	28	29	28	6.7	18	19	19	4.8	8.5	7.5	8.0	13	13	14	13	7.7	18	18	18	3.9	16	14	15	11
Iron	mg/kg	50	20900	21800	21350	4.2	18800	20200	19500	7.2	4790	4710	4750	1.7	13800	14700	14250	6.3	19600	20900	20250	6.4	18000	16100	17050	11
Lead	mg/kg	0.5	16	23	20	34	11	11	11	5.5	4.0	4.0	4.0	0.25	7.8	8.2	8.0	4.6	11	11	11	5.6	10	9.1	9.7	12
Lithium	mg/kg	2.0	21	24	23	11	19	19	19	1.6	4.2	4.0	4.1	NA	14	15	15	8.9	19	20	19	5.2	15	13	14	10
Magnesium	mg/kg	20	6850	6910	6880	0.87	8050	7630	7840	5.4	6170	6230	6200	0.97	6830	7530	7180	9.7	7690	7950	7820	3.3	11000	10200	10600	7.5
Manganese	mg/kg	1.0	551	592	572	7.2	264	261	263	1.1	1360	1420	1390	4.3	664	775	720	15	685	666	676	2.8	306	264	285	15
Mercury	mg/kg	0.005	0.049	0.061	0.055	22	0.034	0.048	0.041	33	0.025	0.055	0.04	**75**	0.029	0.025	0.027	13	0.025	0.027	0.026	6.5	0.041	0.043	0.042	5.7
Molybdenum	mg/kg	0.1	5.8	6.1	5.9	5.4	1.9	2.1	2.0	14	0.71	0.7	0.71	1.4	1.7	1.5	1.6	13	2.1	2.2	2.1	2.8	1.8	1.6	1.7	12
Nickel	mg/kg	0.5	31	34	33	7.1	22	23	22	4.0	201	201	201	0	128	140	134	9.0	92	89	90	3.9	41	36	39	11
Phosphorous	mg/kg	50	1130	1260	1195	11	1170	1110	1140	5.3	330	306	318	7.5	965	958	962	0.73	1150	1250	1200	8.3	1210	1070	1140	12
Potassium	mg/kg	100	3140	3360	3250	6.8	3310	3000	3155	9.8	1010	960	985	5.1	2280	2940	2610	25	3500	3170	3335	9.9	2390	2370	2380	0.84
Selenium	mg/kg	0.2	1.0	1.1	1.1	10	1.1	1.1	1.1	5.5	2.7	2.8	2.8	1.8	2.8	2.9	2.8	2.5	1.7	1.8	1.7	1.1	1.3	1.2	1.3	2.4
Silver	mg/kg	0.1	0.17	0.2	0.19	NA	0.12	0.12	0.12	NA	<0.10	<0.10	0.1	NA	<0.10	<0.10	0.1	NA	<0.10	<0.10	0.1	NA	0.17	0.15	0.16	NA
Sodium	mg/kg	50	89	94	92	NA	87	89	88	NA	328	313	321	4.7	270	254	262	6.1	162	153	158	NA	103	99	101	NA
Strontium	mg/kg	0.5	48	49	49	3.3	73	72	73	1.1	295	307	301	4.0	163	158	161	3.1	76	83	80	9.0	74	70	72	5.2
Sulfur	mg/kg	1000	<1000	<1000	1000	NA	<1000	<1000	1000	NA	3200	3200	3200	NA	1800	2000	1900	NA	<1000	<1000	1000	NA	<1000	<1000	1000	NA
Thallium	mg/kg	0.05	0.76	0.8	0.78	6.2	0.42	0.4	0.41	3.9	0.26	0.26	0.26	1.9	0.31	0.33	0.32	5.9	0.37	0.39	0.38	6.0	0.5	0.45	0.47	11
Tin	mg/kg	2.0	<2.0	<2.0	2.0	NA	<2.0	<2.0	2.0	NA	<2.0	<2.0	2.0	NA	<2.0	<2.0	2.0	NA	<2.0	<2.0	2.0	NA	<2.0	<2.0	2.0	NA
Titanium	mg/kg	1.0	22	23	22	2.2	12	22	17	**60**	9.8	13	11	26	26	16	21	47	17	23	20	32	32	28	30	11
Tungsten	mg/kg	0.5	<0.50	<0.50	0.5	NA	<0.50	<0.50	0.5	NA	<0.50	<0.50	0.5	NA	<0.50	<0.50	0.5	NA	<0.50	<0.50	0.5	NA	<0.50	<0.50	0.5	NA
Uranium	mg/kg	0.05	0.93	0.98	0.96	5.6	0.65	0.64	0.64	1.9	1.7	1.8	1.7	0.57	0.85	0.87	0.86	2.1	0.75	0.8	0.77	6.9	0.79	0.68	0.73	14
Vanadium	mg/kg	0.2	38	41	40	5.6	31	30	31	1.3	12	11	12	6.0	23	25	24	12	32	31	31	3.9	34	32	33	5.7
Zinc	mg/kg	2.0	136	143	140	5.0	93	94	93	2.0	849	842	846	0.83	200	215	208	7.2	185	184	185	0.54	129	113	121	13
Zirconium	mg/kg	1.0	1.0	<1.0	1.0	NA	<1.0	<1.0	1.0	NA	<1.0	<1.0	1.0	NA	<1.0	<1.0	1.0	NA	<1.0	<1.0	1.0	NA	1.1	<1.0	1.1	NA

Table C-3: Sediment Quality Field Duplicate Results for the CMO LAEMP, 2020

Location		MDL	Reference Station				Mine-influenced Stations																				
Watercourse			Michel Creek				Michel Creek				Corbin Creek				Michel Creek											
Station			MI25				MIUCO				CORCK				MIDCO				MIDCO				MIULE			
Date			11-Sep-20				12-Sep-20				13-Sep-20				15-Sep-20				15-Sep-20				16-Sep-20			
Sample ID			RG_MI25_SE-1_2020-09-11_1016	RG_RIVER_SE-1_2020-09-11_1016	Mean	RPD (%)	RG_MIUCO_SE-2_2020-09-12_1137	RG_RIVER_SE-2_2020-09-12_1137	Mean	RPD (%)	RG_CORCK_SE-5_2020-09-13_0946	RG_RIVER_SE-5_2020-09-13_0946	Mean	RPD (%)	RG_MIDCO_SE-2_2020-09-15_0805	RG_RIVER_SE-2_2020-09-15_0805	Mean	RPD (%)	RG_MIDCO_SE-5_2020-09-15_1118	RG_RIVER_SE-5_2020-09-15_1118	Mean	RPD (%)	RG_MIULE_SE-2_2020-09-16_1205	RG_RIVER_SE-2_2020-09-16_1208	Mean	RPD (%)
Parameter	Unit																										
Polycyclic Aromatic Hydrocarbons (PAHs)																											
Acenaphthene	mg/kg	0.005	<0.0050	<0.0050	0.005	NA	<0.0080	<0.0075	0.0078	NA	0.049	<0.040	0.044	20	<0.030	<0.010	0.02	NA	<0.010	<0.010	0.01	NA	<0.010	<0.0050	0.0075	NA
Acenaphthylene	mg/kg	0.005	<0.0050	<0.0050	0.005	NA	<0.0080	<0.0075	0.0078	NA	0.012	<0.015	0.014	NA	<0.011	<0.010	0.011	NA	<0.0050	<0.0050	0.005	NA	<0.0050	<0.0050	0.005	NA
Acridine	mg/kg	0.01	<0.010	<0.010	0.01	NA	<0.016	<0.015	0.016	NA	<0.10	0.081	0.091	21	<0.040	<0.020	0.03	NA	<0.015	<0.020	0.018	NA	<0.020	<0.010	0.015	NA
Anthracene	mg/kg	0.004	<0.0040	<0.0040	0.004	NA	<0.0064	<0.0060	0.0062	NA	0.0062	<0.0060	0.0061	NA	<0.0088	<0.0080	0.0084	NA	<0.0040	<0.0040	0.004	NA	<0.0040	<0.0040	0.004	NA
Benz(a)anthracene	mg/kg	0.01	<0.010	<0.010	0.01	NA	<0.016	<0.015	0.016	NA	0.055	0.055	0.055	0	0.028	<0.020	0.024	NA	<0.010	<0.020	0.015	NA	<0.010	<0.010	0.01	NA
Benzo(a)pyrene	mg/kg	0.01	<0.010	<0.010	0.01	NA	<0.016	<0.015	0.016	NA	0.038	0.04	0.039	NA	<0.022	<0.020	0.021	NA	<0.010	<0.010	0.01	NA	<0.010	<0.010	0.01	NA
Benzo(b&j) fluoranthene	mg/kg	0.01	0.011	0.014	0.013	NA	0.028	0.032	0.03	NA	0.17	0.17	0.17	0.59	0.086	0.045	0.066	NA	0.032	0.042	0.037	NA	0.046	0.041	0.044	NA
Benzo(b+j+k) fluoranthene	mg/kg	0.015	<0.015	<0.015	0.015	NA	0.028	0.032	0.03	NA	0.17	0.17	0.17	0.59	0.086	0.045	0.066	NA	0.032	0.042	0.037	NA	0.046	0.041	0.044	NA
Benzo(e)pyrene	mg/kg	0.01	0.014	0.016	0.015	NA	0.031	0.03	0.031	NA	0.2	0.21	0.2	0.98	0.099	0.052	0.076	NA	0.039	0.047	0.043	NA	0.048	0.043	0.046	NA
Benzo(g,h,i)perylene	mg/kg	0.01	<0.010	<0.010	0.01	NA	<0.016	<0.015	0.016	NA	0.092	0.096	0.094	4.3	0.046	0.022	0.034	NA	0.018	0.019	0.019	NA	0.017	0.016	0.017	NA
Benzo(k)fluoranthene	mg/kg	0.01	<0.010	<0.010	0.01	NA	<0.016	<0.015	0.016	NA	<0.010	<0.015	0.013	NA	<0.022	<0.020	0.021	NA	<0.010	<0.010	0.01	NA	<0.010	<0.010	0.01	NA
Chrysene	mg/kg	0.01	0.025	0.033	0.029	NA	0.055	0.058	0.057	NA	0.28	0.27	0.27	2.2	0.15	0.073	0.11	**66**	0.061	0.077	0.069	23	0.083	0.076	0.08	8.8
Dibenz(a,h) anthracene	mg/kg	0.005	<0.0050	<0.0050	0.005	NA	<0.0080	<0.0075	0.0078	NA	0.025	<0.025	0.025	NA	<0.022	<0.010	0.016	NA	<0.0060	<0.0050	0.0055	NA	<0.0060	<0.0050	0.0055	NA
Fluoranthene	mg/kg	0.01	<0.010	0.012	0.011	NA	<0.016	<0.015	0.016	NA	0.053	0.057	0.055	7.3	0.023	<0.020	0.022	NA	0.011	0.016	0.014	NA	0.027	0.023	0.025	NA
Fluorene	mg/kg	0.01	<0.010	<0.010	0.01	NA	<0.016	0.017	0.017	NA	0.14	0.14	0.14	1.4	0.069	0.032	0.051	NA	0.024	0.022	0.023	NA	0.02	0.019	0.02	NA
Indeno(1,2,3-c,d) pyrene	mg/kg	0.01	<0.010	<0.010	0.01	NA	<0.016	<0.015	0.016	NA	0.025	0.015	0.02	NA	<0.022	<0.020	0.021	NA	<0.010	<0.010	0.01	NA	<0.010	<0.010	0.01	NA
1-Methylnaphthalene	mg/kg	0.05	<0.050	<0.050	0.05	NA	0.12	0.12	0.12	5.9	0.94	0.96	0.95	1.3	0.4	0.22	0.31	**60**	0.16	0.17	0.16	NA	0.12	0.13	0.12	NA
2-Methylnaphthalene	mg/kg	0.01	0.013	0.015	0.014	NA	0.16	0.18	0.17	9.3	1.6	1.6	1.6	1.3	0.65	0.35	0.5	**60**	0.25	0.26	0.25	5.1	0.19	0.19	0.19	2.7
Naphthalene	mg/kg	0.01	<0.010	<0.010	0.01	NA	0.055	0.057	0.056	NA	0.56	0.56	0.56	0.54	0.24	0.13	0.19	**57**	0.096	0.099	0.098	3.1	0.082	0.086	0.084	4.8
Perylene	mg/kg	0.01	<0.010	<0.010	0.01	NA	<0.016	<0.015	0.016	NA	<0.010	<0.015	0.013	NA	<0.022	<0.020	0.021	NA	0.012	0.019	0.016	NA	<0.010	<0.010	0.01	NA
Phenanthrene	mg/kg	0.01	0.024	0.029	0.027	NA	0.13	0.14	0.13	6.0	0.78	0.75	0.77	3.1	0.38	0.21	0.3	**59**	0.16	0.17	0.17	7.8	0.18	0.18	0.18	2.8
Pyrene	mg/kg	0.01	0.01	0.015	0.013	NA	0.018	0.019	0.019	NA	0.09	0.089	0.09	1.1	0.045	0.024	0.035	NA	0.019	0.023	0.021	NA	0.028	0.025	0.027	NA
Quinoline	mg/kg	0.05	<0.050	<0.050	0.05	NA	<0.016	<0.015	0.016	NA	<0.050	<0.015	0.033	NA	<0.022	<0.020	0.021	NA	<0.050	<0.050	0.05	NA	<0.050	<0.050	0.05	NA
d10-Acenaphthene	%	0	99	107	103	8.4	111	110	110	1.3	108	111	110	2.2	107	116	112	8.0	114	114	114	0.35	107	106	107	0.75
d12-Chrysene	%	0	108	114	111	4.6	118	115	116	2.1	114	115	114	0.53	118	125	121	5.4	119	124	122	4.2	115	117	116	1.7
d8-Naphthalene	%	0	97	102	100	5.0	109	106	108	2.9	106	106	106	0.47	106	116	111	9.1	112	114	113	2.0	104	105	105	1.3
d10-Phenanthrene	%	0	98	106	102	7.4	109	108	109	1.5	105	106	105	1.3	109	115	112	4.6	112	113	113	0.8	106	108	107	1.6
B(a)P Total Potency Equivalent	mg/kg	0.05	<0.020	<0.020	0.035	NA	<0.020	<0.020	0.035	NA	0.092	0.081	0.071	NA	0.037	0.023	0.044	NA	<0.020	<0.020	0.035	NA	<0.020	<0.020	0.035	NA
IACR: Coarse	-	0.05	<0.050	<0.050	0.05	NA	<0.050	<0.050	0.05	NA	<0.050	<0.050	0.072	NA	<0.050	<0.050	0.05	NA	<0.050	<0.050	0.05	NA	<0.050	<0.050	0.05	NA
IACR: Fine	-	0.02	<0.050	<0.050	0.035	NA	<0.050	<0.050	0.035	NA	0.092	0.093	0.087	NA	0.058	<0.050	0.041	NA	<0.050	<0.050	0.035	NA	<0.050	<0.050	0.035	NA
IACR (CCME)	-	0.15	0.15	0.17	0.16	NA	0.32	0.34	0.33	NA	1.6	1.6	1.6	3.1	0.85	0.47	0.66	NA	0.31	0.39	0.35	NA	0.4	0.37	0.39	NA

Notes: grey cells represent values with RPDs greater than 20%. Grey cells with bolded values represent values with RPDs greater than 50%.

- = no guideline or no data;% = percent; mg/kg = milligrams per kilograms; dw = dry weight; <= less than; >= greater than; mm = millimetres; µm = micrometers; MDL = method detection limit; RPD = relative percent difference; NA = not applicable; CCME = Canadian Council of the Ministers of Environment.

C.2.4 Benthic Invertebrate Community

The benthic invertebrate community (BIC) quality control reports are provided in Appendix D. Organism sorting efficiency was compared to the laboratory's DQO (≥ 90%). The average recovery was 99.5% with the lowest percent recovery for any given sample of 99%; therefore, organism sorting efficiency was considered excellent.

All BIC samples collected in 2020 were subject to subsampling; the percentage of material sorted in each sample ranged from 5% to 20% of the total sample material. Both the precision and accuracy of the sub-samples randomly chosen for subsample error assessment (CM_MC2) met the DQO (≤ 20%; Appendix D). Thus, the precision and accuracy for sub-sampling of the benthic invertebrate community samples was appropriate.

The laboratory performed an internal audit of taxonomic identification for roughly 10% of all samples. The analysts reported a total identification error rate (TIR) of 0 to 0.31%; percent difference in enumeration of 0.11 to 0.21%; percent taxonomic disagreement of 0.31 to 0.94%, and a Bray Curtis Dissimilarity Index (a measure of the differences in identifications between different analysts) of 0.002 to 0.008 (Appendix I). The laboratory DQO was based on TIR per CABIN laboratory methods (i.e., <5% TIR; Environment Canada 2014). Since TIR was below zero for all but one sample in 2020, the taxonomic accuracy of the analysis was considered excellent.

Data Quality Statement

Benthic community data collected in 2020 were of acceptable quality as characterized by good sorting efficiency, subsampling precision and accuracy, and excellent taxonomic identification accuracy. Therefore, the associated data could be used with a high level of confidence in the derivation of conclusions.

References

BC ENV. 2019. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture – Summary Report. Environmental Protection and Sustainability Branch, Ministry of Environment.

BC ENV. 2021. British Columbia Working Water Quality Guidelines: Aquatic Life, Wildlife and Agriculture. Environmental Protection and Sustainability Branch, Ministry of Environment.

Environment Canada. 2014. Canadian Aquatic Biomonitoring Network (CABIN) laboratory methods: processing, taxonomy, and quality control of benthic macroinvertebrate samples. May 2014.

Minnow (Minnow Environmental Inc.). 2018. Study design for the Regional Aquatic Effects Monitoring Program (RAEMP), 2018 to 2020. Prepared for Teck Coal Limited and Environmental Monitoring Committee. March 2018.

Teck (Teck Resources Limited). 2014. Elk Valley Water Quality Plan. Submitted to BC Ministry of Environment on 22 July 2014.

APPENDIX D

Laboratory Reports

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 11-SEP-20
Report Date: 17-SEP-20 13:52 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2501915

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: CMO LAEMP Sept 2020
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2501915-1
	Description	WS
	Sampled Date	10-SEP-20
	Sampled Time	08:40
	Client ID	RG_AGCK_WS_LAEMP_CMO_2020-09_NP
Grouping	**Analyte**	
WATER		
Physical Tests	Conductivity (@ 25C) (uS/cm)	236
	Hardness (as CaCO3) (mg/L)	131
	pH (pH)	8.36
	ORP (mV)	497
	Total Suspended Solids (mg/L)	<1.0
	Total Dissolved Solids (mg/L)	154 DLHC
	Turbidity (NTU)	0.22
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	<1.0
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	122
	Alkalinity, Total (as CaCO3) (mg/L)	122
	Ammonia as N (mg/L)	0.0055
	Bromide (Br) (mg/L)	<0.050
	Chloride (Cl) (mg/L)	0.23
	Fluoride (F) (mg/L)	0.313
	Ion Balance (%)	93.9
	Nitrate (as N) (mg/L)	0.112
	Nitrite (as N) (mg/L)	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	0.067
	Orthophosphate-Dissolved (as P) (mg/L)	0.0013
	Phosphorus (P)-Total (mg/L)	<0.0020
	Sulfate (SO4) (mg/L)	16.1
	Anion Sum (meq/L)	2.81
	Cation Sum (meq/L)	2.64
	Cation - Anion Balance (%)	-3.2
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	<0.50
	Total Organic Carbon (mg/L)	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.0040
	Antimony (Sb)-Total (mg/L)	<0.00010
	Arsenic (As)-Total (mg/L)	0.00050
	Barium (Ba)-Total (mg/L)	0.0209
	Beryllium (Be)-Total (ug/L)	<0.020
	Bismuth (Bi)-Total (mg/L)	<0.000050
	Boron (B)-Total (mg/L)	<0.010
	Cadmium (Cd)-Total (ug/L)	0.0116

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2501915-1				
	Description	WS				
	Sampled Date	10-SEP-20				
	Sampled Time	08:40				
	Client ID	RG_AGCK_WS_LAEMP_CMO_2020-09_NP				
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	42.1				
	Chromium (Cr)-Total (mg/L)	0.00032				
	Cobalt (Co)-Total (ug/L)	<0.10				
	Copper (Cu)-Total (mg/L)	<0.00050				
	Iron (Fe)-Total (mg/L)	<0.010				
	Lead (Pb)-Total (mg/L)	<0.000050				
	Lithium (Li)-Total (mg/L)	0.0020				
	Magnesium (Mg)-Total (mg/L)	8.75				
	Manganese (Mn)-Total (mg/L)	<0.00010				
	Mercury (Hg)-Total (ug/L)	<0.00050				
	Molybdenum (Mo)-Total (mg/L)	0.000764				
	Nickel (Ni)-Total (mg/L)	<0.00050				
	Potassium (K)-Total (mg/L)	0.197				
	Selenium (Se)-Total (ug/L)	1.37				
	Silicon (Si)-Total (mg/L)	1.45				
	Silver (Ag)-Total (mg/L)	<0.000010				
	Sodium (Na)-Total (mg/L)	0.613				
	Strontium (Sr)-Total (mg/L)	0.150				
	Thallium (Tl)-Total (mg/L)	0.000044				
	Tin (Sn)-Total (mg/L)	<0.00010				
	Titanium (Ti)-Total (mg/L)	<0.010				
	Uranium (U)-Total (mg/L)	0.000754				
	Vanadium (V)-Total (mg/L)	<0.00050				
	Zinc (Zn)-Total (mg/L)	<0.0030				
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD				
	Dissolved Metals Filtration Location	FIELD				
	Aluminum (Al)-Dissolved (mg/L)	<0.0030				
	Antimony (Sb)-Dissolved (mg/L)	<0.00010				
	Arsenic (As)-Dissolved (mg/L)	0.00043				
	Barium (Ba)-Dissolved (mg/L)	0.0196				
	Beryllium (Be)-Dissolved (ug/L)	<0.020				
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050				
	Boron (B)-Dissolved (mg/L)	<0.010				
	Cadmium (Cd)-Dissolved (ug/L)	0.0119				
	Calcium (Ca)-Dissolved (mg/L)	39.4				
	Chromium (Cr)-Dissolved (mg/L)	0.00022				
	Cobalt (Co)-Dissolved (ug/L)	<0.10				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2501915-1				
	Description	WS				
	Sampled Date	10-SEP-20				
	Sampled Time	08:40				
	Client ID	RG_AGCK_WS_LAEMP_CMO_2020-09_NP				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020				
	Iron (Fe)-Dissolved (mg/L)	<0.010				
	Lead (Pb)-Dissolved (mg/L)	<0.000050				
	Lithium (Li)-Dissolved (mg/L)	0.0022				
	Magnesium (Mg)-Dissolved (mg/L)	7.83				
	Manganese (Mn)-Dissolved (mg/L)	<0.00010				
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050				
	Molybdenum (Mo)-Dissolved (mg/L)	0.000690				
	Nickel (Ni)-Dissolved (mg/L)	<0.00050				
	Potassium (K)-Dissolved (mg/L)	0.184				
	Selenium (Se)-Dissolved (ug/L)	1.49				
	Silicon (Si)-Dissolved (mg/L)	1.33				
	Silver (Ag)-Dissolved (mg/L)	<0.000010				
	Sodium (Na)-Dissolved (mg/L)	0.545				
	Strontium (Sr)-Dissolved (mg/L)	0.134				
	Thallium (Tl)-Dissolved (mg/L)	0.000043				
	Tin (Sn)-Dissolved (mg/L)	<0.00010				
	Titanium (Ti)-Dissolved (mg/L)	<0.010				
	Uranium (U)-Dissolved (mg/L)	0.000738				
	Vanadium (V)-Dissolved (mg/L)	<0.00050				
	Zinc (Zn)-Dissolved (mg/L)	0.0017				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2501915-1
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2501915-1
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2501915-1
Matrix Spike	Selenium (Se)-Dissolved	MS-B	L2501915-1
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2501915-1
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2501915-1
Matrix Spike	Uranium (U)-Dissolved	MS-B	L2501915-1
Matrix Spike	Barium (Ba)-Total	MS-B	L2501915-1
Matrix Spike	Calcium (Ca)-Total	MS-B	L2501915-1
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2501915-1
Matrix Spike	Selenium (Se)-Total	MS-B	L2501915-1
Matrix Spike	Sodium (Na)-Total	MS-B	L2501915-1
Matrix Spike	Strontium (Sr)-Total	MS-B	L2501915-1
Matrix Spike	Uranium (U)-Total	MS-B	L2501915-1

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

ALS Test Code	Matrix	Test Description	Method Reference**
BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

ALS Test Code	Matrix	Test Description	Method Reference**
BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

ALS Test Code	Matrix	Test Description	Method Reference**
BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ALS Test Code	Matrix	Test Description	Method Reference**
C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

ALS Test Code	Matrix	Test Description	Method Reference**
C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

Reference Information

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-L-IC-N-CL Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL Water Oxidation redution potential by elect. ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL Water Phosphorus (P)-Total APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

Reference Information

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL	Water	Orthophosphate-Dissolved (as P)	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL	Water	Total Kjeldahl Nitrogen	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

CMO LAEMP Sept 2020

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5224327								
WG3405383-2 LCS								
Acidity (as CaCO3)			98.4		%		85-115	15-SEP-20
WG3405383-1 MB								
Acidity (as CaCO3)			1.8		mg/L		2	15-SEP-20
ALK-MAN-CL	**Water**							
Batch R5224756								
WG3405824-2 LCS								
Alkalinity, Total (as CaCO3)			101.6		%		85-115	16-SEP-20
WG3405824-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	16-SEP-20
BE-D-L-CCMS-VA	**Water**							
Batch R5223324								
WG3403954-2 LCS								
Beryllium (Be)-Dissolved			96.4		%		80-120	15-SEP-20
WG3403954-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	15-SEP-20
BE-T-L-CCMS-VA	**Water**							
Batch R5224180								
WG3404203-2 LCS								
Beryllium (Be)-Total			99.5		%		80-120	16-SEP-20
WG3404203-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	16-SEP-20
BR-L-IC-N-CL	**Water**							
Batch R5223427								
WG3404275-2 LCS								
Bromide (Br)			107.6		%		85-115	11-SEP-20
WG3404275-1 MB								
Bromide (Br)			<0.050		mg/L		0.05	11-SEP-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5223861								
WG3404757-2 LCS								
Dissolved Organic Carbon			103.6		%		80-120	14-SEP-20
WG3404757-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	14-SEP-20
C-TOT-ORG-LOW-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-LOW-CL	**Water**							
Batch R5223861								
WG3404757-2 LCS								
Total Organic Carbon			98.8		%		80-120	14-SEP-20
WG3404757-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	14-SEP-20
CL-L-IC-N-CL	**Water**							
Batch R5223427								
WG3404275-2 LCS								
Chloride (Cl)			104.4		%		85-115	11-SEP-20
WG3404275-1 MB								
Chloride (Cl)			<0.10		mg/L		0.1	11-SEP-20
EC-L-PCT-CL	**Water**							
Batch R5224756								
WG3405824-2 LCS								
Conductivity (@ 25C)			93.7		%		90-110	16-SEP-20
WG3405824-1 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	16-SEP-20
F-IC-N-CL	**Water**							
Batch R5223427								
WG3404275-2 LCS								
Fluoride (F)			106.6		%		90-110	11-SEP-20
WG3404275-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	11-SEP-20
HG-D-CVAA-VA	**Water**							
Batch R5225558								
WG3406211-7 DUP		**L2501915-1**						
Mercury (Hg)-Dissolved		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	17-SEP-20
WG3406211-6 LCS								
Mercury (Hg)-Dissolved			95.6		%		80-120	17-SEP-20
WG3406211-5 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	17-SEP-20
HG-T-U-CVAF-VA	**Water**							
Batch R5226825								
WG3406751-3 DUP		**L2501915-1**						
Mercury (Hg)-Total		<0.00050	<0.00050	RPD-NA	ug/L	N/A	20	17-SEP-20
WG3406751-2 LCS								
Mercury (Hg)-Total			91.8		%		80-120	17-SEP-20
WG3406751-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-U-CVAF-VA	**Water**							
Batch R5226825								
WG3406751-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	17-SEP-20
MET-D-CCMS-VA	**Water**							
Batch R5223324								
WG3403954-2 LCS								
Aluminum (Al)-Dissolved			91.6		%		80-120	15-SEP-20
Antimony (Sb)-Dissolved			96.8		%		80-120	15-SEP-20
Arsenic (As)-Dissolved			92.5		%		80-120	15-SEP-20
Barium (Ba)-Dissolved			94.4		%		80-120	15-SEP-20
Bismuth (Bi)-Dissolved			98.5		%		80-120	15-SEP-20
Boron (B)-Dissolved			95.7		%		80-120	15-SEP-20
Cadmium (Cd)-Dissolved			92.7		%		80-120	15-SEP-20
Calcium (Ca)-Dissolved			100.9		%		80-120	15-SEP-20
Chromium (Cr)-Dissolved			93.6		%		80-120	15-SEP-20
Cobalt (Co)-Dissolved			94.1		%		80-120	15-SEP-20
Copper (Cu)-Dissolved			92.5		%		80-120	15-SEP-20
Iron (Fe)-Dissolved			93.8		%		80-120	15-SEP-20
Lead (Pb)-Dissolved			99.2		%		80-120	15-SEP-20
Lithium (Li)-Dissolved			94.7		%		80-120	15-SEP-20
Magnesium (Mg)-Dissolved			93.3		%		80-120	15-SEP-20
Manganese (Mn)-Dissolved			92.3		%		80-120	15-SEP-20
Molybdenum (Mo)-Dissolved			96.7		%		80-120	15-SEP-20
Nickel (Ni)-Dissolved			93.7		%		80-120	15-SEP-20
Potassium (K)-Dissolved			94.6		%		80-120	15-SEP-20
Selenium (Se)-Dissolved			93.6		%		80-120	15-SEP-20
Silicon (Si)-Dissolved			94.4		%		60-140	15-SEP-20
Silver (Ag)-Dissolved			97.5		%		80-120	15-SEP-20
Sodium (Na)-Dissolved			98.5		%		80-120	15-SEP-20
Strontium (Sr)-Dissolved			98.8		%		80-120	15-SEP-20
Thallium (Tl)-Dissolved			99.5		%		80-120	15-SEP-20
Tin (Sn)-Dissolved			94.5		%		80-120	15-SEP-20
Titanium (Ti)-Dissolved			90.6		%		80-120	15-SEP-20
Uranium (U)-Dissolved			98.7		%		80-120	15-SEP-20
Vanadium (V)-Dissolved			93.9		%		80-120	15-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5223324								
WG3403954-2 LCS								
Zinc (Zn)-Dissolved			96.3		%		80-120	15-SEP-20
WG3403954-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	15-SEP-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	15-SEP-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	15-SEP-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	15-SEP-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	15-SEP-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	15-SEP-20
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	15-SEP-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	15-SEP-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	15-SEP-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	15-SEP-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	15-SEP-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	15-SEP-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	15-SEP-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	15-SEP-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	15-SEP-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	15-SEP-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	15-SEP-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	15-SEP-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	15-SEP-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	15-SEP-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	15-SEP-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	15-SEP-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	15-SEP-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	15-SEP-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	15-SEP-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	15-SEP-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	15-SEP-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	15-SEP-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	15-SEP-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	15-SEP-20
MET-T-CCMS-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5224180								
WG3404203-2 LCS								
Aluminum (Al)-Total			102.6		%		80-120	16-SEP-20
Antimony (Sb)-Total			105.4		%		80-120	16-SEP-20
Arsenic (As)-Total			100.4		%		80-120	16-SEP-20
Barium (Ba)-Total			101.4		%		80-120	16-SEP-20
Bismuth (Bi)-Total			110.5		%		80-120	16-SEP-20
Boron (B)-Total			104.6		%		80-120	16-SEP-20
Cadmium (Cd)-Total			98.8		%		80-120	16-SEP-20
Calcium (Ca)-Total			103.8		%		80-120	16-SEP-20
Chromium (Cr)-Total			103.9		%		80-120	16-SEP-20
Cobalt (Co)-Total			101.0		%		80-120	16-SEP-20
Copper (Cu)-Total			100.5		%		80-120	16-SEP-20
Iron (Fe)-Total			97.5		%		80-120	16-SEP-20
Lead (Pb)-Total			100.1		%		80-120	16-SEP-20
Lithium (Li)-Total			95.3		%		80-120	16-SEP-20
Magnesium (Mg)-Total			100.3		%		80-120	16-SEP-20
Manganese (Mn)-Total			101.8		%		80-120	16-SEP-20
Molybdenum (Mo)-Total			106.0		%		80-120	16-SEP-20
Nickel (Ni)-Total			100.8		%		80-120	16-SEP-20
Potassium (K)-Total			105.4		%		80-120	16-SEP-20
Selenium (Se)-Total			105.8		%		80-120	16-SEP-20
Silicon (Si)-Total			108.3		%		80-120	16-SEP-20
Silver (Ag)-Total			107.1		%		80-120	16-SEP-20
Sodium (Na)-Total			100.4		%		80-120	16-SEP-20
Strontium (Sr)-Total			111.4		%		80-120	16-SEP-20
Thallium (Tl)-Total			99.8		%		80-120	16-SEP-20
Tin (Sn)-Total			100.8		%		80-120	16-SEP-20
Titanium (Ti)-Total			98.0		%		80-120	16-SEP-20
Uranium (U)-Total			101.2		%		80-120	16-SEP-20
Vanadium (V)-Total			104.3		%		80-120	16-SEP-20
Zinc (Zn)-Total			101.6		%		80-120	16-SEP-20
WG3404203-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	16-SEP-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	16-SEP-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	16-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5224180								
WG3404203-1 MB								
Barium (Ba)-Total			<0.00010		mg/L		0.0001	16-SEP-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	16-SEP-20
Boron (B)-Total			<0.010		mg/L		0.01	16-SEP-20
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	16-SEP-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	16-SEP-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	16-SEP-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	16-SEP-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	16-SEP-20
Iron (Fe)-Total			<0.010		mg/L		0.01	16-SEP-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	16-SEP-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	16-SEP-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	16-SEP-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	16-SEP-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	16-SEP-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	16-SEP-20
Potassium (K)-Total			<0.050		mg/L		0.05	16-SEP-20
Silicon (Si)-Total			<0.10		mg/L		0.1	16-SEP-20
Sodium (Na)-Total			<0.050		mg/L		0.05	16-SEP-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	16-SEP-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	16-SEP-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	16-SEP-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	16-SEP-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	16-SEP-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	16-SEP-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	16-SEP-20
NH3-L-F-CL	**Water**							
Batch R5222764								
WG3403463-6 LCS								
Ammonia as N			89.0		%		85-115	12-SEP-20
WG3403463-5 MB								
Ammonia as N			<0.0050		mg/L		0.005	12-SEP-20
NO2-L-IC-N-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-L-IC-N-CL	**Water**							
Batch R5223427								
WG3404275-2 LCS								
Nitrite (as N)			99.9		%		90-110	11-SEP-20
WG3404275-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	11-SEP-20
NO3-L-IC-N-CL	**Water**							
Batch R5223427								
WG3404275-2 LCS								
Nitrate (as N)			105.7		%		90-110	11-SEP-20
WG3404275-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	11-SEP-20
ORP-CL	**Water**							
Batch R5223466								
WG3404288-7 CRM		**CL-ORP**						
ORP			220		mV		210-230	14-SEP-20
P-T-L-COL-CL	**Water**							
Batch R5224813								
WG3405476-10 LCS								
Phosphorus (P)-Total			99.0		%		80-120	16-SEP-20
WG3405476-9 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	16-SEP-20
PH-CL	**Water**							
Batch R5224756								
WG3405824-2 LCS								
pH			6.99		pH		6.9-7.1	16-SEP-20
PO4-DO-L-COL-CL	**Water**							
Batch R5222448								
WG3402890-10 LCS								
Orthophosphate-Dissolved (as P)			100.5		%		80-120	11-SEP-20
WG3402890-9 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	11-SEP-20
SO4-IC-N-CL	**Water**							
Batch R5223427								
WG3404275-2 LCS								
Sulfate (SO4)			104.2		%		90-110	11-SEP-20
WG3404275-1 MB								

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-N-CL	**Water**							
Batch R5223427								
WG3404275-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	11-SEP-20
SOLIDS-TDS-CL	**Water**							
Batch R5224879								
WG3404525-11 LCS								
Total Dissolved Solids			100.7		%		85-115	15-SEP-20
WG3404525-10 MB								
Total Dissolved Solids			<10		mg/L		10	15-SEP-20
TKN-L-F-CL	**Water**							
Batch R5222798								
WG3403208-13 LCS								
Total Kjeldahl Nitrogen			102.3		%		75-125	13-SEP-20
WG3403208-2 LCS								
Total Kjeldahl Nitrogen			119.4		%		75-125	13-SEP-20
WG3403208-5 LCS								
Total Kjeldahl Nitrogen			112.3		%		75-125	13-SEP-20
WG3403208-7 LCS								
Total Kjeldahl Nitrogen			104.2		%		75-125	13-SEP-20
WG3403208-9 LCS								
Total Kjeldahl Nitrogen			105.3		%		75-125	13-SEP-20
WG3403208-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	13-SEP-20
WG3403208-12 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	13-SEP-20
WG3403208-4 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	13-SEP-20
WG3403208-6 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	13-SEP-20
WG3403208-8 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	13-SEP-20
TSS-L-CL	**Water**							
Batch R5224785								
WG3404295-10 LCS								
Total Suspended Solids			98.2		%		85-115	15-SEP-20
WG3404295-9 MB								
Total Suspended Solids			<1.0		mg/L		1	15-SEP-20
TURBIDITY-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TURBIDITY-CL	**Water**							
Batch R5222475								
WG3403036-6 DUP		**L2501915-1**						
Turbidity		0.22	0.23		NTU	4.9	15	11-SEP-20
WG3403036-5 LCS								
Turbidity			99.5		%		85-115	11-SEP-20
WG3403036-4 MB								
Turbidity			<0.10		NTU		0.1	11-SEP-20

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

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	10-SEP-20 08:40	14-SEP-20 15:30	0.25	103	hours	EHTR-FM
pH							
	1	10-SEP-20 08:40	16-SEP-20 14:00	0.25	149	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2501915 were received on 11-SEP-20 08:45.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID:	CMO LAEMP Sept 2020	TURNAROUND TIME:	

PROJECT/CLIENT INFO

Facility Name	REP		
Project Manager	Cait Good		
Email	cait.good@teck.com		
Address	421 Pine Avenue		
City	Sparwood	Province	BC
Postal Code	V0B 2G0	Country	Canada
Phone Number	250-425-8202		

LABORATORY

Lab Name	ALS Calgary		
Lab Contact	Lyudmyla Shvets		
Email	lyudmyla.shvets@alsglobal.com		
Address	2559 29 Street NE		
City	Calgary	Province	AB
Postal Code	T1Y 7B5	Country	Canada
Phone Number	1 403 407 1794		

	Excel	PDF	EDD
cait.good@teck.com	x	x	x
teckcoal@equisonline.com			x
lings@minnow.ca	x	x	x
carlie.meyer@teck.com	x	x	x
swelch@minnow.ca	x	x	x

PO number: 689999

SAMPLE DETAILS / **ANALYSIS REQUESTED** — Filtered - F: Field, L: Lab, FL: Field & Lab, N: None

L2501915-COFC

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_AGCK_WS_LAEMP_CMO_2020-09_NP	RG_AGCK	WS	No	9/10/2020	8:40	G	7	1	1	1	1	1	1	1

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	
Jennifer Ings	September 10, 2020		9/11 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	Jennifer Ings	Mobile #	519-500-3444
Sampler's Signature		Date/Time	September 10, 2020

(6)

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 12-SEP-20
Report Date: 21-SEP-20 12:32 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2502321

Project P.O. #:	VPO00689999
Job Reference:	REGIONAL EFFECTS PROGRAM
C of C Numbers:	CMO LAEMP Sept 2020
Legal Site Desc:	

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2502321-1	L2502321-2	L2502321-3	L2502321-4
	Description	WS	WS	WS	WS
	Sampled Date	11-SEP-20	11-SEP-20	11-SEP-20	11-SEP-20
	Sampled Time	09:17	09:17	09:17	09:17
	Client ID	RG_MI25_WS_LAEMP_CMO_2020-09_NP	RG_RIVER1_WS_LAEMP_CMO_2020-09_NP	RG_FBLANK1_WS_LAEMP_CMO_2020-09_NP	RG_TRIP1_WS_LAEMP_CMO_2020-09_NP
Grouping	**Analyte**				
WATER					
Physical Tests	Conductivity (@ 25C) (uS/cm)	278	281	<2.0	<2.0
	Hardness (as CaCO3) (mg/L)	152	155	<0.50	
	pH (pH)	8.24	8.24	5.15	4.97
	ORP (mV)	414	426	472	500
	Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	<1.0
	Total Dissolved Solids (mg/L)	162 DLHC	171 DLHC	<10	<10
	Turbidity (NTU)	0.14	0.25	<0.10	<0.10
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0	1.5	1.6
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	149	151	<1.0	<1.0
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	149	151	<1.0	<1.0
	Ammonia as N (mg/L)	0.0349	<0.0050	<0.0050	<0.0050
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	0.35	0.35	<0.10	<0.10
	Fluoride (F) (mg/L)	0.073	0.072	<0.020	<0.020
	Ion Balance (%)	96.3	97.0	0.0	0.0
	Nitrate (as N) (mg/L)	0.0207	0.0204	<0.0050	<0.0050
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	<0.050	<0.050	<0.050	<0.050
	Orthophosphate-Dissolved (as P) (mg/L)	0.0046	0.0044	<0.0010	<0.0010
	Phosphorus (P)-Total (mg/L)	0.0057 DLM	0.0055 DLM	<0.0020	<0.0020
	Sulfate (SO4) (mg/L)	15.3	15.3	<0.30	<0.30
	Anion Sum (meq/L)	3.31	3.34	<0.10	<0.10
	Cation Sum (meq/L)	3.19	3.24	<0.10	<0.10
	Cation - Anion Balance (%)	-1.9	-1.5	0.0	0.0
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	<0.50	<0.50	<0.50	
	Total Organic Carbon (mg/L)	<0.50	<0.50	<0.50	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.0049	0.0063	<0.0030	<0.0030
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00020	0.00021	<0.00010	<0.00010
	Barium (Ba)-Total (mg/L)	0.0566	0.0563	0.00027 RRV	<0.00010
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	0.016	0.016	<0.010	<0.010
	Cadmium (Cd)-Total (ug/L)	0.0110	0.0103	<0.0050	<0.0050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2502321-1	L2502321-2	L2502321-3	L2502321-4	
	Description	WS	WS	WS	WS	
	Sampled Date	11-SEP-20	11-SEP-20	11-SEP-20	11-SEP-20	
	Sampled Time	09:17	09:17	09:17	09:17	
	Client ID	RG_MI25_WS_LAEMP_CMO_2020-09_NP	RG_RIVER1_WS_LAEMP_CMO_2020-09_NP	RG_FBLANK1_WS_LAEMP_CMO_2020-09_NP	RG_TRIP1_WS_LAEMP_CMO_2020-09_NP	
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	44.0	42.8	<0.050	<0.050	
	Chromium (Cr)-Total (mg/L)	0.00019	0.00018	<0.00010	<0.00010	
	Cobalt (Co)-Total (ug/L)	<0.10	<0.10	<0.10	<0.10	
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	0.00217 RRV	<0.00050	
	Iron (Fe)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Lithium (Li)-Total (mg/L)	0.0051	0.0051	<0.0010	<0.0010	
	Magnesium (Mg)-Total (mg/L)	11.7	12.0	<0.10	<0.10	
	Manganese (Mn)-Total (mg/L)	0.00025	0.00028	0.00012 RRV	<0.00010	
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Molybdenum (Mo)-Total (mg/L)	0.000908	0.000909	<0.000050	<0.000050	
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Potassium (K)-Total (mg/L)	0.506	0.516	<0.050	<0.050	
	Selenium (Se)-Total (ug/L)	0.218	0.226	<0.050	<0.050	
	Silicon (Si)-Total (mg/L)	2.27	2.30	<0.10	<0.10	
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Total (mg/L)	3.19	3.11	0.135 RRV	<0.050	
	Strontium (Sr)-Total (mg/L)	0.175	0.174	<0.00020	<0.00020	
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Uranium (U)-Total (mg/L)	0.000242	0.000245	<0.000010	<0.000010	
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD		
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	LAB	
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030		
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Arsenic (As)-Dissolved (mg/L)	0.00019	0.00017	<0.00010		
	Barium (Ba)-Dissolved (mg/L)	0.0548	0.0550	<0.00010		
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020		
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Boron (B)-Dissolved (mg/L)	0.015	0.016	<0.010		
	Cadmium (Cd)-Dissolved (ug/L)	0.0088	0.0100	<0.0050		
	Calcium (Ca)-Dissolved (mg/L)	43.0	44.3	<0.050	<0.050	
	Chromium (Cr)-Dissolved (mg/L)	0.00019	0.00018	<0.00010		
	Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10	<0.10		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2502321-1	L2502321-2	L2502321-3	L2502321-4	
	Description	WS	WS	WS	WS	
	Sampled Date	11-SEP-20	11-SEP-20	11-SEP-20	11-SEP-20	
	Sampled Time	09:17	09:17	09:17	09:17	
	Client ID	RG_MI25_WS_LAEMP_CMO_2020-09_NP	RG_RIVER1_WS_LAEMP_CMO_2020-09_NP	RG_FBLANK1_WS_LAEMP_CMO_2020-09_NP	RG_TRIP1_WS_LAEMP_CMO_2020-09_NP	
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020		
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Lithium (Li)-Dissolved (mg/L)	0.0053	0.0052	<0.0010		
	Magnesium (Mg)-Dissolved (mg/L)	11.0	10.8	<0.10	<0.0050	
	Manganese (Mn)-Dissolved (mg/L)	<0.00010	0.00012	<0.00010		
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050		
	Molybdenum (Mo)-Dissolved (mg/L)	0.000861	0.000942	<0.000050		
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Potassium (K)-Dissolved (mg/L)	0.512	0.509	<0.050	<0.050	
	Selenium (Se)-Dissolved (ug/L)	0.181	0.233	<0.050		
	Silicon (Si)-Dissolved (mg/L)	2.26	2.28	<0.050		
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Dissolved (mg/L)	2.92	3.03	<0.050	<0.050	
	Strontium (Sr)-Dissolved (mg/L)	0.157	0.159	<0.00020		
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Dissolved (mg/L)	0.000229	0.000247	<0.000010		
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2502321-4
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2502321-4
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2502321-4
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2502321-1, -2, -3
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2502321-1, -2, -3
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2502321-1, -2, -3
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2502321-1, -2, -3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2502321-1, -2, -3
Matrix Spike	Barium (Ba)-Total	MS-B	L2502321-1, -2, -3, -4
Matrix Spike	Calcium (Ca)-Total	MS-B	L2502321-1, -2, -3, -4
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2502321-1, -2, -3, -4
Matrix Spike	Selenium (Se)-Total	MS-B	L2502321-1, -2, -3, -4
Matrix Spike	Sodium (Na)-Total	MS-B	L2502321-1, -2, -3, -4
Matrix Spike	Strontium (Sr)-Total	MS-B	L2502321-1, -2, -3, -4

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon

Reference Information

and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-L-IC-N-CL	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL	Water	Electrical Conductivity (EC)	APHA 2510B

Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25C.

F-IC-N-CL	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA	Water	Total Mercury in Water by CVAFS (Ultra)	EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-CL	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL	Water	Ammonia, Total (as N)	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL	Water	Oxidation redution potential by elect.	ASTM D1498

Reference Information

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL	Water	Phosphorus (P)-Total	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL	Water	Orthophosphate-Dissolved (as P)	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL	Water	Total Kjeldahl Nitrogen	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

CMO LAEMP Sept 2020

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0

Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5224327								
WG3405383-14 LCS								
Acidity (as CaCO3)			102.6		%		85-115	15-SEP-20
WG3405383-13 MB								
Acidity (as CaCO3)			1.7		mg/L		2	15-SEP-20
ALK-MAN-CL	**Water**							
Batch R5226926								
WG3406781-11 LCS								
Alkalinity, Total (as CaCO3)			99.8		%		85-115	17-SEP-20
WG3406781-10 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	17-SEP-20
BE-D-L-CCMS-VA	**Water**							
Batch R5226820								
WG3405995-3 DUP		**L2502321-1**						
Beryllium (Be)-Dissolved		<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	17-SEP-20
WG3405995-2 LCS								
Beryllium (Be)-Dissolved			95.4		%		80-120	17-SEP-20
WG3405995-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	17-SEP-20
WG3405995-4 MS		**L2502321-2**						
Beryllium (Be)-Dissolved			99.4		%		70-130	17-SEP-20
BE-T-L-CCMS-VA	**Water**							
Batch R5226940								
WG3405856-2 LCS								
Beryllium (Be)-Total			98.5		%		80-120	17-SEP-20
WG3405856-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	17-SEP-20
BR-L-IC-N-CL	**Water**							
Batch R5223278								
WG3404056-10 LCS								
Bromide (Br)			101.3		%		85-115	12-SEP-20
WG3404056-9 MB								
Bromide (Br)			<0.050		mg/L		0.05	12-SEP-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5231439								
WG3408405-7 DUP		**L2502321-3**						
Dissolved Organic Carbon		<0.50	<0.50	RPD-NA	mg/L	N/A	20	20-SEP-20
WG3408405-2 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-LOW-CL	**Water**							
Batch R5231439								
WG3408405-2 LCS								
Dissolved Organic Carbon			108.9		%		80-120	20-SEP-20
WG3408405-6 LCS								
Dissolved Organic Carbon			91.7		%		80-120	20-SEP-20
WG3408405-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	20-SEP-20
WG3408405-5 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	20-SEP-20
WG3408405-8 MS		**L2502321-3**						
Dissolved Organic Carbon			100.1		%		70-130	20-SEP-20
C-TOT-ORG-LOW-CL	**Water**							
Batch R5231439								
WG3408405-7 DUP		**L2502321-3**						
Total Organic Carbon		<0.50	<0.50	RPD-NA	mg/L	N/A	20	20-SEP-20
WG3408405-2 LCS								
Total Organic Carbon			98.2		%		80-120	20-SEP-20
WG3408405-6 LCS								
Total Organic Carbon			96.9		%		80-120	20-SEP-20
WG3408405-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	20-SEP-20
WG3408405-5 MB								
Total Organic Carbon			<0.50		mg/L		0.5	20-SEP-20
WG3408405-8 MS		**L2502321-3**						
Total Organic Carbon			101.9		%		70-130	20-SEP-20
Batch R5231476								
WG3408398-3 DUP		**L2502321-4**						
Total Organic Carbon		<0.50	<0.50	RPD-NA	mg/L	N/A	20	20-SEP-20
WG3408398-2 LCS								
Total Organic Carbon			98.2		%		80-120	20-SEP-20
WG3408398-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	20-SEP-20
WG3408398-4 MS		**L2502321-4**						
Total Organic Carbon			85.9		%		70-130	20-SEP-20
CL-L-IC-N-CL	**Water**							
Batch R5223278								
WG3404056-10 LCS								
Chloride (Cl)			101.1		%		85-115	12-SEP-20
WG3404056-9 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-L-IC-N-CL	**Water**							
Batch R5223278								
WG3404056-9 MB								
Chloride (Cl)			<0.10		mg/L		0.1	12-SEP-20
EC-L-PCT-CL	**Water**							
Batch R5226926								
WG3406781-11 LCS								
Conductivity (@ 25C)			95.1		%		90-110	17-SEP-20
WG3406781-10 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	17-SEP-20
F-IC-N-CL	**Water**							
Batch R5223278								
WG3404056-10 LCS								
Fluoride (F)			102.4		%		90-110	12-SEP-20
WG3404056-9 MB								
Fluoride (F)			<0.020		mg/L		0.02	12-SEP-20
HG-D-CVAA-VA	**Water**							
Batch R5228437								
WG3407162-7 DUP		**L2502321-2**						
Mercury (Hg)-Dissolved		<0.0000050	<0.000005C	RPD-NA	mg/L	N/A	20	18-SEP-20
WG3407162-6 LCS								
Mercury (Hg)-Dissolved			97.2		%		80-120	18-SEP-20
WG3407162-5 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005C		mg/L		0.000005	18-SEP-20
HG-T-U-CVAF-VA	**Water**							
Batch R5226825								
WG3406751-2 LCS								
Mercury (Hg)-Total			91.8		%		80-120	17-SEP-20
WG3406751-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	17-SEP-20
MET-D-CCMS-CL	**Water**							
Batch R5224003								
WG3404942-2 LCS		**TMRM**						
Calcium (Ca)-Dissolved			101.8		%		80-120	15-SEP-20
Magnesium (Mg)-Dissolved			103.6		%		80-120	15-SEP-20
Potassium (K)-Dissolved			99.1		%		80-120	15-SEP-20
Sodium (Na)-Dissolved			101.3		%		80-120	15-SEP-20
WG3404942-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-CL	**Water**							
Batch R5224003								
WG3404942-1 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	15-SEP-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	15-SEP-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	15-SEP-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	15-SEP-20
MET-D-CCMS-VA	**Water**							
Batch R5226820								
WG3405995-3 DUP		**L2502321-1**						
Aluminum (Al)-Dissolved		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	17-SEP-20
Antimony (Sb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	17-SEP-20
Arsenic (As)-Dissolved		0.00019	0.00021		mg/L	12	20	17-SEP-20
Barium (Ba)-Dissolved		0.0548	0.0557		mg/L	1.8	20	17-SEP-20
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	17-SEP-20
Boron (B)-Dissolved		0.015	0.015		mg/L	0.2	20	17-SEP-20
Cadmium (Cd)-Dissolved		0.0000088	0.0000122	J	mg/L	0.000003	0.00001	17-SEP-20
Calcium (Ca)-Dissolved		43.0	43.5		mg/L	1.3	20	17-SEP-20
Chromium (Cr)-Dissolved		0.00019	0.00017		mg/L	11	20	17-SEP-20
Cobalt (Co)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	17-SEP-20
Copper (Cu)-Dissolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	17-SEP-20
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	17-SEP-20
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	17-SEP-20
Lithium (Li)-Dissolved		0.0053	0.0052		mg/L	1.4	20	17-SEP-20
Magnesium (Mg)-Dissolved		11.0	11.3		mg/L	3.0	20	17-SEP-20
Manganese (Mn)-Dissolved		<0.00010	0.00011	RPD-NA	mg/L	N/A	20	17-SEP-20
Molybdenum (Mo)-Dissolved		0.000861	0.000873		mg/L	1.4	20	17-SEP-20
Nickel (Ni)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	17-SEP-20
Potassium (K)-Dissolved		0.512	0.514		mg/L	0.4	20	17-SEP-20
Selenium (Se)-Dissolved		0.000181	0.000200		mg/L	10	20	17-SEP-20
Silicon (Si)-Dissolved		2.26	2.25		mg/L	0.6	20	17-SEP-20
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	17-SEP-20
Sodium (Na)-Dissolved		2.92	3.09		mg/L	5.8	20	17-SEP-20
Strontium (Sr)-Dissolved		0.157	0.159		mg/L	1.2	20	17-SEP-20
Thallium (Tl)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	17-SEP-20
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	17-SEP-20
Titanium (Ti)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	17-SEP-20

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5226820								
WG3405995-3 DUP		**L2502321-1**						
Uranium (U)-Dissolved		0.000229	0.000234		mg/L	2.1	20	17-SEP-20
Vanadium (V)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	17-SEP-20
Zinc (Zn)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	17-SEP-20
WG3405995-2 LCS								
Aluminum (Al)-Dissolved			98.8		%		80-120	17-SEP-20
Antimony (Sb)-Dissolved			88.5		%		80-120	17-SEP-20
Arsenic (As)-Dissolved			93.9		%		80-120	17-SEP-20
Barium (Ba)-Dissolved			97.1		%		80-120	17-SEP-20
Bismuth (Bi)-Dissolved			98.4		%		80-120	17-SEP-20
Boron (B)-Dissolved			92.8		%		80-120	17-SEP-20
Cadmium (Cd)-Dissolved			94.0		%		80-120	17-SEP-20
Calcium (Ca)-Dissolved			97.7		%		80-120	17-SEP-20
Chromium (Cr)-Dissolved			95.1		%		80-120	17-SEP-20
Cobalt (Co)-Dissolved			94.1		%		80-120	17-SEP-20
Copper (Cu)-Dissolved			92.0		%		80-120	17-SEP-20
Iron (Fe)-Dissolved			92.4		%		80-120	17-SEP-20
Lead (Pb)-Dissolved			96.8		%		80-120	17-SEP-20
Lithium (Li)-Dissolved			97.1		%		80-120	17-SEP-20
Magnesium (Mg)-Dissolved			92.0		%		80-120	17-SEP-20
Manganese (Mn)-Dissolved			96.0		%		80-120	17-SEP-20
Molybdenum (Mo)-Dissolved			90.9		%		80-120	17-SEP-20
Nickel (Ni)-Dissolved			95.7		%		80-120	17-SEP-20
Potassium (K)-Dissolved			97.1		%		80-120	17-SEP-20
Selenium (Se)-Dissolved			91.3		%		80-120	17-SEP-20
Silicon (Si)-Dissolved			95.5		%		60-140	17-SEP-20
Silver (Ag)-Dissolved			90.4		%		80-120	17-SEP-20
Sodium (Na)-Dissolved			98.3		%		80-120	17-SEP-20
Strontium (Sr)-Dissolved			92.9		%		80-120	17-SEP-20
Thallium (Tl)-Dissolved			95.7		%		80-120	17-SEP-20
Tin (Sn)-Dissolved			90.6		%		80-120	17-SEP-20
Titanium (Ti)-Dissolved			88.3		%		80-120	17-SEP-20
Uranium (U)-Dissolved			96.1		%		80-120	17-SEP-20
Vanadium (V)-Dissolved			95.6		%		80-120	17-SEP-20
Zinc (Zn)-Dissolved			94.4		%		80-120	17-SEP-20
WG3405995-1 MB		**NP**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5226820								
WG3405995-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	17-SEP-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	17-SEP-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	17-SEP-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	17-SEP-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	17-SEP-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	17-SEP-20
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	17-SEP-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	17-SEP-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	17-SEP-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	17-SEP-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	17-SEP-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	17-SEP-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	17-SEP-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	17-SEP-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	17-SEP-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	17-SEP-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	17-SEP-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	17-SEP-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	17-SEP-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	17-SEP-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	17-SEP-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	17-SEP-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	17-SEP-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	17-SEP-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	17-SEP-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	17-SEP-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	17-SEP-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	17-SEP-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	17-SEP-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	17-SEP-20
WG3405995-4 MS		**L2502321-2**						
Aluminum (Al)-Dissolved			97.2		%		70-130	17-SEP-20
Antimony (Sb)-Dissolved			90.7		%		70-130	17-SEP-20
Arsenic (As)-Dissolved			95.5		%		70-130	17-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5226820								
WG3405995-4 MS		**L2502321-2**						
Barium (Ba)-Dissolved			N/A	MS-B	%		-	17-SEP-20
Bismuth (Bi)-Dissolved			89.8		%		70-130	17-SEP-20
Boron (B)-Dissolved			90.3		%		70-130	17-SEP-20
Cadmium (Cd)-Dissolved			97.6		%		70-130	17-SEP-20
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	17-SEP-20
Chromium (Cr)-Dissolved			95.1		%		70-130	17-SEP-20
Cobalt (Co)-Dissolved			95.0		%		70-130	17-SEP-20
Copper (Cu)-Dissolved			92.4		%		70-130	17-SEP-20
Iron (Fe)-Dissolved			96.7		%		70-130	17-SEP-20
Lead (Pb)-Dissolved			94.6		%		70-130	17-SEP-20
Lithium (Li)-Dissolved			99.0		%		70-130	17-SEP-20
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	17-SEP-20
Manganese (Mn)-Dissolved			97.3		%		70-130	17-SEP-20
Molybdenum (Mo)-Dissolved			87.3		%		70-130	17-SEP-20
Nickel (Ni)-Dissolved			97.4		%		70-130	17-SEP-20
Potassium (K)-Dissolved			98.2		%		70-130	17-SEP-20
Selenium (Se)-Dissolved			99.7		%		70-130	17-SEP-20
Silicon (Si)-Dissolved			88.4		%		70-130	17-SEP-20
Silver (Ag)-Dissolved			88.0		%		70-130	17-SEP-20
Sodium (Na)-Dissolved			N/A	MS-B	%		-	17-SEP-20
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	17-SEP-20
Thallium (Tl)-Dissolved			92.9		%		70-130	17-SEP-20
Tin (Sn)-Dissolved			89.3		%		70-130	17-SEP-20
Titanium (Ti)-Dissolved			92.7		%		70-130	17-SEP-20
Uranium (U)-Dissolved			95.2		%		70-130	17-SEP-20
Vanadium (V)-Dissolved			98.9		%		70-130	17-SEP-20
Zinc (Zn)-Dissolved			96.1		%		70-130	17-SEP-20
MET-T-CCMS-VA	**Water**							
Batch R5226940								
WG3405856-2 LCS								
Aluminum (Al)-Total			104.2		%		80-120	17-SEP-20
Antimony (Sb)-Total			109.6		%		80-120	17-SEP-20
Arsenic (As)-Total			103.0		%		80-120	17-SEP-20
Barium (Ba)-Total			110.2		%		80-120	17-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5226940								
WG3405856-2 LCS								
Bismuth (Bi)-Total			103.7		%		80-120	17-SEP-20
Boron (B)-Total			100.8		%		80-120	17-SEP-20
Cadmium (Cd)-Total			107.3		%		80-120	17-SEP-20
Calcium (Ca)-Total			101.6		%		80-120	17-SEP-20
Chromium (Cr)-Total			103.3		%		80-120	17-SEP-20
Cobalt (Co)-Total			103.1		%		80-120	17-SEP-20
Copper (Cu)-Total			103.0		%		80-120	17-SEP-20
Iron (Fe)-Total			102.5		%		80-120	17-SEP-20
Lead (Pb)-Total			102.2		%		80-120	17-SEP-20
Lithium (Li)-Total			96.6		%		80-120	17-SEP-20
Magnesium (Mg)-Total			99.3		%		80-120	17-SEP-20
Manganese (Mn)-Total			108.1		%		80-120	17-SEP-20
Molybdenum (Mo)-Total			101.2		%		80-120	17-SEP-20
Nickel (Ni)-Total			104.7		%		80-120	17-SEP-20
Potassium (K)-Total			106.0		%		80-120	17-SEP-20
Selenium (Se)-Total			104.9		%		80-120	17-SEP-20
Silicon (Si)-Total			103.8		%		80-120	17-SEP-20
Silver (Ag)-Total			107.2		%		80-120	17-SEP-20
Sodium (Na)-Total			104.5		%		80-120	17-SEP-20
Strontium (Sr)-Total			103.4		%		80-120	17-SEP-20
Thallium (Tl)-Total			103.6		%		80-120	17-SEP-20
Tin (Sn)-Total			104.4		%		80-120	17-SEP-20
Titanium (Ti)-Total			101.0		%		80-120	17-SEP-20
Uranium (U)-Total			99.5		%		80-120	17-SEP-20
Vanadium (V)-Total			101.8		%		80-120	17-SEP-20
Zinc (Zn)-Total			109.3		%		80-120	17-SEP-20
WG3405856-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	17-SEP-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	17-SEP-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	17-SEP-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	17-SEP-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	17-SEP-20
Boron (B)-Total			<0.010		mg/L		0.01	17-SEP-20
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	17-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5226940								
WG3405856-1 MB								
Calcium (Ca)-Total			<0.050		mg/L		0.05	17-SEP-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	17-SEP-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	17-SEP-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	17-SEP-20
Iron (Fe)-Total			<0.010		mg/L		0.01	17-SEP-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	17-SEP-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	17-SEP-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	17-SEP-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	17-SEP-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	17-SEP-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	17-SEP-20
Potassium (K)-Total			<0.050		mg/L		0.05	17-SEP-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	17-SEP-20
Silicon (Si)-Total			<0.10		mg/L		0.1	17-SEP-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	17-SEP-20
Sodium (Na)-Total			<0.050		mg/L		0.05	17-SEP-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	17-SEP-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	17-SEP-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	17-SEP-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	17-SEP-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	17-SEP-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	17-SEP-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	17-SEP-20
Batch R5230596								
WG3407139-2 LCS								
Aluminum (Al)-Total			103.6		%		80-120	18-SEP-20
Antimony (Sb)-Total			115.7		%		80-120	18-SEP-20
Arsenic (As)-Total			105.6		%		80-120	18-SEP-20
Barium (Ba)-Total			108.0		%		80-120	18-SEP-20
Bismuth (Bi)-Total			108.7		%		80-120	18-SEP-20
Boron (B)-Total			102.9		%		80-120	18-SEP-20
Cadmium (Cd)-Total			105.2		%		80-120	18-SEP-20
Calcium (Ca)-Total			103.6		%		80-120	18-SEP-20
Chromium (Cr)-Total			106.7		%		80-120	18-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5230596								
WG3407139-2 LCS								
Cobalt (Co)-Total			106.2		%		80-120	18-SEP-20
Copper (Cu)-Total			103.8		%		80-120	18-SEP-20
Iron (Fe)-Total			105.9		%		80-120	18-SEP-20
Lead (Pb)-Total			107.8		%		80-120	18-SEP-20
Lithium (Li)-Total			96.5		%		80-120	18-SEP-20
Magnesium (Mg)-Total			102.1		%		80-120	18-SEP-20
Manganese (Mn)-Total			107.5		%		80-120	18-SEP-20
Molybdenum (Mo)-Total			102.7		%		80-120	18-SEP-20
Nickel (Ni)-Total			103.4		%		80-120	18-SEP-20
Potassium (K)-Total			103.2		%		80-120	18-SEP-20
Selenium (Se)-Total			106.6		%		80-120	18-SEP-20
Silicon (Si)-Total			104.2		%		80-120	18-SEP-20
Silver (Ag)-Total			106.1		%		80-120	18-SEP-20
Sodium (Na)-Total			109.8		%		80-120	18-SEP-20
Strontium (Sr)-Total			102.7		%		80-120	18-SEP-20
Thallium (Tl)-Total			106.1		%		80-120	18-SEP-20
Tin (Sn)-Total			105.7		%		80-120	18-SEP-20
Titanium (Ti)-Total			105.9		%		80-120	18-SEP-20
Uranium (U)-Total			105.0		%		80-120	18-SEP-20
Vanadium (V)-Total			108.4		%		80-120	18-SEP-20
Zinc (Zn)-Total			106.6		%		80-120	18-SEP-20
WG3407139-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	18-SEP-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	18-SEP-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	18-SEP-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	18-SEP-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	18-SEP-20
Boron (B)-Total			<0.010		mg/L		0.01	18-SEP-20
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	18-SEP-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	18-SEP-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	18-SEP-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	18-SEP-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	18-SEP-20
Iron (Fe)-Total			<0.010		mg/L		0.01	18-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5230596								
WG3407139-1 MB								
Lead (Pb)-Total			<0.000050		mg/L		0.00005	18-SEP-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	18-SEP-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	18-SEP-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	18-SEP-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	18-SEP-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	18-SEP-20
Potassium (K)-Total			<0.050		mg/L		0.05	18-SEP-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	18-SEP-20
Silicon (Si)-Total			<0.10		mg/L		0.1	18-SEP-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	18-SEP-20
Sodium (Na)-Total			<0.050		mg/L		0.05	18-SEP-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	18-SEP-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	18-SEP-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	18-SEP-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	18-SEP-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	18-SEP-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	18-SEP-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	18-SEP-20
NH3-L-F-CL	**Water**							
Batch R5224062								
WG3404326-14 LCS								
Ammonia as N			102.7		%		85-115	14-SEP-20
WG3404326-18 LCS								
Ammonia as N			103.9		%		85-115	15-SEP-20
WG3404326-13 MB								
Ammonia as N			<0.0050		mg/L		0.005	14-SEP-20
WG3404326-17 MB								
Ammonia as N			<0.0050		mg/L		0.005	15-SEP-20
NO2-L-IC-N-CL	**Water**							
Batch R5223278								
WG3404056-10 LCS								
Nitrite (as N)			100.1		%		90-110	12-SEP-20
WG3404056-9 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	12-SEP-20
NO3-L-IC-N-CL	**Water**							

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-L-IC-N-CL	**Water**							
Batch R5223278								
WG3404056-10 LCS								
Nitrate (as N)			101.8		%		90-110	12-SEP-20
WG3404056-9 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	12-SEP-20
ORP-CL	**Water**							
Batch R5224232								
WG3404997-2 CRM		**CL-ORP**						
ORP			220		mV		210-230	15-SEP-20
WG3404997-4 CRM		**CL-ORP**						
ORP			224		mV		210-230	15-SEP-20
P-T-L-COL-CL	**Water**							
Batch R5229838								
WG3407574-18 LCS								
Phosphorus (P)-Total			100.3		%		80-120	18-SEP-20
WG3407574-17 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	18-SEP-20
PH-CL	**Water**							
Batch R5226926								
WG3406781-11 LCS								
pH			7.00		pH		6.9-7.1	17-SEP-20
PO4-DO-L-COL-CL	**Water**							
Batch R5222820								
WG3403419-10 LCS								
Orthophosphate-Dissolved (as P)			99.98		%		80-120	12-SEP-20
WG3403419-9 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	12-SEP-20
SO4-IC-N-CL	**Water**							
Batch R5223278								
WG3404056-10 LCS								
Sulfate (SO4)			101.7		%		90-110	12-SEP-20
WG3404056-9 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	12-SEP-20
SOLIDS-TDS-CL	**Water**							

Quality Control Report

Workorder: L2502321 Report Date: 21-SEP-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-CL	**Water**							
Batch R5226876								
WG3405388-14 LCS								
Total Dissolved Solids			101.2		%		85-115	16-SEP-20
WG3405388-13 MB								
Total Dissolved Solids			<10		mg/L		10	16-SEP-20
TKN-L-F-CL	**Water**							
Batch R5224612								
WG3405544-2 LCS								
Total Kjeldahl Nitrogen			108.2		%		75-125	16-SEP-20
WG3405544-4 LCS								
Total Kjeldahl Nitrogen			111.8		%		75-125	16-SEP-20
WG3405544-6 LCS								
Total Kjeldahl Nitrogen			110.4		%		75-125	16-SEP-20
WG3405544-8 LCS								
Total Kjeldahl Nitrogen			110.5		%		75-125	16-SEP-20
WG3405544-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	16-SEP-20
WG3405544-3 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	16-SEP-20
WG3405544-5 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	16-SEP-20
WG3405544-7 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	16-SEP-20
TSS-L-CL	**Water**							
Batch R5226690								
WG3405393-4 LCS								
Total Suspended Solids			95.2		%		85-115	16-SEP-20
WG3405393-3 MB								
Total Suspended Solids			<1.0		mg/L		1	16-SEP-20
TURBIDITY-CL	**Water**							
Batch R5222915								
WG3403353-11 LCS								
Turbidity			96.5		%		85-115	12-SEP-20
WG3403353-10 MB								
Turbidity			<0.10		NTU		0.1	12-SEP-20

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

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	11-SEP-20 09:17	15-SEP-20 13:45	0.25	101	hours	EHTR-FM
	2	11-SEP-20 09:17	15-SEP-20 13:45	0.25	101	hours	EHTR-FM
	3	11-SEP-20 09:17	15-SEP-20 13:45	0.25	101	hours	EHTR-FM
	4	11-SEP-20 09:17	15-SEP-20 13:45	0.25	101	hours	EHTR-FM
pH							
	1	11-SEP-20 09:17	17-SEP-20 14:00	0.25	149	hours	EHTR-FM
	2	11-SEP-20 09:17	17-SEP-20 14:00	0.25	149	hours	EHTR-FM
	3	11-SEP-20 09:17	17-SEP-20 14:00	0.25	149	hours	EHTR-FM
	4	11-SEP-20 09:17	17-SEP-20 14:00	0.25	149	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2502321 were received on 12-SEP-20 09:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID:	CMO LAEMP Sept 2020	TURNAROUND TIME:

PROJECT/CLIENT INFO

Facility Name	REP
Project Manager	Cait Good
Email	cait.good@teck.com
Address	421 Pine Avenue
City	Sparwood
Province	BC
Postal Code	V0B 2G0
Country	Canada
Phone Number	250-425-8202

LABORATORY

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Lab Contact	Lyudmyla Shvets
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	Excel	PDF	EDD
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teckcoal@equisonline.com			x
flings@minnow.ca	x	x	x
carlie.meyer@teck.com	x	x	x
swench@minnow.ca	x	x	x

PO number: 689999

SAMPLE DETAILS

L2502321-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.	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_MI25_WS_LAEMP_CMO_2020-09_NP	RG_MI25	WS	No	9/11/2020	9:17	G	7	1	1	1	1	1	1	1
RG_RIVER1_WS_LAEMP_CMO_2020-09_NP	RG_RIVER	WS	No	9/11/2020	9:17	G	7	1	1	1	1	1	1	1
RG_FBLANK1_WS_LAEMP_CMO_2020-09_NP	RG_FBLANK	WS	No	9/11/2020	9:17	G	7	1	1	1	1	1	1	1
RG_TRIP1_WS_LAEMP_CMO_2020-09_NP	RG_TRIP	WS	No	9/11/2020	9:17	G	7	1		1	1		1	

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
	Jennifer Ings	September 11, 2020	DK ES	9/12 0900

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 11, 2020

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 15-SEP-20
Report Date: 21-SEP-20 17:23 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2503379

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: CMO LAEMP Sept 2020
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2503379-1	L2503379-2	L2503379-3		
	Description	WS	WS	WS		
	Sampled Date	12-SEP-20	12-SEP-20	13-SEP-20		
	Sampled Time	17:23	08:38	12:46		
	Client ID	RG_CORCK_WS_LAEMP_CMO_2020-09_NP	RG_MIUCO_WS_LAEMP_CMO_2020-09_NP	RG_MIDCO_WS_LAEMP_CMO_2020-09_NP		
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	1570	300	1120		
	Hardness (as CaCO3) (mg/L)	978	172	629		
	pH (pH)	8.15	8.41	8.27		
	ORP (mV)	423	330	448		
	Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0		
	Total Dissolved Solids (mg/L)	DLHC 1370	DLHC 189	DLHC 879		
	Turbidity (NTU)	0.72	0.25	0.61		
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0	<1.0		
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	259	156	222		
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	5.0	<1.0		
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0		
	Alkalinity, Total (as CaCO3) (mg/L)	259	161	222		
	Ammonia as N (mg/L)	0.0384	<0.0050	0.0266		
	Bromide (Br) (mg/L)	DLHC <0.25	<0.050	DLHC <0.25		
	Chloride (Cl) (mg/L)	DLHC 2.49	0.25	DLHC 2.28		
	Fluoride (F) (mg/L)	DLHC 0.22	0.089	DLHC 0.16		
	Ion Balance (%)	105	99.7	97.3		
	Nitrate (as N) (mg/L)	DLHC 4.93	<0.0050	DLHC 2.92		
	Nitrite (as N) (mg/L)	DLHC 0.0307	<0.0010	DLHC <0.0050		
	Total Kjeldahl Nitrogen (mg/L)	TKNI <0.050	<0.050	TKNI 0.146		
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	0.0033	<0.0010		
	Phosphorus (P)-Total (mg/L)	<0.0020	0.0045	<0.0020		
	Sulfate (SO4) (mg/L)	DLHC 752	16.6	DLHC 474		
	Anion Sum (meq/L)	21.2	3.57	14.6		
	Cation Sum (meq/L)	22.2	3.56	14.2		
	Cation - Anion Balance (%)	2.3	-0.2	-1.4		
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.42	1.09	1.59		
	Total Organic Carbon (mg/L)	1.45	1.28	1.77		
Total Metals	Aluminum (Al)-Total (mg/L)	0.0032	0.0050	0.0126		
	Antimony (Sb)-Total (mg/L)	0.00051	<0.00010	0.00030		
	Arsenic (As)-Total (mg/L)	0.00023	0.00017	0.00020		
	Barium (Ba)-Total (mg/L)	0.0437	0.0763	0.0660		
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020		
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050		
	Boron (B)-Total (mg/L)	0.099	0.012	0.063		
	Cadmium (Cd)-Total (ug/L)	0.0291	0.0073	0.0189		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2503379-1	L2503379-2	L2503379-3		
	Description	WS	WS	WS		
	Sampled Date	12-SEP-20	12-SEP-20	13-SEP-20		
	Sampled Time	17:23	08:38	12:46		
	Client ID	RG_CORCK_WS_LAEMP_CMO_2020-09_NP	RG_MIUCO_WS_LAEMP_CMO_2020-09_NP	RG_MIDCO_WS_LAEMP_CMO_2020-09_NP		
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	190	40.3	132		
	Chromium (Cr)-Total (mg/L)	<0.00010	0.00019	0.00014		
	Cobalt (Co)-Total (ug/L)	5.45	<0.10	1.93		
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050		
	Iron (Fe)-Total (mg/L)	0.038	0.010	0.025		
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050		
	Lithium (Li)-Total (mg/L)	0.0653	0.0037	0.0389		
	Magnesium (Mg)-Total (mg/L)	101	12.1	65.2		
	Manganese (Mn)-Total (mg/L)	0.0143	0.00195	0.00515		
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	<0.00050		
	Molybdenum (Mo)-Total (mg/L)	0.00193	0.000676	0.00140		
	Nickel (Ni)-Total (mg/L)	0.0644	<0.00050	0.0309		
	Potassium (K)-Total (mg/L)	3.43	0.411	2.23		
	Selenium (Se)-Total (ug/L)	17.7	0.296	10.5		
	Silicon (Si)-Total (mg/L)	2.17	2.22	2.20		
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Total (mg/L)	55.3	2.52	34.5		
	Strontium (Sr)-Total (mg/L)	0.926	0.141	0.595		
	Thallium (Tl)-Total (mg/L)	0.000059	<0.000010	0.000029		
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Total (mg/L)	0.00656	0.000272	0.00403		
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050		
	Zinc (Zn)-Total (mg/L)	0.0034	<0.0030	<0.0030		
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD		
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD		
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030		
	Antimony (Sb)-Dissolved (mg/L)	0.00046	<0.00010	0.00028		
	Arsenic (As)-Dissolved (mg/L)	0.00021	0.00012	0.00017		
	Barium (Ba)-Dissolved (mg/L)	0.0449	0.0789	0.0646		
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020		
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Boron (B)-Dissolved (mg/L)	0.101	0.012	0.062		
	Cadmium (Cd)-Dissolved (ug/L)	0.0265	0.0081	0.0201		
	Calcium (Ca)-Dissolved (mg/L)	207	47.7	140		
	Chromium (Cr)-Dissolved (mg/L)	0.00010	0.00021	0.00012		
	Cobalt (Co)-Dissolved (ug/L)	5.13	<0.10	1.78		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2503379-1	L2503379-2	L2503379-3		
	Description	WS	WS	WS		
	Sampled Date	12-SEP-20	12-SEP-20	13-SEP-20		
	Sampled Time	17:23	08:38	12:46		
	Client ID	RG_CORCK_WS_LAEMP_CMO_2020-09_NP	RG_MIUCO_WS_LAEMP_CMO_2020-09_NP	RG_MIDCO_WS_LAEMP_CMO_2020-09_NP		
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	0.00026	<0.00020	<0.00020		
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Lithium (Li)-Dissolved (mg/L)	0.0716	0.0043	0.0414		
	Magnesium (Mg)-Dissolved (mg/L)	112	12.7	68.0		
	Manganese (Mn)-Dissolved (mg/L)	0.00988	0.00145	0.00347		
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050		
	Molybdenum (Mo)-Dissolved (mg/L)	0.00183	0.000747	0.00133		
	Nickel (Ni)-Dissolved (mg/L)	0.0666	<0.00050	0.0303		
	Potassium (K)-Dissolved (mg/L)	3.81	0.435	2.26		
	Selenium (Se)-Dissolved (ug/L)	20.1	0.320	11.1		
	Silicon (Si)-Dissolved (mg/L)	2.05	2.28	2.00		
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Dissolved (mg/L)	59.8	2.68	35.9		
	Strontium (Sr)-Dissolved (mg/L)	0.938	0.154	0.625		
	Thallium (Tl)-Dissolved (mg/L)	0.000055	<0.000010	0.000026		
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Dissolved (mg/L)	0.00625	0.000275	0.00383		
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Zinc (Zn)-Dissolved (mg/L)	0.0023	<0.0010	<0.0010		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2503379-1, -2, -3
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2503379-1, -2, -3
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2503379-1, -2, -3
Matrix Spike	Selenium (Se)-Dissolved	MS-B	L2503379-1, -2, -3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2503379-1, -2, -3
Matrix Spike	Barium (Ba)-Total	MS-B	L2503379-1, -2, -3
Matrix Spike	Calcium (Ca)-Total	MS-B	L2503379-1, -2, -3
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2503379-1, -2, -3
Matrix Spike	Nickel (Ni)-Total	MS-B	L2503379-1, -2, -3
Matrix Spike	Strontium (Sr)-Total	MS-B	L2503379-1, -2, -3
Matrix Spike	Uranium (U)-Total	MS-B	L2503379-1, -2, -3

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

Reference Information

CL-L-IC-N-CL Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL Water Oxidation redution potential by elect. ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL Water Phosphorus (P)-Total APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL Water pH APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

Reference Information

PO4-DO-L-COL-CL	Water	Orthophosphate-Dissolved (as P)	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL	Water	Total Kjeldahl Nitrogen	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

CMO LAEMP Sept 2020

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0

Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5224717								
WG3405808-2 LCS								
Acidity (as CaCO3)			100.9		%		85-115	16-SEP-20
WG3405808-1 MB								
Acidity (as CaCO3)			1.7		mg/L		2	16-SEP-20
ALK-MAN-CL	**Water**							
Batch R5226926								
WG3406781-2 LCS								
Alkalinity, Total (as CaCO3)			101.3		%		85-115	17-SEP-20
WG3406781-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	17-SEP-20
BE-D-L-CCMS-VA	**Water**							
Batch R5230167								
WG3407095-2 LCS								
Beryllium (Be)-Dissolved			107.5		%		80-120	18-SEP-20
WG3407095-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	18-SEP-20
BE-T-L-CCMS-VA	**Water**							
Batch R5230865								
WG3407530-2 LCS								
Beryllium (Be)-Total			101.8		%		80-120	18-SEP-20
WG3407530-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	18-SEP-20
BR-L-IC-N-CL	**Water**							
Batch R5224527								
WG3405572-15 DUP		**L2503379-2**						
Bromide (Br)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	15-SEP-20
WG3405572-14 LCS								
Bromide (Br)			96.5		%		85-115	15-SEP-20
WG3405572-13 MB								
Bromide (Br)			<0.050		mg/L		0.05	15-SEP-20
WG3405572-16 MS		**L2503379-2**						
Bromide (Br)			106.1		%		75-125	15-SEP-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5230793								
WG3407917-2 LCS								
Dissolved Organic Carbon			104.8		%		80-120	18-SEP-20
WG3407917-1 MB								

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-LOW-CL	**Water**							
Batch R5230793								
WG3407917-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	18-SEP-20
C-TOT-ORG-LOW-CL	**Water**							
Batch R5230793								
WG3407917-2 LCS								
Total Organic Carbon			107.9		%		80-120	18-SEP-20
WG3407917-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	18-SEP-20
CL-L-IC-N-CL	**Water**							
Batch R5224527								
WG3405572-15 DUP		**L2503379-2**						
Chloride (Cl)		0.25	0.33	J	mg/L	0.08	0.2	15-SEP-20
WG3405572-14 LCS								
Chloride (Cl)			100.8		%		85-115	15-SEP-20
WG3405572-13 MB								
Chloride (Cl)			<0.10		mg/L		0.1	15-SEP-20
WG3405572-16 MS		**L2503379-2**						
Chloride (Cl)			110.1		%		75-125	15-SEP-20
EC-L-PCT-CL	**Water**							
Batch R5226926								
WG3406781-2 LCS								
Conductivity (@ 25C)			94.8		%		90-110	17-SEP-20
WG3406781-1 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	17-SEP-20
F-IC-N-CL	**Water**							
Batch R5224527								
WG3405572-15 DUP		**L2503379-2**						
Fluoride (F)		0.089	0.084		mg/L	5.3	20	15-SEP-20
WG3405572-14 LCS								
Fluoride (F)			106.0		%		90-110	15-SEP-20
WG3405572-13 MB								
Fluoride (F)			<0.020		mg/L		0.02	15-SEP-20
WG3405572-16 MS		**L2503379-2**						
Fluoride (F)			113.1		%		75-125	15-SEP-20
HG-D-CVAA-VA	**Water**							

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-CVAA-VA	**Water**							
Batch R5231716								
WG3408817-2 LCS								
Mercury (Hg)-Dissolved			98.6		%		80-120	21-SEP-20
WG3408817-1 MB		**NP**						
Mercury (Hg)-Dissolved			<0.0000050		mg/L		0.000005	21-SEP-20
HG-T-U-CVAF-VA	**Water**							
Batch R5231287								
WG3408412-2 LCS								
Mercury (Hg)-Total			93.4		%		80-120	21-SEP-20
WG3408412-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	21-SEP-20
WG3408412-4 MS		**L2503379-2**						
Mercury (Hg)-Total			92.3		%		70-130	21-SEP-20
MET-D-CCMS-VA	**Water**							
Batch R5230167								
WG3407095-2 LCS								
Aluminum (Al)-Dissolved			105.3		%		80-120	18-SEP-20
Antimony (Sb)-Dissolved			108.9		%		80-120	18-SEP-20
Arsenic (As)-Dissolved			106.4		%		80-120	18-SEP-20
Barium (Ba)-Dissolved			110.9		%		80-120	18-SEP-20
Bismuth (Bi)-Dissolved			113.0		%		80-120	18-SEP-20
Boron (B)-Dissolved			100.4		%		80-120	18-SEP-20
Cadmium (Cd)-Dissolved			107.3		%		80-120	18-SEP-20
Calcium (Ca)-Dissolved			109.8		%		80-120	18-SEP-20
Chromium (Cr)-Dissolved			104.7		%		80-120	18-SEP-20
Cobalt (Co)-Dissolved			105.2		%		80-120	18-SEP-20
Copper (Cu)-Dissolved			105.6		%		80-120	18-SEP-20
Iron (Fe)-Dissolved			100.8		%		80-120	18-SEP-20
Lead (Pb)-Dissolved			108.2		%		80-120	18-SEP-20
Lithium (Li)-Dissolved			108.7		%		80-120	18-SEP-20
Magnesium (Mg)-Dissolved			103.8		%		80-120	18-SEP-20
Manganese (Mn)-Dissolved			105.7		%		80-120	18-SEP-20
Molybdenum (Mo)-Dissolved			113.3		%		80-120	18-SEP-20
Nickel (Ni)-Dissolved			106.6		%		80-120	18-SEP-20
Potassium (K)-Dissolved			103.5		%		80-120	18-SEP-20
Selenium (Se)-Dissolved			115.2		%		80-120	18-SEP-20
Silicon (Si)-Dissolved			107.2		%		60-140	18-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5230167								
WG3407095-2 LCS								
Silver (Ag)-Dissolved			112.6		%		80-120	18-SEP-20
Sodium (Na)-Dissolved			107.8		%		80-120	18-SEP-20
Strontium (Sr)-Dissolved			113.8		%		80-120	18-SEP-20
Thallium (Tl)-Dissolved			109.6		%		80-120	18-SEP-20
Tin (Sn)-Dissolved			107.0		%		80-120	18-SEP-20
Titanium (Ti)-Dissolved			99.97		%		80-120	18-SEP-20
Uranium (U)-Dissolved			108.8		%		80-120	18-SEP-20
Vanadium (V)-Dissolved			105.8		%		80-120	18-SEP-20
Zinc (Zn)-Dissolved			109.8		%		80-120	18-SEP-20
WG3407095-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	18-SEP-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	18-SEP-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	18-SEP-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	18-SEP-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	18-SEP-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	18-SEP-20
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	18-SEP-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	18-SEP-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	18-SEP-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	18-SEP-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	18-SEP-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	18-SEP-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	18-SEP-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	18-SEP-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	18-SEP-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	18-SEP-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	18-SEP-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	18-SEP-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	18-SEP-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	18-SEP-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	18-SEP-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	18-SEP-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	18-SEP-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	18-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5230167								
WG3407095-1 MB		**NP**						
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	18-SEP-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	18-SEP-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	18-SEP-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	18-SEP-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	18-SEP-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	18-SEP-20
MET-T-CCMS-VA	**Water**							
Batch R5230865								
WG3407530-2 LCS								
Aluminum (Al)-Total			101.9		%		80-120	18-SEP-20
Antimony (Sb)-Total			110.5		%		80-120	18-SEP-20
Arsenic (As)-Total			104.4		%		80-120	18-SEP-20
Barium (Ba)-Total			110.8		%		80-120	18-SEP-20
Bismuth (Bi)-Total			106.8		%		80-120	18-SEP-20
Boron (B)-Total			101.7		%		80-120	18-SEP-20
Cadmium (Cd)-Total			107.0		%		80-120	18-SEP-20
Calcium (Ca)-Total			102.1		%		80-120	18-SEP-20
Chromium (Cr)-Total			106.5		%		80-120	18-SEP-20
Cobalt (Co)-Total			103.7		%		80-120	18-SEP-20
Copper (Cu)-Total			103.3		%		80-120	18-SEP-20
Iron (Fe)-Total			108.4		%		80-120	18-SEP-20
Lead (Pb)-Total			108.3		%		80-120	18-SEP-20
Lithium (Li)-Total			103.1		%		80-120	18-SEP-20
Magnesium (Mg)-Total			102.7		%		80-120	18-SEP-20
Manganese (Mn)-Total			105.7		%		80-120	18-SEP-20
Molybdenum (Mo)-Total			105.1		%		80-120	18-SEP-20
Nickel (Ni)-Total			102.9		%		80-120	18-SEP-20
Potassium (K)-Total			104.3		%		80-120	18-SEP-20
Selenium (Se)-Total			104.5		%		80-120	18-SEP-20
Silicon (Si)-Total			110.2		%		80-120	18-SEP-20
Silver (Ag)-Total			108.0		%		80-120	18-SEP-20
Sodium (Na)-Total			106.6		%		80-120	18-SEP-20
Strontium (Sr)-Total			104.5		%		80-120	18-SEP-20
Thallium (Tl)-Total			105.0		%		80-120	18-SEP-20

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5230865								
WG3407530-2 LCS								
Tin (Sn)-Total			105.9		%		80-120	18-SEP-20
Titanium (Ti)-Total			97.0		%		80-120	18-SEP-20
Uranium (U)-Total			106.4		%		80-120	18-SEP-20
Vanadium (V)-Total			104.7		%		80-120	18-SEP-20
Zinc (Zn)-Total			99.2		%		80-120	18-SEP-20
WG3407530-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	18-SEP-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	18-SEP-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	18-SEP-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	18-SEP-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	18-SEP-20
Boron (B)-Total			<0.010		mg/L		0.01	18-SEP-20
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	18-SEP-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	18-SEP-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	18-SEP-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	18-SEP-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	18-SEP-20
Iron (Fe)-Total			<0.010		mg/L		0.01	18-SEP-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	18-SEP-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	18-SEP-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	18-SEP-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	18-SEP-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	18-SEP-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	18-SEP-20
Potassium (K)-Total			<0.050		mg/L		0.05	18-SEP-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	18-SEP-20
Silicon (Si)-Total			<0.10		mg/L		0.1	18-SEP-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	18-SEP-20
Sodium (Na)-Total			<0.050		mg/L		0.05	18-SEP-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	18-SEP-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	18-SEP-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	18-SEP-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	18-SEP-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	18-SEP-20

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5230865								
WG3407530-1 MB								
Vanadium (V)-Total			<0.00050		mg/L		0.0005	18-SEP-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	18-SEP-20
NH3-L-F-CL	**Water**							
Batch R5228422								
WG3406742-10 LCS								
Ammonia as N			97.1		%		85-115	17-SEP-20
WG3406742-9 MB								
Ammonia as N			<0.0050		mg/L		0.005	17-SEP-20
NO2-L-IC-N-CL	**Water**							
Batch R5224527								
WG3405572-15 DUP		**L2503379-2**						
Nitrite (as N)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	15-SEP-20
WG3405572-14 LCS								
Nitrite (as N)			103.9		%		90-110	15-SEP-20
WG3405572-13 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	15-SEP-20
WG3405572-16 MS		**L2503379-2**						
Nitrite (as N)			111.7		%		75-125	15-SEP-20
NO3-L-IC-N-CL	**Water**							
Batch R5224527								
WG3405572-15 DUP		**L2503379-2**						
Nitrate (as N)		<0.0050	0.0059	RPD-NA	mg/L	N/A	20	15-SEP-20
WG3405572-14 LCS								
Nitrate (as N)			100.9		%		90-110	15-SEP-20
WG3405572-13 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	15-SEP-20
WG3405572-16 MS		**L2503379-2**						
Nitrate (as N)			110.0		%		75-125	15-SEP-20
ORP-CL	**Water**							
Batch R5225056								
WG3405837-2 CRM		**CL-ORP**						
ORP			220		mV		210-230	16-SEP-20
P-T-L-COL-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-T-L-COL-CL	**Water**							
Batch R5230972								
WG3408145-6 LCS								
Phosphorus (P)-Total			97.6		%		80-120	19-SEP-20
WG3408145-5 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	19-SEP-20
PH-CL	**Water**							
Batch R5226926								
WG3406781-2 LCS								
pH			7.00		pH		6.9-7.1	17-SEP-20
PO4-DO-L-COL-CL	**Water**							
Batch R5224224								
WG3404933-6 LCS								
Orthophosphate-Dissolved (as P)			104.8		%		80-120	15-SEP-20
WG3404933-5 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	15-SEP-20
SO4-IC-N-CL	**Water**							
Batch R5224527								
WG3405572-15 DUP		**L2503379-2**						
Sulfate (SO4)		16.6	16.6		mg/L	0.1	20	15-SEP-20
WG3405572-14 LCS								
Sulfate (SO4)			103.0		%		90-110	15-SEP-20
WG3405572-13 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	15-SEP-20
WG3405572-16 MS		**L2503379-2**						
Sulfate (SO4)			110.2		%		75-125	15-SEP-20
SOLIDS-TDS-CL	**Water**							
Batch R5229601								
WG3406333-6 DUP		**L2503379-1**						
Total Dissolved Solids		1370	1360		mg/L	1.0	20	17-SEP-20
WG3406333-5 LCS								
Total Dissolved Solids			98.3		%		85-115	17-SEP-20
WG3406333-4 MB								
Total Dissolved Solids			<10		mg/L		10	17-SEP-20
TKN-L-F-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-L-F-CL	**Water**							
Batch R5226059								
WG3406476-12 LCS								
Total Kjeldahl Nitrogen			104.7		%		75-125	17-SEP-20
WG3406476-2 LCS								
Total Kjeldahl Nitrogen			99.6		%		75-125	17-SEP-20
WG3406476-4 LCS								
Total Kjeldahl Nitrogen			106.0		%		75-125	17-SEP-20
WG3406476-6 LCS								
Total Kjeldahl Nitrogen			103.7		%		75-125	17-SEP-20
WG3406476-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	17-SEP-20
WG3406476-11 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	17-SEP-20
WG3406476-3 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	17-SEP-20
WG3406476-5 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	17-SEP-20
TSS-L-CL	**Water**							
Batch R5229505								
WG3406130-4 LCS								
Total Suspended Solids			93.1		%		85-115	17-SEP-20
WG3406130-3 MB								
Total Suspended Solids			<1.0		mg/L		1	17-SEP-20
TURBIDITY-CL	**Water**							
Batch R5225305								
WG3405584-2 LCS								
Turbidity			99.0		%		85-115	16-SEP-20
WG3405584-1 MB								
Turbidity			<0.10		NTU		0.1	16-SEP-20

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

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	12-SEP-20 17:23	16-SEP-20 12:30	0.25	91	hours	EHTR-FM
	2	12-SEP-20 08:38	16-SEP-20 12:30	0.25	100	hours	EHTR-FM
	3	13-SEP-20 12:46	16-SEP-20 12:30	0.25	72	hours	EHTR-FM
Turbidity							
	1	12-SEP-20 17:23	16-SEP-20 06:45	3	4	days	EHTL
	2	12-SEP-20 08:38	16-SEP-20 06:45	3	4	days	EHTR
pH							
	1	12-SEP-20 17:23	17-SEP-20 14:00	0.25	117	hours	EHTR-FM
	2	12-SEP-20 08:38	17-SEP-20 14:00	0.25	125	hours	EHTR-FM
	3	13-SEP-20 12:46	17-SEP-20 14:00	0.25	97	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2503379 were received on 15-SEP-20 10:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID:	CMO LAEMP Sept 2020	TURNAROUND TIME:	

PROJECT/CLIENT INFO

Facility Name	REP		
Project Manager	Cait Good		
Email	cait.good@teck.com		
Address	421 Pine Avenue		
City	Sparwood	Province	BC
Postal Code	V0B 2G0	Country	Canada
Phone Number	250-425-8202		

LABORATORY

Lab Name	ALS Calgary		
Lab Contact	Lyudmyla Shvets		
Email	lyudmyla.shvets@alsglobal.com		
Address	2559 29 Street NE		
City	Calgary	Province	AB
Postal Code	T1Y 7B5	Country	Canada
Phone Number	1 403 407 1794		

	Excel	PDF	EDD
cait.good@teck.com	x	x	x
teckcoal@equisonline.com			x
fings@minnow.ca	x	x	x
carlie.meyer@teck.com	x	x	x
sweech@minnow.ca	x	x	x

PO number: 689999

L2503379-COFC

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_CORCK_WS_LAEMP_CMO_2020-09_NP	RG_CORCK	WS	No	9/12/2020	17:23	G	7	1	1	1	1	1	1	1
RG_MIUCO_WS_LAEMP_CMO_2020-09_NP	RG_MIUCO	WS	No	9/12/2020	8:38	G	7	1	1	1	1	1	1	1
RG_MIDCO_WS_LAEMP_CMO_2020-09_NP	RG_MIDCO	WS	No	9/13/2020	12:46	G	7	1	1	1	1	1	1	1

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
	Jennifer Ings	September 14, 2020		09/15 9:00

NB 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		Date/Time	September 14, 2020
Emergency (1 Business Day) - 100% surcharge					
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

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Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 17-SEP-20
Report Date: 24-SEP-20 13:13 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2504626

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: CMO LAEMP SEPT 2020
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2504626-1	L2504626-2			
	Description	WS	WS			
	Sampled Date	15-SEP-20	16-SEP-20			
	Sampled Time	14:51	12:06			
	Client ID	RG_MIDAG_WS_LAEMP_CMO_2020-09_N	RG_MIULE_WS_LAEMP_CMO_2020-09_NP			
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	741	634			
	Hardness (as CaCO3) (mg/L)	406	346			
	pH (pH)	8.24	8.25			
	ORP (mV)	443	424			
	Total Suspended Solids (mg/L)	<1.0	<1.0			
	Total Dissolved Solids (mg/L)	536 DLHC	444 DLHC			
	Turbidity (NTU)	0.19	0.34			
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	186	188			
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Total (as CaCO3) (mg/L)	186	188			
	Ammonia as N (mg/L)	0.0050	0.0051			
	Bromide (Br) (mg/L)	<0.050	<0.050			
	Chloride (Cl) (mg/L)	1.11	1.27			
	Fluoride (F) (mg/L)	0.162	0.136			
	Ion Balance (%)	104	100			
	Nitrate (as N) (mg/L)	1.25	0.798			
	Nitrite (as N) (mg/L)	0.0027	0.0010			
	Total Kjeldahl Nitrogen (mg/L)	0.232	0.132			
	Orthophosphate-Dissolved (as P) (mg/L)	0.0012	0.0014			
	Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020			
	Sulfate (SO4) (mg/L)	230	175			
	Anion Sum (meq/L)	8.63	7.49			
	Cation Sum (meq/L)	8.96	7.50			
	Cation - Anion Balance (%)	1.9	0.1			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	<0.50	<0.50			
	Total Organic Carbon (mg/L)	<0.50	<0.50			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0049	0.0080			
	Antimony (Sb)-Total (mg/L)	0.00017	0.00012			
	Arsenic (As)-Total (mg/L)	0.00027	0.00021			
	Barium (Ba)-Total (mg/L)	0.0874	0.119			
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020			
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050			
	Boron (B)-Total (mg/L)	0.030	0.022			
	Cadmium (Cd)-Total (ug/L)	0.0253	0.0251			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2504626-1	L2504626-2			
	Description	WS	WS			
	Sampled Date	15-SEP-20	16-SEP-20			
	Sampled Time	14:51	12:06			
	Client ID	RG_MIDAG_WS_LAEMP_CMO_2020-09_N	RG_MIULE_WS_LAEMP_CMO_2020-09_NP			
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	99.6	90.5			
	Chromium (Cr)-Total (mg/L)	0.00065	0.00019			
	Cobalt (Co)-Total (ug/L)	0.25	<0.10			
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050			
	Iron (Fe)-Total (mg/L)	0.011	<0.010			
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Total (mg/L)	0.0181	0.0129			
	Magnesium (Mg)-Total (mg/L)	37.4	29.8			
	Manganese (Mn)-Total (mg/L)	0.00202	0.00077			
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050			
	Molybdenum (Mo)-Total (mg/L)	0.00101	0.000931			
	Nickel (Ni)-Total (mg/L)	0.00623	0.00246			
	Potassium (K)-Total (mg/L)	1.37	1.11			
	Selenium (Se)-Total (ug/L)	5.59	3.96			
	Silicon (Si)-Total (mg/L)	1.88	2.02			
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Total (mg/L)	18.2	12.5			
	Strontium (Sr)-Total (mg/L)	0.367	0.294			
	Thallium (Tl)-Total (mg/L)	0.000020	<0.000010			
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010			
	Uranium (U)-Total (mg/L)	0.00205	0.00136			
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050			
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030			
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD			
	Dissolved Metals Filtration Location	FIELD	FIELD			
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030			
	Antimony (Sb)-Dissolved (mg/L)	0.00016	0.00012			
	Arsenic (As)-Dissolved (mg/L)	0.00022	0.00019			
	Barium (Ba)-Dissolved (mg/L)	0.0872	0.116			
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020			
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050			
	Boron (B)-Dissolved (mg/L)	0.032	0.023			
	Cadmium (Cd)-Dissolved (ug/L)	0.0226	0.0188			
	Calcium (Ca)-Dissolved (mg/L)	100	89.5			
	Chromium (Cr)-Dissolved (mg/L)	0.00017	0.00014			
	Cobalt (Co)-Dissolved (ug/L)	0.22	<0.10			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2504626-1	L2504626-2			
	Description	WS	WS			
	Sampled Date	15-SEP-20	16-SEP-20			
	Sampled Time	14:51	12:06			
	Client ID	RG_MIDAG_WS_LAEMP_CMO_2020-09_N	RG_MIULE_WS_LAEMP_CMO_2020-09_NP			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020	<0.00020			
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010			
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	0.0198	0.0137			
	Magnesium (Mg)-Dissolved (mg/L)	38.0	29.7			
	Manganese (Mn)-Dissolved (mg/L)	0.00161	0.00050			
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050			
	Molybdenum (Mo)-Dissolved (mg/L)	0.00100	0.000909			
	Nickel (Ni)-Dissolved (mg/L)	0.00606	0.00226			
	Potassium (K)-Dissolved (mg/L)	1.34	1.05			
	Selenium (Se)-Dissolved (ug/L)	5.35	4.01			
	Silicon (Si)-Dissolved (mg/L)	1.73	1.86			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	18.5	13.0			
	Strontium (Sr)-Dissolved (mg/L)	0.365	0.296			
	Thallium (Tl)-Dissolved (mg/L)	0.000022	<0.000010			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010			
	Uranium (U)-Dissolved (mg/L)	0.00200	0.00133			
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050			
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Total	MS-B	L2504626-1, -2
Matrix Spike	Calcium (Ca)-Total	MS-B	L2504626-1, -2
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2504626-1, -2
Matrix Spike	Selenium (Se)-Total	MS-B	L2504626-1, -2
Matrix Spike	Strontium (Sr)-Total	MS-B	L2504626-1, -2

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

ALS Test Code	Matrix	Test Description	Method Reference**
BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

ALS Test Code	Matrix	Test Description	Method Reference**
BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

ALS Test Code	Matrix	Test Description	Method Reference**
BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ALS Test Code	Matrix	Test Description	Method Reference**
C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

ALS Test Code	Matrix	Test Description	Method Reference**
C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

ALS Test Code	Matrix	Test Description	Method Reference**
CL-L-IC-N-CL	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ALS Test Code	Matrix	Test Description	Method Reference**
EC-L-PCT-CL	Water	Electrical Conductivity (EC)	APHA 2510B

Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25C.

ALS Test Code	Matrix	Test Description	Method Reference**
F-IC-N-CL	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Reference Information

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in $CaCO_3$ equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL Water Oxidation redution potential by elect. ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL Water Phosphorus (P)-Total APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL Water pH APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL Water Orthophosphate-Dissolved (as P) APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Reference Information

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL	Water	Total Kjeldahl Nitrogen	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

CMO LAEMP SEPT 2020

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0

Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5229719								
WG3407723-11 LCS								
Acidity (as CaCO3)			98.7		%		85-115	18-SEP-20
WG3407723-14 LCS								
Acidity (as CaCO3)			97.8		%		85-115	18-SEP-20
WG3407723-10 MB								
Acidity (as CaCO3)			1.8		mg/L		2	18-SEP-20
WG3407723-13 MB								
Acidity (as CaCO3)			1.8		mg/L		2	18-SEP-20
ALK-MAN-CL	**Water**							
Batch R5232154								
WG3409751-11 LCS								
Alkalinity, Total (as CaCO3)			100.7		%		85-115	22-SEP-20
WG3409751-10 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	22-SEP-20
BE-D-L-CCMS-VA	**Water**							
Batch R5230869								
WG3407811-2 LCS								
Beryllium (Be)-Dissolved			99.0		%		80-120	19-SEP-20
WG3407811-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	19-SEP-20
BE-T-L-CCMS-VA	**Water**							
Batch R5231517								
WG3407922-2 LCS								
Beryllium (Be)-Total			99.8		%		80-120	20-SEP-20
WG3407922-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	20-SEP-20
BR-L-IC-N-CL	**Water**							
Batch R5228923								
WG3407420-2 LCS								
Bromide (Br)			102.0		%		85-115	17-SEP-20
WG3407420-1 MB								
Bromide (Br)			<0.050		mg/L		0.05	17-SEP-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5232361								
WG3409957-6 LCS								
Dissolved Organic Carbon			100.3		%		80-120	21-SEP-20
WG3409957-5 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-LOW-CL	**Water**							
Batch R5232361								
WG3409957-5 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	21-SEP-20
C-TOT-ORG-LOW-CL	**Water**							
Batch R5232361								
WG3409957-6 LCS								
Total Organic Carbon			108.7		%		80-120	21-SEP-20
WG3409957-5 MB								
Total Organic Carbon			<0.50		mg/L		0.5	21-SEP-20
CL-L-IC-N-CL	**Water**							
Batch R5228923								
WG3407420-2 LCS								
Chloride (Cl)			99.1		%		85-115	17-SEP-20
WG3407420-1 MB								
Chloride (Cl)			<0.10		mg/L		0.1	17-SEP-20
EC-L-PCT-CL	**Water**							
Batch R5232154								
WG3409751-11 LCS								
Conductivity (@ 25C)			99.9		%		90-110	22-SEP-20
WG3409751-10 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	22-SEP-20
F-IC-N-CL	**Water**							
Batch R5228923								
WG3407420-2 LCS								
Fluoride (F)			103.5		%		90-110	17-SEP-20
WG3407420-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	17-SEP-20
HG-D-CVAA-VA	**Water**							
Batch R5231937								
WG3409373-10 LCS								
Mercury (Hg)-Dissolved			98.3		%		80-120	22-SEP-20
WG3409373-9 MB		**NP**						
Mercury (Hg)-Dissolved			<0.0000050		mg/L		0.000005	22-SEP-20
WG3409373-12 MS		**L2504626-2**						
Mercury (Hg)-Dissolved			98.3		%		70-130	22-SEP-20
MET-D-CCMS-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5230869								
WG3407811-2 LCS								
Aluminum (Al)-Dissolved			98.1		%		80-120	19-SEP-20
Antimony (Sb)-Dissolved			95.4		%		80-120	19-SEP-20
Arsenic (As)-Dissolved			99.3		%		80-120	19-SEP-20
Barium (Ba)-Dissolved			100.4		%		80-120	19-SEP-20
Bismuth (Bi)-Dissolved			93.2		%		80-120	19-SEP-20
Boron (B)-Dissolved			96.6		%		80-120	19-SEP-20
Cadmium (Cd)-Dissolved			97.9		%		80-120	19-SEP-20
Calcium (Ca)-Dissolved			100.3		%		80-120	19-SEP-20
Chromium (Cr)-Dissolved			101.9		%		80-120	19-SEP-20
Cobalt (Co)-Dissolved			97.0		%		80-120	19-SEP-20
Copper (Cu)-Dissolved			97.6		%		80-120	19-SEP-20
Iron (Fe)-Dissolved			99.0		%		80-120	19-SEP-20
Lead (Pb)-Dissolved			97.0		%		80-120	19-SEP-20
Lithium (Li)-Dissolved			99.9		%		80-120	19-SEP-20
Magnesium (Mg)-Dissolved			101.9		%		80-120	19-SEP-20
Manganese (Mn)-Dissolved			96.9		%		80-120	19-SEP-20
Molybdenum (Mo)-Dissolved			101.3		%		80-120	19-SEP-20
Nickel (Ni)-Dissolved			98.4		%		80-120	19-SEP-20
Potassium (K)-Dissolved			100.8		%		80-120	19-SEP-20
Selenium (Se)-Dissolved			95.7		%		80-120	19-SEP-20
Silicon (Si)-Dissolved			99.9		%		60-140	19-SEP-20
Silver (Ag)-Dissolved			102.9		%		80-120	19-SEP-20
Sodium (Na)-Dissolved			101.5		%		80-120	19-SEP-20
Strontium (Sr)-Dissolved			103.4		%		80-120	19-SEP-20
Thallium (Tl)-Dissolved			96.7		%		80-120	19-SEP-20
Tin (Sn)-Dissolved			97.4		%		80-120	19-SEP-20
Titanium (Ti)-Dissolved			91.0		%		80-120	19-SEP-20
Uranium (U)-Dissolved			95.3		%		80-120	19-SEP-20
Vanadium (V)-Dissolved			99.4		%		80-120	19-SEP-20
Zinc (Zn)-Dissolved			100.6		%		80-120	19-SEP-20
WG3407811-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	19-SEP-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	19-SEP-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	19-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5230869								
WG3407811-1 MB		**NP**						
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	19-SEP-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	19-SEP-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	19-SEP-20
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	19-SEP-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	19-SEP-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	19-SEP-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	19-SEP-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	19-SEP-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	19-SEP-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	19-SEP-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	19-SEP-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	19-SEP-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	19-SEP-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	19-SEP-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	19-SEP-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	19-SEP-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	19-SEP-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	19-SEP-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	19-SEP-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	19-SEP-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	19-SEP-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	19-SEP-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	19-SEP-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	19-SEP-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	19-SEP-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	19-SEP-20
Batch R5232586								
WG3407811-1 MB		**NP**						
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	22-SEP-20
MET-T-CCMS-VA	**Water**							
Batch R5231517								
WG3407922-2 LCS								
Aluminum (Al)-Total			104.0		%		80-120	20-SEP-20
Antimony (Sb)-Total			106.6		%		80-120	20-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5231517								
WG3407922-2 LCS								
Arsenic (As)-Total			100.5		%		80-120	20-SEP-20
Barium (Ba)-Total			99.9		%		80-120	20-SEP-20
Bismuth (Bi)-Total			103.8		%		80-120	20-SEP-20
Boron (B)-Total			92.1		%		80-120	20-SEP-20
Cadmium (Cd)-Total			103.0		%		80-120	20-SEP-20
Calcium (Ca)-Total			102.4		%		80-120	20-SEP-20
Chromium (Cr)-Total			101.4		%		80-120	20-SEP-20
Cobalt (Co)-Total			101.0		%		80-120	20-SEP-20
Copper (Cu)-Total			100.5		%		80-120	20-SEP-20
Iron (Fe)-Total			99.7		%		80-120	20-SEP-20
Lead (Pb)-Total			102.7		%		80-120	20-SEP-20
Lithium (Li)-Total			96.8		%		80-120	20-SEP-20
Magnesium (Mg)-Total			101.6		%		80-120	20-SEP-20
Manganese (Mn)-Total			106.3		%		80-120	20-SEP-20
Molybdenum (Mo)-Total			103.4		%		80-120	20-SEP-20
Nickel (Ni)-Total			103.6		%		80-120	20-SEP-20
Potassium (K)-Total			106.7		%		80-120	20-SEP-20
Selenium (Se)-Total			103.4		%		80-120	20-SEP-20
Silicon (Si)-Total			109.1		%		80-120	20-SEP-20
Silver (Ag)-Total			105.8		%		80-120	20-SEP-20
Sodium (Na)-Total			102.4		%		80-120	20-SEP-20
Strontium (Sr)-Total			105.8		%		80-120	20-SEP-20
Thallium (Tl)-Total			101.8		%		80-120	20-SEP-20
Tin (Sn)-Total			101.4		%		80-120	20-SEP-20
Titanium (Ti)-Total			100.2		%		80-120	20-SEP-20
Uranium (U)-Total			101.3		%		80-120	20-SEP-20
Vanadium (V)-Total			105.0		%		80-120	20-SEP-20
Zinc (Zn)-Total			104.9		%		80-120	20-SEP-20
WG3407922-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	20-SEP-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	20-SEP-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	20-SEP-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	20-SEP-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	20-SEP-20

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5231517								
WG3407922-1 MB								
Boron (B)-Total			<0.010		mg/L		0.01	20-SEP-20
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	20-SEP-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	20-SEP-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	20-SEP-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	20-SEP-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	20-SEP-20
Iron (Fe)-Total			<0.010		mg/L		0.01	20-SEP-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	20-SEP-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	20-SEP-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	20-SEP-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	20-SEP-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	20-SEP-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	20-SEP-20
Potassium (K)-Total			<0.050		mg/L		0.05	20-SEP-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	20-SEP-20
Silicon (Si)-Total			<0.10		mg/L		0.1	20-SEP-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	20-SEP-20
Sodium (Na)-Total			<0.050		mg/L		0.05	20-SEP-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	20-SEP-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	20-SEP-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	20-SEP-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	20-SEP-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	20-SEP-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	20-SEP-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	20-SEP-20
NH3-L-F-CL	**Water**							
Batch R5232236								
WG3409307-2 LCS								
Ammonia as N			99.7		%		85-115	21-SEP-20
WG3409307-1 MB								
Ammonia as N			<0.0050		mg/L		0.005	21-SEP-20
NO2-L-IC-N-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-L-IC-N-CL	**Water**							
Batch R5228923								
WG3407420-2 LCS								
Nitrite (as N)			101.4		%		90-110	17-SEP-20
WG3407420-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	17-SEP-20
NO3-L-IC-N-CL	**Water**							
Batch R5228923								
WG3407420-2 LCS								
Nitrate (as N)			100.2		%		90-110	17-SEP-20
WG3407420-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	17-SEP-20
ORP-CL	**Water**							
Batch R5230757								
WG3407855-3 CRM		**CL-ORP**						
ORP			221		mV		210-230	18-SEP-20
P-T-L-COL-CL	**Water**							
Batch R5232246								
WG3409788-6 LCS								
Phosphorus (P)-Total			99.0		%		80-120	22-SEP-20
WG3409788-5 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	22-SEP-20
PH-CL	**Water**							
Batch R5232154								
WG3409751-11 LCS								
pH			6.94		pH		6.9-7.1	22-SEP-20
PO4-DO-L-COL-CL	**Water**							
Batch R5228141								
WG3406978-4 LCS								
Orthophosphate-Dissolved (as P)			100.4		%		80-120	17-SEP-20
WG3406978-3 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	17-SEP-20
SO4-IC-N-CL	**Water**							
Batch R5228923								
WG3407420-2 LCS								
Sulfate (SO4)			99.9		%		90-110	17-SEP-20
WG3407420-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-N-CL	**Water**							
Batch R5228923								
WG3407420-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	17-SEP-20
SOLIDS-TDS-CL	**Water**							
Batch R5232371								
WG3408576-11 LCS								
Total Dissolved Solids			100.3		%		85-115	21-SEP-20
WG3408576-17 LCS								
Total Dissolved Solids			101.0		%		85-115	21-SEP-20
WG3408576-10 MB								
Total Dissolved Solids			<10		mg/L		10	21-SEP-20
WG3408576-16 MB								
Total Dissolved Solids			<10		mg/L		10	21-SEP-20
TKN-L-F-CL	**Water**							
Batch R5231791								
WG3409258-12 LCS								
Total Kjeldahl Nitrogen			93.7		%		75-125	21-SEP-20
WG3409258-16 LCS								
Total Kjeldahl Nitrogen			95.0		%		75-125	21-SEP-20
WG3409258-2 LCS								
Total Kjeldahl Nitrogen			94.1		%		75-125	21-SEP-20
WG3409258-20 LCS								
Total Kjeldahl Nitrogen			97.7		%		75-125	21-SEP-20
WG3409258-4 LCS								
Total Kjeldahl Nitrogen			101.8		%		75-125	21-SEP-20
WG3409258-8 LCS								
Total Kjeldahl Nitrogen			97.6		%		75-125	21-SEP-20
WG3409258-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	21-SEP-20
WG3409258-11 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	21-SEP-20
WG3409258-15 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	21-SEP-20
WG3409258-19 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	21-SEP-20
WG3409258-3 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	21-SEP-20
WG3409258-7 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-L-F-CL	**Water**							
Batch R5231791								
WG3409258-7 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	21-SEP-20
TSS-L-CL	**Water**							
Batch R5231562								
WG3408575-10 LCS								
Total Suspended Solids			108.0		%		85-115	21-SEP-20
WG3408575-8 LCS								
Total Suspended Solids			88.3		%		85-115	21-SEP-20
WG3408575-7 MB								
Total Suspended Solids			<1.0		mg/L		1	21-SEP-20
WG3408575-9 MB								
Total Suspended Solids			<1.0		mg/L		1	21-SEP-20
TURBIDITY-CL	**Water**							
Batch R5228150								
WG3406697-15 LCS								
Turbidity			96.5		%		85-115	17-SEP-20
WG3406697-14 MB								
Turbidity			<0.10		NTU		0.1	17-SEP-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	15-SEP-20 14:51	18-SEP-20 14:15	0.25	72	hours	EHTR-FM
	2	16-SEP-20 12:06	18-SEP-20 14:15	0.25	50	hours	EHTR-FM
pH							
	1	15-SEP-20 14:51	22-SEP-20 14:00	0.25	167	hours	EHTR-FM
	2	16-SEP-20 12:06	22-SEP-20 14:00	0.25	146	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2504626 were received on 17-SEP-20 10:55.

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.

[illegible]O LAEMP Sept 2020

TURNAROUND TIME:

CLIENT INFORMATION				LABORATORY			
[illegible] Manager	Cait Good			Lab Name	ALS Calgary		
Email	cait.good@teck.com			Lab Contact	Lyudmyla Shvets		
Address	421 Pine Avenue			Email	lyudmyla.shvets@alsglobal.com		
				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
cait.good@teck.com	x	x	x
teckcoal@equisonline.com			x
jings@minnow.ca	x	x	x
carlie.meyer@teck.com	x	x	x
sweech@minnow.ca	x	x	x

PO number: 689999

L2504626-COFC

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_MIDAG_WS_LAEMP_CMO_2020-09_N	RG_MIDAG	WS	No	9/15/2020	14:51	G	7	1	1	1	1	1	1	1
RG_MIULE_WS_LAEMP_CMO_2020-09_NP	RG_MIULE	WS	No	9/16/2020	12:06	G	7	1	1	1	1	1	1	1

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION
	Jennifer Ings	September 16, 2020	[signature] 9/17/10:35

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 16, 2020
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 19-SEP-20
Report Date: 28-SEP-20 17:40 (MT)
Version: DRAFT

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2505602
Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: CMO LAEMP Sept 2020
Legal Site Desc:

DRAFT

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505602-1	L2505602-2	L2505602-3	L2505602-4	L2505602-5
	Description	WS	WS	WS	WS	WS
	Sampled Date	17-SEP-20	17-SEP-20	18-SEP-20	18-SEP-20	18-SEP-20
	Sampled Time	16:30	17:00	13:51	13:51	13:51
	Client ID	RG_LE1_WS_LAEMP_CMO_2020-09_NP	RG_MI5_WS_LAEMP_CMO_2020-09_NP	RG_RIVER_WS_LAEMP_CMO_2020-09_NP	RG_FBLANK_WS_LAEMP_CMO_2020-09_NP	RG_TRIP_WS_LAEMP_CMO_2020-09_NP
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	195	502	1130	<2.0	<2.0
	Hardness (as CaCO3) (mg/L)	112	268	657	<0.50	
	pH (pH)	7.91	8.30	8.26	5.47	5.10
	ORP (mV)	440	361	424	410	495
	Total Suspended Solids (mg/L)	<1.0	1.3	<1.0	<1.0	<1.0
	Total Dissolved Solids (mg/L)	120 DLHC	340 DLHC	844 DLHC	<10	<10
	Turbidity (NTU)	0.54	0.26	0.38	<0.10	<0.10
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	1.6	1.6
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	110	163	227	<1.0	<1.0
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	4.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	110	167	227	<1.0	<1.0
	Ammonia as N (mg/L)	0.0060	0.0073	<0.0050	<0.0050	<0.0050
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	0.13	1.06	1.92	<0.10	<0.10
	Fluoride (F) (mg/L)	0.058	0.114	0.126	<0.020	<0.020
	Ion Balance (%)	99.8	95.1	104	0.0	0.0
	Nitrate (as N) (mg/L)	0.0051	0.413	2.83	<0.0050	<0.0050
	Nitrite (as N) (mg/L)	<0.0010	0.0013	0.0101	<0.0010	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	<0.050	<0.25	<0.050 TKNI	<0.050	<0.050
	Orthophosphate-Dissolved (as P) (mg/L)	0.0146	0.0041	0.0024	<0.0010	<0.0010
	Phosphorus (P)-Total (mg/L)	0.015 DLM	0.0045 DLM	<0.0020	<0.0020	<0.0020
	Sulfate (SO4) (mg/L)	4.22	128	453	<0.30	<0.30
	Anion Sum (meq/L)	2.30	6.07	14.2	<0.10	<0.10
	Cation Sum (meq/L)	2.30	5.77	14.9	<0.10	<0.10
	Cation - Anion Balance (%)	-0.1	-2.5	2.2	0.0	0.0
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.04	1.02	0.92	<0.50	
	Total Organic Carbon (mg/L)	1.04	1.05	1.05	<0.50	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.0046	<0.0030	<0.0030	<0.0030	<0.0030
	Antimony (Sb)-Total (mg/L)	<0.00010	0.00012	0.00029	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00022	0.00022	0.00020	<0.00010	<0.00010
	Barium (Ba)-Total (mg/L)	0.137	0.132	0.0671	<0.00010	<0.00010
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	0.016	0.066	<0.010	<0.010
	Cadmium (Cd)-Total (ug/L)	0.0338	0.0355	0.0151	<0.0050	<0.0050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L2505602-1 WS 17-SEP-20 16:30 RG_LE1_WS_LAEMP_CMO_2020-09_NP	L2505602-2 WS 17-SEP-20 17:00 RG_MI5_WS_LAEMP_CMO_2020-09_NP	L2505602-3 WS 18-SEP-20 13:51 RG_RIVER_WS_LAEMP_CMO_2020-09_NP	L2505602-4 WS 18-SEP-20 13:51 RG_FBLANK_WS_LAEMP_CMO_2020-09_NP	L2505602-5 WS 18-SEP-20 13:51 RG_TRIP_WS_LAEMP_CMO_2020-09_NP
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	28.7	67.3	140	<0.050	<0.050
	Chromium (Cr)-Total (mg/L)	<0.00010	0.00012	0.00013	<0.00010	<0.00010
	Cobalt (Co)-Total (ug/L)	<0.10	<0.10	1.62	<0.10	<0.10
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	<0.010	<0.010	0.016	<0.010	<0.010
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	0.0018	0.0093	0.0423	<0.0010	<0.0010
	Magnesium (Mg)-Total (mg/L)	7.79	21.2	62.3	<0.10	<0.10
	Manganese (Mn)-Total (mg/L)	0.00102	0.00087	0.00377	<0.00010	<0.00010
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Molybdenum (Mo)-Total (mg/L)	0.000635	0.000800	0.00127	0.000505 [RRV]	<0.000050
	Nickel (Ni)-Total (mg/L)	<0.00050	0.00115	0.0302	<0.00050	<0.00050
	Potassium (K)-Total (mg/L)	0.573	0.922	2.36	<0.050	<0.050
	Selenium (Se)-Total (ug/L)	0.549	2.71	10.7	<0.050	<0.050
	Silicon (Si)-Total (mg/L)	2.26	1.97	1.93	<0.10	<0.10
	Silver (Ag)-Total (mg/L)	<0.000020 [DLB]	<0.000020 [DLB]	<0.000020 [DLB]	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	0.816	8.70	35.9	<0.050	<0.050
	Strontium (Sr)-Total (mg/L)	0.0664	0.209	0.572	<0.00020	<0.00020
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	0.000027	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.000222	0.00104	0.00385	<0.000010	<0.000010
	Vanadium (V)-Total (mg/L)	0.00063	0.00053	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	LAB	FIELD	FIELD	
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	LAB
	Aluminum (Al)-Dissolved (mg/L)	0.0042	<0.0030	<0.0030	<0.0030	
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	0.00012	0.00027	<0.00010	
	Arsenic (As)-Dissolved (mg/L)	0.00017	0.00018	0.00014	<0.00010	
	Barium (Ba)-Dissolved (mg/L)	0.146	0.139	0.0753	<0.00010	
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020	<0.020	
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Boron (B)-Dissolved (mg/L)	<0.010	0.016	0.064	<0.010	
	Cadmium (Cd)-Dissolved (ug/L)	0.0340	0.0325	0.0150	<0.0050	
	Calcium (Ca)-Dissolved (mg/L)	31.7	71.3	154	<0.050	<0.050
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	0.00011	<0.00010	
	Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10	1.52	<0.10	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505602-1	L2505602-2	L2505602-3	L2505602-4	L2505602-5
	Description	WS	WS	WS	WS	WS
	Sampled Date	17-SEP-20	17-SEP-20	18-SEP-20	18-SEP-20	18-SEP-20
	Sampled Time	16:30	17:00	13:51	13:51	13:51
	Client ID	RG_LE1_WS_LAEMP_CMO_2020-09_NP	RG_MI5_WS_LAEMP_CMO_2020-09_NP	RG_RIVER_WS_LAEMP_CMO_2020-09_NP	RG_FBLANK_WS_LAEMP_CMO_2020-09_NP	RG_TRIP_WS_LAEMP_CMO_2020-09_NP
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	0.00025	<0.00020	0.00023	<0.00020	
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Lithium (Li)-Dissolved (mg/L)	0.0019	0.0090	0.0395	<0.0010	
	Magnesium (Mg)-Dissolved (mg/L)	8.05	21.9	65.9	<0.10	<0.0050
	Manganese (Mn)-Dissolved (mg/L)	0.00087	0.00042	0.00280	<0.00010	
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
	Molybdenum (Mo)-Dissolved (mg/L)	0.000635	0.000830	0.00133	RRV 0.000252	
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	0.00107	0.0303	<0.00050	
	Potassium (K)-Dissolved (mg/L)	0.616	0.979	2.45	<0.050	<0.050
	Selenium (Se)-Dissolved (ug/L)	0.593	2.60	9.97	<0.050	
	Silicon (Si)-Dissolved (mg/L)	2.07	1.91	1.85	<0.050	
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Dissolved (mg/L)	0.868	8.92	38.4	<0.050	<0.050
	Strontium (Sr)-Dissolved (mg/L)	0.0652	0.227	0.614	<0.00020	
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	0.000027	<0.000010	
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Uranium (U)-Dissolved (mg/L)	0.000229	0.00103	0.00388	<0.000010	
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	0.0010	<0.0010	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Sample Submission Listed:

Qualifier	Description
SFPL	Sample was Filtered and Preserved at the laboratory - -2 D-HG: EMPTY VIAL RECEIVED, SUBSAMPLED/FILTERED/PRESERVED AT THE LAB

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Calcium (Ca)-Dissolved	B	L2505602-1, -2, -3, -4
Method Blank	Manganese (Mn)-Total	MB-LOR	L2505602-1, -2, -3, -4, -5
Method Blank	Silver (Ag)-Total	MB-LOR	L2505602-1, -2, -3, -4, -5
Laboratory Control Sample	Bismuth (Bi)-Total	MES	L2505602-1, -2, -3, -4, -5
Laboratory Control Sample	Uranium (U)-Total	MES	L2505602-1, -2, -3, -4, -5
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2505602-1, -2, -3, -4
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2505602-4
Matrix Spike	Boron (B)-Dissolved	MS-B	L2505602-4
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2505602-1, -2, -3, -4
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2505602-4
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2505602-1, -2, -3, -4
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2505602-4
Matrix Spike	Nickel (Ni)-Dissolved	MS-B	L2505602-4
Matrix Spike	Selenium (Se)-Dissolved	MS-B	L2505602-1, -2, -3, -4
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2505602-1, -2, -3, -4
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2505602-4
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2505602-1, -2, -3, -4
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2505602-4
Matrix Spike	Uranium (U)-Dissolved	MS-B	L2505602-1, -2, -3, -4
Matrix Spike	Uranium (U)-Dissolved	MS-B	L2505602-4
Matrix Spike	Barium (Ba)-Total	MS-B	L2505602-4, -5
Matrix Spike	Calcium (Ca)-Total	MS-B	L2505602-4, -5
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2505602-4, -5
Matrix Spike	Selenium (Se)-Total	MS-B	L2505602-4, -5
Matrix Spike	Sodium (Na)-Total	MS-B	L2505602-4, -5
Matrix Spike	Strontium (Sr)-Total	MS-B	L2505602-4, -5
Matrix Spike	Uranium (U)-Total	MS-B	L2505602-4, -5

Qualifiers for Individual Parameters Listed:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
DLB	Detection Limit Raised. Analyte detected at comparable level in Method Blank.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

Reference Information

ALK-MAN-CL Water Alkalinity (Species) by Manual Titration APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA Water Diss. Be (low) in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA Water Total Be (Low) in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL Water Bromide in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL Water Dissolved Organic Carbon APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL Water Total Organic Carbon APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-L-IC-N-CL Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Reference Information

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-CL	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL	Water	Ammonia, Total (as N)	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL	Water	Oxidation redution potential by elect.	ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL	Water	Phosphorus (P)-Total	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL	Water	Orthophosphate-Dissolved (as P)	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL	Water	Total Kjeldahl Nitrogen	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

Reference Information

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

CMO LAEMP Sept 2020

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5231949								
WG3409471-6 DUP		**L2505602-3**						
Acidity (as CaCO3)		<1.0	<1.0	RPD-NA	mg/L	N/A	20	21-SEP-20
WG3409471-5 LCS								
Acidity (as CaCO3)			96.0		%		85-115	21-SEP-20
WG3409471-8 LCS								
Acidity (as CaCO3)			96.8		%		85-115	21-SEP-20
WG3409471-4 MB								
Acidity (as CaCO3)			1.7		mg/L		2	21-SEP-20
WG3409471-7 MB								
Acidity (as CaCO3)			1.5		mg/L		2	21-SEP-20
ALK-MAN-CL	**Water**							
Batch R5232779								
WG3410445-12 DUP		**L2505602-2**						
Alkalinity, Total (as CaCO3)		167	166		mg/L	0.4	20	22-SEP-20
WG3410445-11 LCS								
Alkalinity, Total (as CaCO3)			100.0		%		85-115	22-SEP-20
WG3410445-10 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	22-SEP-20
BE-D-L-CCMS-VA	**Water**							
Batch R5233230								
WG3410182-2 LCS								
Beryllium (Be)-Dissolved			98.7		%		80-120	24-SEP-20
WG3410182-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	24-SEP-20
BE-T-L-CCMS-VA	**Water**							
Batch R5235341								
WG3410017-2 LCS								
Beryllium (Be)-Total			107.4		%		80-120	27-SEP-20
WG3410017-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	27-SEP-20
BR-L-IC-N-CL	**Water**							
Batch R5231603								
WG3409033-11 DUP		**L2505602-4**						
Bromide (Br)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	20-SEP-20
WG3409033-10 LCS								
Bromide (Br)			93.3		%		85-115	20-SEP-20
WG3409033-9 MB								

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BR-L-IC-N-CL	**Water**							
Batch R5231603								
WG3409033-9 MB								
Bromide (Br)			<0.050		mg/L		0.05	20-SEP-20
WG3409033-12 MS		**L2505602-4**						
Bromide (Br)			118.3		%		75-125	20-SEP-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5234902								
WG3411572-2 LCS								
Dissolved Organic Carbon			98.2		%		80-120	22-SEP-20
WG3411572-6 LCS								
Dissolved Organic Carbon			90.4		%		80-120	22-SEP-20
WG3411572-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	22-SEP-20
WG3411572-5 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	22-SEP-20
C-TOT-ORG-LOW-CL	**Water**							
Batch R5234902								
WG3411572-2 LCS								
Total Organic Carbon			104.0		%		80-120	22-SEP-20
WG3411572-6 LCS								
Total Organic Carbon			94.4		%		80-120	22-SEP-20
WG3411572-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	22-SEP-20
WG3411572-5 MB								
Total Organic Carbon			<0.50		mg/L		0.5	22-SEP-20
CL-L-IC-N-CL	**Water**							
Batch R5231603								
WG3409033-11 DUP		**L2505602-4**						
Chloride (Cl)		<0.10	<0.10	RPD-NA	mg/L	N/A	20	20-SEP-20
WG3409033-10 LCS								
Chloride (Cl)			102.9		%		85-115	20-SEP-20
WG3409033-9 MB								
Chloride (Cl)			<0.10		mg/L		0.1	20-SEP-20
WG3409033-12 MS		**L2505602-4**						
Chloride (Cl)			110.7		%		75-125	20-SEP-20
EC-L-PCT-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-L-PCT-CL	**Water**							
Batch R5232779								
WG3410445-12 DUP		**L2505602-2**						
Conductivity (@ 25C)		502	501		uS/cm	0.2	10	22-SEP-20
WG3410445-11 LCS								
Conductivity (@ 25C)			96.1		%		90-110	22-SEP-20
WG3410445-10 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	22-SEP-20
F-IC-N-CL	**Water**							
Batch R5231603								
WG3409033-11 DUP		**L2505602-4**						
Fluoride (F)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	20-SEP-20
WG3409033-10 LCS								
Fluoride (F)			96.7		%		90-110	20-SEP-20
WG3409033-9 MB								
Fluoride (F)			<0.020		mg/L		0.02	20-SEP-20
WG3409033-12 MS		**L2505602-4**						
Fluoride (F)			102.5		%		75-125	20-SEP-20
HG-D-CVAA-VA	**Water**							
Batch R5232718								
WG3410332-10 LCS								
Mercury (Hg)-Dissolved			96.7		%		80-120	23-SEP-20
WG3410332-6 LCS								
Mercury (Hg)-Dissolved			96.8		%		80-120	23-SEP-20
WG3410332-5 MB		**NP**						
Mercury (Hg)-Dissolved			<0.0000050		mg/L		0.000005	23-SEP-20
WG3410332-9 MB		**NP**						
Mercury (Hg)-Dissolved			<0.0000050		mg/L		0.000005	23-SEP-20
Batch R5237756								
WG3412441-2 LCS								
Mercury (Hg)-Dissolved			90.0		%		80-120	25-SEP-20
WG3412441-1 MB		**LF**						
Mercury (Hg)-Dissolved			<0.0000050		mg/L		0.000005	25-SEP-20
HG-T-U-CVAF-VA	**Water**							
Batch R5236558								
WG3412529-2 LCS								
Mercury (Hg)-Total			97.0		%		80-120	25-SEP-20
WG3412529-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	25-SEP-20
MET-D-CCMS-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-CL	**Water**							
Batch R5232258								
WG3410198-2 LCS		**TMRM**						
Calcium (Ca)-Dissolved			99.6		%		80-120	22-SEP-20
Magnesium (Mg)-Dissolved			106.7		%		80-120	22-SEP-20
Potassium (K)-Dissolved			104.2		%		80-120	22-SEP-20
Sodium (Na)-Dissolved			99.3		%		80-120	22-SEP-20
WG3410198-6 LCS		**TMRM**						
Calcium (Ca)-Dissolved			92.3		%		80-120	22-SEP-20
Magnesium (Mg)-Dissolved			101.5		%		80-120	22-SEP-20
Potassium (K)-Dissolved			102.1		%		80-120	22-SEP-20
Sodium (Na)-Dissolved			96.6		%		80-120	22-SEP-20
WG3410198-1 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	22-SEP-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	22-SEP-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	22-SEP-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	22-SEP-20
WG3410198-5 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	22-SEP-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	22-SEP-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	22-SEP-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	22-SEP-20
MET-D-CCMS-VA	**Water**							
Batch R5233230								
WG3410182-2 LCS								
Aluminum (Al)-Dissolved			110.2		%		80-120	24-SEP-20
Antimony (Sb)-Dissolved			99.7		%		80-120	24-SEP-20
Arsenic (As)-Dissolved			105.5		%		80-120	24-SEP-20
Barium (Ba)-Dissolved			117.3		%		80-120	24-SEP-20
Bismuth (Bi)-Dissolved			105.0		%		80-120	24-SEP-20
Boron (B)-Dissolved			97.9		%		80-120	24-SEP-20
Cadmium (Cd)-Dissolved			107.7		%		80-120	24-SEP-20
Calcium (Ca)-Dissolved			107.0		%		80-120	24-SEP-20
Chromium (Cr)-Dissolved			108.6		%		80-120	24-SEP-20
Cobalt (Co)-Dissolved			107.4		%		80-120	24-SEP-20
Copper (Cu)-Dissolved			105.9		%		80-120	24-SEP-20
Iron (Fe)-Dissolved			103.4		%		80-120	24-SEP-20
Lead (Pb)-Dissolved			97.3		%		80-120	24-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5233230								
WG3410182-2 LCS								
Lithium (Li)-Dissolved			99.5		%		80-120	24-SEP-20
Magnesium (Mg)-Dissolved			102.5		%		80-120	24-SEP-20
Manganese (Mn)-Dissolved			106.1		%		80-120	24-SEP-20
Molybdenum (Mo)-Dissolved			99.3		%		80-120	24-SEP-20
Nickel (Ni)-Dissolved			105.5		%		80-120	24-SEP-20
Potassium (K)-Dissolved			105.1		%		80-120	24-SEP-20
Selenium (Se)-Dissolved			99.8		%		80-120	24-SEP-20
Silicon (Si)-Dissolved			104.1		%		60-140	24-SEP-20
Silver (Ag)-Dissolved			98.3		%		80-120	24-SEP-20
Sodium (Na)-Dissolved			108.3		%		80-120	24-SEP-20
Strontium (Sr)-Dissolved			102.5		%		80-120	24-SEP-20
Thallium (Tl)-Dissolved			102.1		%		80-120	24-SEP-20
Tin (Sn)-Dissolved			95.0		%		80-120	24-SEP-20
Titanium (Ti)-Dissolved			99.0		%		80-120	24-SEP-20
Uranium (U)-Dissolved			101.9		%		80-120	24-SEP-20
Vanadium (V)-Dissolved			108.7		%		80-120	24-SEP-20
Zinc (Zn)-Dissolved			103.3		%		80-120	24-SEP-20
WG3410182-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	24-SEP-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	24-SEP-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	24-SEP-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	24-SEP-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	24-SEP-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	24-SEP-20
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	24-SEP-20
Calcium (Ca)-Dissolved			0.054	B	mg/L		0.05	24-SEP-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	24-SEP-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	24-SEP-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	24-SEP-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	24-SEP-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	24-SEP-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	24-SEP-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	24-SEP-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	24-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5233230								
WG3410182-1 MB		**NP**						
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	24-SEP-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	24-SEP-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	24-SEP-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	24-SEP-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	24-SEP-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	24-SEP-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	24-SEP-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	24-SEP-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	24-SEP-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	24-SEP-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	24-SEP-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	24-SEP-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	24-SEP-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	24-SEP-20
Batch R5235341								
WG3411686-2 LCS								
Aluminum (Al)-Dissolved			100.5		%		80-120	25-SEP-20
Antimony (Sb)-Dissolved			99.9		%		80-120	25-SEP-20
Arsenic (As)-Dissolved			102.5		%		80-120	25-SEP-20
Barium (Ba)-Dissolved			101.9		%		80-120	25-SEP-20
Bismuth (Bi)-Dissolved			109.7		%		80-120	25-SEP-20
Boron (B)-Dissolved			91.4		%		80-120	25-SEP-20
Cadmium (Cd)-Dissolved			102.3		%		80-120	25-SEP-20
Calcium (Ca)-Dissolved			108.8		%		80-120	25-SEP-20
Chromium (Cr)-Dissolved			102.1		%		80-120	25-SEP-20
Cobalt (Co)-Dissolved			99.8		%		80-120	25-SEP-20
Copper (Cu)-Dissolved			102.7		%		80-120	25-SEP-20
Iron (Fe)-Dissolved			102.3		%		80-120	25-SEP-20
Lead (Pb)-Dissolved			103.8		%		80-120	25-SEP-20
Lithium (Li)-Dissolved			98.4		%		80-120	25-SEP-20
Magnesium (Mg)-Dissolved			96.2		%		80-120	25-SEP-20
Manganese (Mn)-Dissolved			104.9		%		80-120	25-SEP-20
Molybdenum (Mo)-Dissolved			103.0		%		80-120	25-SEP-20
Nickel (Ni)-Dissolved			99.3		%		80-120	25-SEP-20

Quality Control Report

Workorder: L2505602 Report Date: 28-SEP-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5235341								
WG3411686-2 LCS								
Potassium (K)-Dissolved			103.1		%		80-120	25-SEP-20
Selenium (Se)-Dissolved			102.7		%		80-120	25-SEP-20
Silicon (Si)-Dissolved			103.8		%		60-140	25-SEP-20
Silver (Ag)-Dissolved			103.4		%		80-120	25-SEP-20
Sodium (Na)-Dissolved			103.9		%		80-120	25-SEP-20
Strontium (Sr)-Dissolved			110.4		%		80-120	25-SEP-20
Thallium (Tl)-Dissolved			103.6		%		80-120	25-SEP-20
Tin (Sn)-Dissolved			103.1		%		80-120	25-SEP-20
Titanium (Ti)-Dissolved			99.4		%		80-120	25-SEP-20
Uranium (U)-Dissolved			104.7		%		80-120	25-SEP-20
Vanadium (V)-Dissolved			102.5		%		80-120	25-SEP-20
Zinc (Zn)-Dissolved			96.3		%		80-120	25-SEP-20
WG3411686-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	25-SEP-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	25-SEP-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	25-SEP-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	25-SEP-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	25-SEP-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	25-SEP-20
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	25-SEP-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	25-SEP-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	25-SEP-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	25-SEP-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	25-SEP-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	25-SEP-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	25-SEP-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	25-SEP-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	25-SEP-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	25-SEP-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	25-SEP-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	25-SEP-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	25-SEP-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	25-SEP-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	25-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5235341								
WG3411686-1 MB		**NP**						
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	25-SEP-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	25-SEP-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	25-SEP-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	25-SEP-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	25-SEP-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	25-SEP-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	25-SEP-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	25-SEP-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	25-SEP-20
MET-T-CCMS-VA	**Water**							
Batch R5235341								
WG3410017-2 LCS								
Aluminum (Al)-Total			110.1		%		80-120	27-SEP-20
Antimony (Sb)-Total			119.6		%		80-120	27-SEP-20
Arsenic (As)-Total			112.1		%		80-120	27-SEP-20
Barium (Ba)-Total			118.7		%		80-120	27-SEP-20
Bismuth (Bi)-Total			122.4	MES	%		80-120	27-SEP-20
Boron (B)-Total			103.9		%		80-120	27-SEP-20
Cadmium (Cd)-Total			115.5		%		80-120	27-SEP-20
Calcium (Ca)-Total			116.6		%		80-120	27-SEP-20
Chromium (Cr)-Total			110.8		%		80-120	27-SEP-20
Cobalt (Co)-Total			112.4		%		80-120	27-SEP-20
Copper (Cu)-Total			111.6		%		80-120	27-SEP-20
Iron (Fe)-Total			110.0		%		80-120	27-SEP-20
Lead (Pb)-Total			113.1		%		80-120	27-SEP-20
Lithium (Li)-Total			112.7		%		80-120	27-SEP-20
Magnesium (Mg)-Total			100.6		%		80-120	27-SEP-20
Manganese (Mn)-Total			112.4		%		80-120	27-SEP-20
Molybdenum (Mo)-Total			113.3		%		80-120	27-SEP-20
Nickel (Ni)-Total			111.4		%		80-120	27-SEP-20
Potassium (K)-Total			114.1		%		80-120	27-SEP-20
Selenium (Se)-Total			114.1		%		80-120	27-SEP-20
Silicon (Si)-Total			114.2		%		80-120	27-SEP-20
Silver (Ag)-Total			116.5		%		80-120	27-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5235341								
WG3410017-2 LCS								
Sodium (Na)-Total			110.2		%		80-120	27-SEP-20
Strontium (Sr)-Total			115.1		%		80-120	27-SEP-20
Thallium (Tl)-Total			116.1		%		80-120	27-SEP-20
Tin (Sn)-Total			115.7		%		80-120	27-SEP-20
Titanium (Ti)-Total			108.1		%		80-120	27-SEP-20
Uranium (U)-Total			121.0	MES	%		80-120	27-SEP-20
Vanadium (V)-Total			112.4		%		80-120	27-SEP-20
Zinc (Zn)-Total			113.1		%		80-120	27-SEP-20
WG3410017-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	27-SEP-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	27-SEP-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	27-SEP-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	27-SEP-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	27-SEP-20
Boron (B)-Total			<0.010		mg/L		0.01	27-SEP-20
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	27-SEP-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	27-SEP-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	27-SEP-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	27-SEP-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	27-SEP-20
Iron (Fe)-Total			<0.010		mg/L		0.01	27-SEP-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	27-SEP-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	27-SEP-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	27-SEP-20
Manganese (Mn)-Total			0.00011	MB-LOR	mg/L		0.0001	27-SEP-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	27-SEP-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	27-SEP-20
Potassium (K)-Total			<0.050		mg/L		0.05	27-SEP-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	27-SEP-20
Silicon (Si)-Total			<0.10		mg/L		0.1	27-SEP-20
Silver (Ag)-Total			0.000015	MB-LOR	mg/L		0.00001	27-SEP-20
Sodium (Na)-Total			<0.050		mg/L		0.05	27-SEP-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	27-SEP-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	27-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5235341								
WG3410017-1 MB								
Tin (Sn)-Total			<0.00010		mg/L		0.0001	27-SEP-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	27-SEP-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	27-SEP-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	27-SEP-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	27-SEP-20
Batch R5240798								
WG3413295-2 LCS								
Aluminum (Al)-Total			106.2		%		80-120	28-SEP-20
Antimony (Sb)-Total			100.1		%		80-120	28-SEP-20
Arsenic (As)-Total			103.6		%		80-120	28-SEP-20
Barium (Ba)-Total			106.9		%		80-120	28-SEP-20
Bismuth (Bi)-Total			98.0		%		80-120	28-SEP-20
Boron (B)-Total			103.0		%		80-120	28-SEP-20
Cadmium (Cd)-Total			103.1		%		80-120	28-SEP-20
Calcium (Ca)-Total			106.9		%		80-120	28-SEP-20
Chromium (Cr)-Total			102.1		%		80-120	28-SEP-20
Cobalt (Co)-Total			106.5		%		80-120	28-SEP-20
Copper (Cu)-Total			104.4		%		80-120	28-SEP-20
Iron (Fe)-Total			94.1		%		80-120	28-SEP-20
Lead (Pb)-Total			97.1		%		80-120	28-SEP-20
Lithium (Li)-Total			108.1		%		80-120	28-SEP-20
Magnesium (Mg)-Total			102.8		%		80-120	28-SEP-20
Manganese (Mn)-Total			105.7		%		80-120	28-SEP-20
Molybdenum (Mo)-Total			97.7		%		80-120	28-SEP-20
Nickel (Ni)-Total			105.6		%		80-120	28-SEP-20
Potassium (K)-Total			111.3		%		80-120	28-SEP-20
Selenium (Se)-Total			108.4		%		80-120	28-SEP-20
Silicon (Si)-Total			102.7		%		80-120	28-SEP-20
Silver (Ag)-Total			95.8		%		80-120	28-SEP-20
Sodium (Na)-Total			108.1		%		80-120	28-SEP-20
Strontium (Sr)-Total			98.3		%		80-120	28-SEP-20
Thallium (Tl)-Total			99.96		%		80-120	28-SEP-20
Tin (Sn)-Total			98.1		%		80-120	28-SEP-20
Titanium (Ti)-Total			104.0		%		80-120	28-SEP-20

Quality Control Report

Workorder: L2505602 Report Date: 28-SEP-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5240798								
WG3413295-2 LCS								
Uranium (U)-Total			94.3		%		80-120	28-SEP-20
Vanadium (V)-Total			107.4		%		80-120	28-SEP-20
Zinc (Zn)-Total			106.8		%		80-120	28-SEP-20
WG3413295-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	28-SEP-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	28-SEP-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	28-SEP-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	28-SEP-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	28-SEP-20
Boron (B)-Total			<0.010		mg/L		0.01	28-SEP-20
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	28-SEP-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	28-SEP-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	28-SEP-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	28-SEP-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	28-SEP-20
Iron (Fe)-Total			<0.010		mg/L		0.01	28-SEP-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	28-SEP-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	28-SEP-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	28-SEP-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	28-SEP-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	28-SEP-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	28-SEP-20
Potassium (K)-Total			<0.050		mg/L		0.05	28-SEP-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	28-SEP-20
Silicon (Si)-Total			<0.10		mg/L		0.1	28-SEP-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	28-SEP-20
Sodium (Na)-Total			<0.050		mg/L		0.05	28-SEP-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	28-SEP-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	28-SEP-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	28-SEP-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	28-SEP-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	28-SEP-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	28-SEP-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	28-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-L-F-CL	**Water**							
Batch R5232866								
WG3410229-14 LCS								
Ammonia as N			100.4		%		85-115	22-SEP-20
WG3410229-18 LCS								
Ammonia as N			104.1		%		85-115	22-SEP-20
WG3410229-13 MB								
Ammonia as N			<0.0050		mg/L		0.005	22-SEP-20
WG3410229-17 MB								
Ammonia as N			<0.0050		mg/L		0.005	22-SEP-20
NO2-L-IC-N-CL	**Water**							
Batch R5231603								
WG3409033-11 DUP		**L2505602-4**						
Nitrite (as N)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-SEP-20
WG3409033-10 LCS								
Nitrite (as N)			99.5		%		90-110	20-SEP-20
WG3409033-9 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	20-SEP-20
WG3409033-12 MS		**L2505602-4**						
Nitrite (as N)			110.7		%		75-125	20-SEP-20
NO3-L-IC-N-CL	**Water**							
Batch R5231603								
WG3409033-11 DUP		**L2505602-4**						
Nitrate (as N)		<0.0050	0.0072	RPD-NA	mg/L	N/A	20	20-SEP-20
WG3409033-10 LCS								
Nitrate (as N)			103.1		%		90-110	20-SEP-20
WG3409033-9 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	20-SEP-20
WG3409033-12 MS		**L2505602-4**						
Nitrate (as N)			108.0		%		75-125	20-SEP-20
ORP-CL	**Water**							
Batch R5231796								
WG3409206-10 CRM		**CL-ORP**						
ORP			223		mV		210-230	21-SEP-20
P-T-L-COL-CL	**Water**							
Batch R5234777								
WG3411568-10 LCS								
Phosphorus (P)-Total			103.8		%		80-120	24-SEP-20
WG3411568-9 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-T-L-COL-CL	**Water**							
Batch R5234777								
WG3411568-9 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	24-SEP-20
PH-CL	**Water**							
Batch R5232779								
WG3410445-12 DUP		**L2505602-2**						
pH		8.30	8.29	J	pH	0.01	0.2	22-SEP-20
WG3410445-11 LCS								
pH			6.99		pH		6.9-7.1	22-SEP-20
PO4-DO-L-COL-CL	**Water**							
Batch R5231084								
WG3408249-10 LCS								
Orthophosphate-Dissolved (as P)			104.2		%		80-120	19-SEP-20
WG3408249-9 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	19-SEP-20
SO4-IC-N-CL	**Water**							
Batch R5231603								
WG3409033-11 DUP		**L2505602-4**						
Sulfate (SO4)		<0.30	<0.30	RPD-NA	mg/L	N/A	20	20-SEP-20
WG3409033-10 LCS								
Sulfate (SO4)			100.5		%		90-110	20-SEP-20
WG3409033-9 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	20-SEP-20
WG3409033-12 MS		**L2505602-4**						
Sulfate (SO4)			108.0		%		75-125	20-SEP-20
SOLIDS-TDS-CL	**Water**							
Batch R5233145								
WG3409473-14 LCS								
Total Dissolved Solids			99.1		%		85-115	22-SEP-20
WG3409473-13 MB								
Total Dissolved Solids			<10		mg/L		10	22-SEP-20
Batch R5234762								
WG3410367-5 LCS								
Total Dissolved Solids			97.8		%		85-115	23-SEP-20
WG3410367-4 MB								
Total Dissolved Solids			<10		mg/L		10	23-SEP-20
TKN-L-F-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-L-F-CL	**Water**							
Batch R5234612								
WG3411296-5 DUP		**L2505602-5**						
Total Kjeldahl Nitrogen		<0.050	<0.050	RPD-NA	mg/L	N/A	20	24-SEP-20
WG3411296-12 LCS								
Total Kjeldahl Nitrogen			85.0		%		75-125	24-SEP-20
WG3411296-2 LCS								
Total Kjeldahl Nitrogen			92.3		%		75-125	24-SEP-20
WG3411296-4 LCS								
Total Kjeldahl Nitrogen			93.1		%		75-125	24-SEP-20
WG3411296-8 LCS								
Total Kjeldahl Nitrogen			95.3		%		75-125	24-SEP-20
WG3411296-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	24-SEP-20
WG3411296-11 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	24-SEP-20
WG3411296-3 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	24-SEP-20
WG3411296-7 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	24-SEP-20
WG3411296-6 MS		**L2505602-5**						
Total Kjeldahl Nitrogen			99.4		%		70-130	24-SEP-20
TSS-L-CL	**Water**							
Batch R5233042								
WG3409472-10 LCS								
Total Suspended Solids			96.7		%		85-115	22-SEP-20
WG3409472-9 MB								
Total Suspended Solids			<1.0		mg/L		1	22-SEP-20
Batch R5234760								
WG3410197-4 LCS								
Total Suspended Solids			105.4		%		85-115	23-SEP-20
WG3410197-3 MB								
Total Suspended Solids			<1.0		mg/L		1	23-SEP-20
TURBIDITY-CL	**Water**							
Batch R5231228								
WG3408414-6 DUP		**L2505602-3**						
Turbidity		0.38	0.39		NTU	3.4	15	20-SEP-20
WG3408414-5 LCS								
Turbidity			99.5		%		85-115	20-SEP-20
WG3408414-4 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TURBIDITY-CL	**Water**							
Batch R5231228								
WG3408414-4 MB								
Turbidity			<0.10		NTU		0.1	20-SEP-20

Quality Control Report

Workorder: L2505602 Report Date: 28-SEP-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
J	Duplicate results and limits are expressed in terms of absolute difference.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
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).
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	17-SEP-20 16:30	21-SEP-20 15:45	0.25	95	hours	EHTR-FM
	2	17-SEP-20 17:00	21-SEP-20 15:45	0.25	95	hours	EHTR-FM
	3	18-SEP-20 13:51	21-SEP-20 15:45	0.25	74	hours	EHTR-FM
	4	18-SEP-20 13:51	21-SEP-20 15:45	0.25	74	hours	EHTR-FM
	5	18-SEP-20 13:51	21-SEP-20 15:45	0.25	74	hours	EHTR-FM
pH							
	1	17-SEP-20 16:30	22-SEP-20 14:00	0.25	118	hours	EHTR-FM
	2	17-SEP-20 17:00	22-SEP-20 14:00	0.25	117	hours	EHTR-FM
	3	18-SEP-20 13:51	22-SEP-20 14:00	0.25	96	hours	EHTR-FM
	4	18-SEP-20 13:51	22-SEP-20 14:00	0.25	96	hours	EHTR-FM
	5	18-SEP-20 13:51	22-SEP-20 14:00	0.25	96	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2505602 were received on 19-SEP-20 08:30.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID:	CMO LAEMP Sept 2020	TURNAROUND TIME:	

PROJECT/CLIENT INFO

Facility Name	REP		
Project Manager	Cait Good		
Email	cait.good@teck.com		
Address	421 Pine Avenue		
City	Sparwood	Province	BC
Postal Code	V0B 2G0	Country	Canada
Phone Number	250-425-8202		

LABORATORY

Lab Name	ALS Calgary		
Lab Contact	Lyudmyla Shvets		
Email	lyudmyla.shvets@alsglobal.com		
Address	2559 29 Street NE		
City	Calgary	Province	AB
Postal Code	T1Y 7B5	Country	Canada
Phone Number	1 403 407 1794		

	Excel	PDF	EDD
cait.good@teck.com	x	x	x
teckcoal@equisonline.com			x
jings@minnow.ca	x	x	x
carlie.meyer@teck.com	x	x	x
sweech@minnow.ca	x	x	x

PO number: 689999

L2505602-COFC

SAMPLE DETAILS

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.
RG_LE1_WS_LAEMP_CMO_2020-09_NP	RG_LE1	WS	No	9/17/2020	16:30	G	7
RG_MI5_WS_LAEMP_CMO_2020-09_NP	RG_MI5	WS	No	9/17/2020	17:00	G	7
RG_RIVER_WS_LAEMP_CMO_2020-09_NP	RG_RIVER	WS	No	9/18/2020	13:51	G	7
RG_FBLANK_WS_LAEMP_CMO_2020-09_NP	RG_FBLANK	WS	No	9/18/2020	13:51	G	7
RG_TRIP_WS_LAEMP_CMO_2020-09_NP	RG_TRIP	WS	No	9/18/2020	13:51	G	4

ANALYSIS REQUESTED

Filtered - F: Field, L: Lab, FL: Field & Lab, N: None

Sample ID	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
FILT.	N	F	N	N	F	N	F
PRESERV.		H2SO4	H2SO4		HCL	HNO3	HNO3
RG_LE1_WS_LAEMP_CMO_2020-09_NP	1	1	1	1	1	1	1
RG_MI5_WS_LAEMP_CMO_2020-09_NP	1	1	1	1	1	1	1
RG_RIVER_WS_LAEMP_CMO_2020-09_NP	1	1	1	1	1	1	1
RG_FBLANK_WS_LAEMP_CMO_2020-09_NP	1	1	1	1	1	1	1
RG_TRIP_WS_LAEMP_CMO_2020-09_NP	1		1	1		1	

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	
	Jennifer Ings	September 18, 2020	DK	9/19 0830
				1°C

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 18, 2020

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 19-SEP-20
Report Date: 27-SEP-20 15:23 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2505605

Project P.O. #: NOT SUBMITTED
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: CMO Supplemental
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505605-1	L2505605-2	L2505605-3		
	Description	WS	WS	WS		
	Sampled Date	17-SEP-20	17-SEP-20	17-SEP-20		
	Sampled Time	11:39	13:51	09:00		
	Client ID	RG_MIDAG-S2_WS_LAEMP_CMO_2020-09_NP	CM_MC2_WS_LAEMP_CMO_2020-09_N	RG_MIDAG-S1_WS_LAEMP_CMO_2020-09_NP		
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	767	1130	802		
	Hardness (as CaCO3) (mg/L)	404	621	419		
	pH (pH)	8.49	8.28	8.37		
	ORP (mV)	458	473	426		
	Total Suspended Solids (mg/L)	<1.0	1.2	<1.0		
	Total Dissolved Solids (mg/L)	541 DLHC	844 DLHC	570 DLHC		
	Turbidity (NTU)	0.41	0.55	0.45		
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0	<1.0		
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	186	230	185		
	Alkalinity, Carbonate (as CaCO3) (mg/L)	12.8	2.4	8.4		
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0		
	Alkalinity, Total (as CaCO3) (mg/L)	198	232	193		
	Ammonia as N (mg/L)	<0.0050	0.0120	<0.0050		
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050		
	Chloride (Cl) (mg/L)	1.12	1.92	1.22		
	Fluoride (F) (mg/L)	0.164	0.126	0.168		
	Ion Balance (%)	95.5	98.0	95.8		
	Nitrate (as N) (mg/L)	1.43	2.82	1.69		
	Nitrite (as N) (mg/L)	0.0022	0.0095	0.0035		
	Total Kjeldahl Nitrogen (mg/L)	0.088 TKNI	0.207 TKNI	0.221		
	Orthophosphate-Dissolved (as P) (mg/L)	0.0018	0.0011	0.0016		
	Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020	<0.0020		
	Sulfate (SO4) (mg/L)	254	453	273		
	Anion Sum (meq/L)	9.40	14.3	9.71		
	Cation Sum (meq/L)	8.97	14.0	9.30		
	Cation - Anion Balance (%)	-2.3	-1.0	-2.1		
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	0.83	0.89	0.79		
	Total Organic Carbon (mg/L)	0.79	1.00	0.80		
Total Metals	Aluminum (Al)-Total (mg/L)	0.0066	0.0039	0.0068		
	Antimony (Sb)-Total (mg/L)	0.00017	0.00029	0.00020		
	Arsenic (As)-Total (mg/L)	0.00027	0.00022	0.00031		
	Barium (Ba)-Total (mg/L)	0.0921	0.0674	0.0691		
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020		
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050		
	Boron (B)-Total (mg/L)	0.033	0.066	0.038		
	Cadmium (Cd)-Total (ug/L)	0.0240	0.0196	0.0196		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505605-1	L2505605-2	L2505605-3		
	Description	WS	WS	WS		
	Sampled Date	17-SEP-20	17-SEP-20	17-SEP-20		
	Sampled Time	11:39	13:51	09:00		
	Client ID	RG_MIDAG-S2_WS_LAEMP_CMO_2020-09_NP	CM_MC2_WS_LAEMP_CMO_2020-09_N	RG_MIDAG-S1_WS_LAEMP_CMO_2020-09_NP		
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	99.5	139	104		
	Chromium (Cr)-Total (mg/L)	0.00018	0.00013	0.00019		
	Cobalt (Co)-Total (ug/L)	0.29	1.66	0.52		
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050		
	Iron (Fe)-Total (mg/L)	<0.010	0.016	0.012		
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050		
	Lithium (Li)-Total (mg/L)	0.0203	0.0417	0.0234		
	Magnesium (Mg)-Total (mg/L)	37.7	62.4	39.2		
	Manganese (Mn)-Total (mg/L)	0.00207	0.00385	0.00193		
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	<0.00050		
	Molybdenum (Mo)-Total (mg/L)	0.00104	0.00138	0.00109		
	Nickel (Ni)-Total (mg/L)	0.00789	0.0314	0.0123		
	Potassium (K)-Total (mg/L)	1.42	2.44	1.45		
	Selenium (Se)-Total (ug/L)	5.86	10.8	6.73		
	Silicon (Si)-Total (mg/L)	1.84	1.88	1.76		
	Silver (Ag)-Total (mg/L)	DLB <0.000020	DLB <0.000020	DLB <0.000020		
	Sodium (Na)-Total (mg/L)	20.4	38.4	22.0		
	Strontium (Sr)-Total (mg/L)	0.368	0.601	0.414		
	Thallium (Tl)-Total (mg/L)	0.000022	0.000029	0.000029		
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Total (mg/L)	0.00240	0.00403	0.00260		
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	0.00053		
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030		
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD		
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD		
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030		
	Antimony (Sb)-Dissolved (mg/L)	0.00017	0.00029	0.00019		
	Arsenic (As)-Dissolved (mg/L)	0.00022	0.00016	0.00025		
	Barium (Ba)-Dissolved (mg/L)	0.0863	0.0637	0.0676		
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020		
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Boron (B)-Dissolved (mg/L)	0.034	0.065	0.037		
	Cadmium (Cd)-Dissolved (ug/L)	0.0232	0.0142	0.0186		
	Calcium (Ca)-Dissolved (mg/L)	99.8	139	104		
	Chromium (Cr)-Dissolved (mg/L)	0.00018	0.00014	0.00018		
	Cobalt (Co)-Dissolved (ug/L)	0.23	1.45	0.44		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505605-1	L2505605-2	L2505605-3		
	Description	WS	WS	WS		
	Sampled Date	17-SEP-20	17-SEP-20	17-SEP-20		
	Sampled Time	11:39	13:51	09:00		
	Client ID	RG_MIDAG-S2_WS_LAEMP_CMO_2020-09_NP	CM_MC2_WS_LAEMP_CMO_2020-09_N	RG_MIDAG-S1_WS_LAEMP_CMO_2020-09_NP		
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020		
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Lithium (Li)-Dissolved (mg/L)	0.0189	0.0398	0.0222		
	Magnesium (Mg)-Dissolved (mg/L)	37.6	66.4	39.0		
	Manganese (Mn)-Dissolved (mg/L)	0.00157	0.00260	0.00141		
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050		
	Molybdenum (Mo)-Dissolved (mg/L)	0.000937	0.00132	0.00105		
	Nickel (Ni)-Dissolved (mg/L)	0.00704	0.0279	0.0117		
	Potassium (K)-Dissolved (mg/L)	1.36	2.28	1.41		
	Selenium (Se)-Dissolved (ug/L)	5.36	10.1	6.45		
	Silicon (Si)-Dissolved (mg/L)	1.69	1.82	1.63		
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Dissolved (mg/L)	20.0	36.1	20.5		
	Strontium (Sr)-Dissolved (mg/L)	0.361	0.620	0.400		
	Thallium (Tl)-Dissolved (mg/L)	0.000019	0.000027	0.000024		
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Dissolved (mg/L)	0.00215	0.00375	0.00244		
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Manganese (Mn)-Total	MB-LOR	L2505605-1, -2, -3
Method Blank	Silver (Ag)-Total	MB-LOR	L2505605-1, -2, -3
Laboratory Control Sample	Bismuth (Bi)-Total	MES	L2505605-1, -2, -3
Laboratory Control Sample	Uranium (U)-Total	MES	L2505605-1, -2, -3
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2505605-1, -2, -3
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2505605-1, -2, -3
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2505605-1, -2, -3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2505605-1, -2, -3

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLB	Detection Limit Raised. Analyte detected at comparable level in Method Blank.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.

Reference Information

TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-L-IC-N-CL	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL	Water	Electrical Conductivity (EC)	APHA 2510B

Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25C.

F-IC-N-CL	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA	Water	Total Mercury in Water by CVAFS (Ultra)	EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL	Water	Ammonia, Total (as N)	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL	Water	Oxidation redution potential by elect.	ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL	Water	Phosphorus (P)-Total	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL	Water	pH	APHA 4500 H-Electrode

Reference Information

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL	Water	Orthophosphate-Dissolved (as P)	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL	Water	Total Kjeldahl Nitrogen	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

CMO Supplemental

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0

Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5231949								
WG3409471-9 DUP		**L2505605-3**						
Acidity (as CaCO3)		<1.0	<1.0	RPD-NA	mg/L	N/A	20	21-SEP-20
WG3409471-8 LCS								
Acidity (as CaCO3)			96.8		%		85-115	21-SEP-20
WG3409471-7 MB								
Acidity (as CaCO3)			1.5		mg/L		2	21-SEP-20
ALK-MAN-CL	**Water**							
Batch R5232779								
WG3410445-11 LCS								
Alkalinity, Total (as CaCO3)			100.0		%		85-115	22-SEP-20
WG3410445-10 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	22-SEP-20
BE-D-L-CCMS-VA	**Water**							
Batch R5233230								
WG3410263-2 LCS								
Beryllium (Be)-Dissolved			100.5		%		80-120	23-SEP-20
WG3410263-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	23-SEP-20
BE-T-L-CCMS-VA	**Water**							
Batch R5235341								
WG3410017-2 LCS								
Beryllium (Be)-Total			107.4		%		80-120	27-SEP-20
WG3410017-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	27-SEP-20
BR-L-IC-N-CL	**Water**							
Batch R5231603								
WG3409033-10 LCS								
Bromide (Br)			93.3		%		85-115	20-SEP-20
WG3409033-9 MB								
Bromide (Br)			<0.050		mg/L		0.05	20-SEP-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5234902								
WG3411572-6 LCS								
Dissolved Organic Carbon			90.4		%		80-120	22-SEP-20
WG3411572-5 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	22-SEP-20
C-TOT-ORG-LOW-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-LOW-CL	**Water**							
Batch R5234902								
WG3411572-6 LCS								
Total Organic Carbon			94.4		%		80-120	22-SEP-20
WG3411572-5 MB								
Total Organic Carbon			<0.50		mg/L		0.5	22-SEP-20
CL-L-IC-N-CL	**Water**							
Batch R5231603								
WG3409033-10 LCS								
Chloride (Cl)			102.9		%		85-115	20-SEP-20
WG3409033-9 MB								
Chloride (Cl)			<0.10		mg/L		0.1	20-SEP-20
EC-L-PCT-CL	**Water**							
Batch R5232779								
WG3410445-11 LCS								
Conductivity (@ 25C)			96.1		%		90-110	22-SEP-20
WG3410445-10 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	22-SEP-20
F-IC-N-CL	**Water**							
Batch R5231603								
WG3409033-10 LCS								
Fluoride (F)			96.7		%		90-110	20-SEP-20
WG3409033-9 MB								
Fluoride (F)			<0.020		mg/L		0.02	20-SEP-20
HG-D-CVAA-VA	**Water**							
Batch R5232718								
WG3410332-10 LCS								
Mercury (Hg)-Dissolved			96.7		%		80-120	23-SEP-20
WG3410332-9 MB		**NP**						
Mercury (Hg)-Dissolved			<0.0000050		mg/L		0.000005	23-SEP-20
WG3410332-12 MS		**L2505605-2**						
Mercury (Hg)-Dissolved			95.9		%		70-130	23-SEP-20
HG-T-U-CVAF-VA	**Water**							
Batch R5235073								
WG3411718-2 LCS								
Mercury (Hg)-Total			85.8		%		80-120	24-SEP-20
WG3411718-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	24-SEP-20
MET-D-CCMS-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5233230								
WG3410263-2 LCS								
Aluminum (Al)-Dissolved			105.9		%		80-120	23-SEP-20
Antimony (Sb)-Dissolved			101.3		%		80-120	23-SEP-20
Arsenic (As)-Dissolved			103.8		%		80-120	23-SEP-20
Barium (Ba)-Dissolved			108.8		%		80-120	23-SEP-20
Bismuth (Bi)-Dissolved			102.2		%		80-120	23-SEP-20
Boron (B)-Dissolved			98.3		%		80-120	23-SEP-20
Cadmium (Cd)-Dissolved			106.5		%		80-120	23-SEP-20
Calcium (Ca)-Dissolved			105.6		%		80-120	23-SEP-20
Chromium (Cr)-Dissolved			105.4		%		80-120	23-SEP-20
Cobalt (Co)-Dissolved			104.8		%		80-120	23-SEP-20
Copper (Cu)-Dissolved			104.2		%		80-120	23-SEP-20
Iron (Fe)-Dissolved			105.7		%		80-120	23-SEP-20
Lead (Pb)-Dissolved			101.7		%		80-120	23-SEP-20
Lithium (Li)-Dissolved			98.5		%		80-120	23-SEP-20
Magnesium (Mg)-Dissolved			101.5		%		80-120	23-SEP-20
Manganese (Mn)-Dissolved			110.2		%		80-120	23-SEP-20
Molybdenum (Mo)-Dissolved			103.6		%		80-120	23-SEP-20
Nickel (Ni)-Dissolved			103.4		%		80-120	23-SEP-20
Potassium (K)-Dissolved			104.6		%		80-120	23-SEP-20
Selenium (Se)-Dissolved			100.8		%		80-120	23-SEP-20
Silicon (Si)-Dissolved			103.0		%		60-140	23-SEP-20
Silver (Ag)-Dissolved			103.9		%		80-120	23-SEP-20
Sodium (Na)-Dissolved			106.9		%		80-120	23-SEP-20
Strontium (Sr)-Dissolved			103.6		%		80-120	23-SEP-20
Thallium (Tl)-Dissolved			99.4		%		80-120	23-SEP-20
Tin (Sn)-Dissolved			99.8		%		80-120	23-SEP-20
Titanium (Ti)-Dissolved			104.5		%		80-120	23-SEP-20
Uranium (U)-Dissolved			98.5		%		80-120	23-SEP-20
Vanadium (V)-Dissolved			106.2		%		80-120	23-SEP-20
Zinc (Zn)-Dissolved			104.9		%		80-120	23-SEP-20
WG3410263-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	23-SEP-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	23-SEP-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	23-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5233230								
WG3410263-1 MB		**NP**						
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	23-SEP-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	23-SEP-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	23-SEP-20
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	23-SEP-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	23-SEP-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	23-SEP-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	23-SEP-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	23-SEP-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	23-SEP-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	23-SEP-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	23-SEP-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	23-SEP-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	23-SEP-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	23-SEP-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	23-SEP-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	23-SEP-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	23-SEP-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	23-SEP-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	23-SEP-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	23-SEP-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	23-SEP-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	23-SEP-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	23-SEP-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	23-SEP-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	23-SEP-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	23-SEP-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	23-SEP-20
MET-T-CCMS-VA	**Water**							
Batch R5235341								
WG3410017-2 LCS								
Aluminum (Al)-Total			110.1		%		80-120	27-SEP-20
Antimony (Sb)-Total			119.6		%		80-120	27-SEP-20
Arsenic (As)-Total			112.1		%		80-120	27-SEP-20
Barium (Ba)-Total			118.7		%		80-120	27-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5235341								
WG3410017-2 LCS								
Bismuth (Bi)-Total			122.4	MES	%		80-120	27-SEP-20
Boron (B)-Total			103.9		%		80-120	27-SEP-20
Cadmium (Cd)-Total			115.5		%		80-120	27-SEP-20
Calcium (Ca)-Total			116.6		%		80-120	27-SEP-20
Chromium (Cr)-Total			110.8		%		80-120	27-SEP-20
Cobalt (Co)-Total			112.4		%		80-120	27-SEP-20
Copper (Cu)-Total			111.6		%		80-120	27-SEP-20
Iron (Fe)-Total			110.0		%		80-120	27-SEP-20
Lead (Pb)-Total			113.1		%		80-120	27-SEP-20
Lithium (Li)-Total			112.7		%		80-120	27-SEP-20
Magnesium (Mg)-Total			100.6		%		80-120	27-SEP-20
Manganese (Mn)-Total			112.4		%		80-120	27-SEP-20
Molybdenum (Mo)-Total			113.3		%		80-120	27-SEP-20
Nickel (Ni)-Total			111.4		%		80-120	27-SEP-20
Potassium (K)-Total			114.1		%		80-120	27-SEP-20
Selenium (Se)-Total			114.1		%		80-120	27-SEP-20
Silicon (Si)-Total			114.2		%		80-120	27-SEP-20
Silver (Ag)-Total			116.5		%		80-120	27-SEP-20
Sodium (Na)-Total			110.2		%		80-120	27-SEP-20
Strontium (Sr)-Total			115.1		%		80-120	27-SEP-20
Thallium (Tl)-Total			116.1		%		80-120	27-SEP-20
Tin (Sn)-Total			115.7		%		80-120	27-SEP-20
Titanium (Ti)-Total			108.1		%		80-120	27-SEP-20
Uranium (U)-Total			121.0	MES	%		80-120	27-SEP-20
Vanadium (V)-Total			112.4		%		80-120	27-SEP-20
Zinc (Zn)-Total			113.1		%		80-120	27-SEP-20
WG3410017-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	27-SEP-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	27-SEP-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	27-SEP-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	27-SEP-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	27-SEP-20
Boron (B)-Total			<0.010		mg/L		0.01	27-SEP-20
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	27-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5235341								
WG3410017-1 MB								
Calcium (Ca)-Total			<0.050		mg/L		0.05	27-SEP-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	27-SEP-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	27-SEP-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	27-SEP-20
Iron (Fe)-Total			<0.010		mg/L		0.01	27-SEP-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	27-SEP-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	27-SEP-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	27-SEP-20
Manganese (Mn)-Total			0.00011	MB-LOR	mg/L		0.0001	27-SEP-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	27-SEP-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	27-SEP-20
Potassium (K)-Total			<0.050		mg/L		0.05	27-SEP-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	27-SEP-20
Silicon (Si)-Total			<0.10		mg/L		0.1	27-SEP-20
Silver (Ag)-Total			0.000015	MB-LOR	mg/L		0.00001	27-SEP-20
Sodium (Na)-Total			<0.050		mg/L		0.05	27-SEP-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	27-SEP-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	27-SEP-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	27-SEP-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	27-SEP-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	27-SEP-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	27-SEP-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	27-SEP-20
NH3-L-F-CL	**Water**							
Batch R5232866								
WG3410229-18 LCS								
Ammonia as N			104.1		%		85-115	22-SEP-20
WG3410229-17 MB								
Ammonia as N			<0.0050		mg/L		0.005	22-SEP-20
NO2-L-IC-N-CL	**Water**							
Batch R5231603								
WG3409033-10 LCS								
Nitrite (as N)			99.5		%		90-110	20-SEP-20
WG3409033-9 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	20-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-L-IC-N-CL	**Water**							
Batch R5231603								
WG3409033-10 LCS								
Nitrate (as N)			103.1		%		90-110	20-SEP-20
WG3409033-9 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	20-SEP-20
ORP-CL	**Water**							
Batch R5231796								
WG3409206-10 CRM		**CL-ORP**						
ORP			223		mV		210-230	21-SEP-20
WG3409206-9 DUP		**L2505605-3**						
ORP		426	425	J	mV	1.3	15	21-SEP-20
P-T-L-COL-CL	**Water**							
Batch R5234777								
WG3411568-10 LCS								
Phosphorus (P)-Total			103.8		%		80-120	24-SEP-20
WG3411568-9 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	24-SEP-20
PH-CL	**Water**							
Batch R5232779								
WG3410445-11 LCS								
pH			6.99		pH		6.9-7.1	22-SEP-20
PO4-DO-L-COL-CL	**Water**							
Batch R5231084								
WG3408249-14 LCS								
Orthophosphate-Dissolved (as P)			101.2		%		80-120	20-SEP-20
WG3408249-13 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	20-SEP-20
SO4-IC-N-CL	**Water**							
Batch R5231603								
WG3409033-10 LCS								
Sulfate (SO4)			100.5		%		90-110	20-SEP-20
WG3409033-9 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	20-SEP-20
SOLIDS-TDS-CL	**Water**							

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-CL	**Water**							
Batch R5233145								
WG3409473-14 LCS								
Total Dissolved Solids			99.1		%		85-115	22-SEP-20
WG3409473-17 LCS								
Total Dissolved Solids			95.9		%		85-115	22-SEP-20
WG3409473-13 MB								
Total Dissolved Solids			<10		mg/L		10	22-SEP-20
WG3409473-16 MB								
Total Dissolved Solids			<10		mg/L		10	22-SEP-20
TKN-L-F-CL	**Water**							
Batch R5234612								
WG3411296-12 LCS								
Total Kjeldahl Nitrogen			85.0		%		75-125	24-SEP-20
WG3411296-2 LCS								
Total Kjeldahl Nitrogen			92.3		%		75-125	24-SEP-20
WG3411296-4 LCS								
Total Kjeldahl Nitrogen			93.1		%		75-125	24-SEP-20
WG3411296-8 LCS								
Total Kjeldahl Nitrogen			95.3		%		75-125	24-SEP-20
WG3411296-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	24-SEP-20
WG3411296-11 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	24-SEP-20
WG3411296-3 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	24-SEP-20
WG3411296-7 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	24-SEP-20
TSS-L-CL	**Water**							
Batch R5233042								
WG3409472-10 LCS								
Total Suspended Solids			96.7		%		85-115	22-SEP-20
WG3409472-9 MB								
Total Suspended Solids			<1.0		mg/L		1	22-SEP-20
TURBIDITY-CL	**Water**							
Batch R5231228								
WG3408414-5 LCS								
Turbidity			99.5		%		85-115	20-SEP-20
WG3408414-4 MB								
Turbidity			<0.10		NTU		0.1	20-SEP-20

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

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
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).
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	17-SEP-20 11:39	21-SEP-20 15:45	0.25	100	hours	EHTR-FM
	2	17-SEP-20 13:51	21-SEP-20 15:45	0.25	98	hours	EHTR-FM
	3	17-SEP-20 09:00	21-SEP-20 15:45	0.25	103	hours	EHTR-FM
pH							
	1	17-SEP-20 11:39	22-SEP-20 14:00	0.25	122	hours	EHTR-FM
	2	17-SEP-20 13:51	22-SEP-20 14:00	0.25	120	hours	EHTR-FM
	3	17-SEP-20 09:00	22-SEP-20 14:00	0.25	125	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2505605 were received on 19-SEP-20 08:30.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID:	CMO Supplemental Sampling Sept 2020	TURNAROUND TIME:	

PROJECT/CLIENT INFO

Facility Name	REP		
Project Manager	Cait Good		
Email	cait.good@teck.com		
Address	421 Pine Avenue		
City	Sparwood	Province	BC
Postal Code	V0B 2G0	Country	Canada
Phone Number	250-425-8202		

LABORATORY

Lab Name	ALS Calgary		
Lab Contact	Lyudmyla Shvets		
Email	lyudmyla.shvets@alsglobal.com		
Address	2559 29 Street NE		
City	Calgary	Province	AB
Postal Code	T1Y 7B5	Country	Canada
Phone Number	1 403 407 1794		

	Excel	PDF	EDD
cait.good@teck.com	x	x	x
teckcoal@equisonline.com			x
Jings@minnow.ca	x	x	x
carlie.meyer@teck.com	x	x	x
sweech@minnow.ca	x	x	x

Please invoice to Minnow Environmental Inc.

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_MIDAG-S2_WS_LAEMP_CMO_2020-09_NP	RG_MIDAG-S2	WS	No	9/17/2020	11:39	G	7	1	1	1	1	1	1	1
CM_MC2_WS_LAEMP_CMO_2020-09_N	CM_MC2	WS	No	9/18/2020	13:51	G	7	1	1	1	1	1	1	1
RG_MIDAG-S1_WS_LAEMP_CMO_2020-09_NP	RG_MIDAG-S1	WS	No	9/18/2020	9:00	G	7	1	1	1	1	1	1	1

L2505605-COFC

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	
	Jennifer Ings	September 18, 2020	Dt	9/19 0830

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 18, 2020

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 19-SEP-20
Report Date: 30-SEP-20 14:55 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2505739

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: CMO LAEMP Sept 2020
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-1	L2505739-2	L2505739-3	L2505739-4	L2505739-5
	Description	SE	SE	SE	SE	SE
	Sampled Date	10-SEP-20	13-SEP-20	12-SEP-20	11-SEP-20	12-SEP-20
	Sampled Time	16:22	09:46	11:37	10:16	16:14
	Client ID	RG_AGCK_SE-1_2020-09-10_1622	RG_RIVER_SE-5_2020-09-13_0946	RG_RIVER_SE-2_2020-09-12_1137	RG_RIVER_SE-1_2020-09-11_1016	RG_CORCK_SE-1_2020-09-12_1614
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	90.8	64.7	70.6	57.8	73.1
	pH (1:2 soil:water) (pH)	7.12	8.14	7.94	7.91	8.17
Particle Size	% Gravel (>2mm) (%)	1.5 PSAL	1.2	<1.0	<1.0	<1.0
	% Sand (2.00mm - 1.00mm) (%)	4.6 PSAL	3.1	1.3	<1.0	1.0
	% Sand (1.00mm - 0.50mm) (%)	7.7 PSAL	5.7	5.0	1.4	2.9
	% Sand (0.50mm - 0.25mm) (%)	6.8 PSAL	15.0	7.5	4.4	12.1
	% Sand (0.25mm - 0.125mm) (%)	7.0 PSAL	16.7	8.1	11.1	20.2
	% Sand (0.125mm - 0.063mm) (%)	8.3 PSAL	12.9	14.6	19.0	16.4
	% Silt (0.063mm - 0.0312mm) (%)	27.8 PSAL	17.2	26.4	27.0	21.9
	% Silt (0.0312mm - 0.004mm) (%)	29.0 PSAL	22.9	31.2	29.6	22.7
	% Clay (<4um) (%)	7.4 PSAL	5.2	5.8	6.9	2.9
	Texture	Silt loam	Sandy loam	Silt loam	Silt loam	Sandy loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	8.9	8.6	5.60	3.49	7.3
Metals	Aluminum (Al) (mg/kg)	3550	3630	14200	17100	2010
	Antimony (Sb) (mg/kg)	0.43	0.32	0.39	2.96	0.25
	Arsenic (As) (mg/kg)	6.07	3.06	7.05	11.1	1.61
	Barium (Ba) (mg/kg)	71.9	168	229	192	135
	Beryllium (Be) (mg/kg)	0.44	0.41	0.84	0.92	0.29
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	0.25	<0.20
	Boron (B) (mg/kg)	7.0	9.3	15.3	17.3	6.4
	Cadmium (Cd) (mg/kg)	0.558	9.13	0.869	1.39	7.94
	Calcium (Ca) (mg/kg)	138000	218000	32400	16600	289000
	Chromium (Cr) (mg/kg)	9.03	5.70	17.9	21.6	3.18
	Cobalt (Co) (mg/kg)	2.28	190	6.95	8.60	244
	Copper (Cu) (mg/kg)	6.40	7.49	19.2	29.4	4.46
	Iron (Fe) (mg/kg)	6170	4710	20200	21800	2640
	Lead (Pb) (mg/kg)	4.12	3.95	11.3	23.0	1.85
	Lithium (Li) (mg/kg)	4.6	4.0	18.9	23.7	3.2
	Magnesium (Mg) (mg/kg)	12300	6230	7630	6910	5760
	Manganese (Mn) (mg/kg)	111	1420	261	592	1640
	Mercury (Hg) (mg/kg)	0.0437	0.0552	0.0476	0.0606	0.0295
	Molybdenum (Mo) (mg/kg)	0.70	0.70	2.13	6.10	0.61
	Nickel (Ni) (mg/kg)	15.0	201	22.8	33.7	218
	Phosphorus (P) (mg/kg)	830	306	1110	1260	166
	Potassium (K) (mg/kg)	1090	960	3000	3360	590
	Selenium (Se) (mg/kg)	1.55	2.79	1.06	1.13	1.56

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		L2505739-6	L2505739-7	L2505739-8	L2505739-9	L2505739-10
	Sample ID	L2505739-6	L2505739-7	L2505739-8	L2505739-9	L2505739-10
	Description	SE	SE	SE	SE	SE
	Sampled Date	12-SEP-20	12-SEP-20	13-SEP-20	13-SEP-20	11-SEP-20
	Sampled Time	16:57	17:04	09:36	09:46	10:16
	Client ID	RG_CORCK_SE-2_2020-09-12_1657	RG_CORCK_SE-3_2020-09-12_1704	RG_CORCK_SE-4_2020-09-13_0936	RG_CORCK_SE-5_2020-09-13_0946	RG_MI25_SE-1_2020-09-11_1016
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	70.2	57.2	79.6	61.7	56.0
	pH (1:2 soil:water) (pH)	8.10	8.22	8.00	8.16	8.00
Particle Size	% Gravel (>2mm) (%)	<1.0	1.2	<1.0	<1.0	<1.0
	% Sand (2.00mm - 1.00mm) (%)	<1.0	2.5	<1.0	<1.0	<1.0
	% Sand (1.00mm - 0.50mm) (%)	<1.0	4.4	1.1	5.2	1.5
	% Sand (0.50mm - 0.25mm) (%)	2.9	10.8	3.5	11.9	3.2
	% Sand (0.25mm - 0.125mm) (%)	13.3	21.0	14.7	18.9	14.0
	% Sand (0.125mm - 0.063mm) (%)	16.7	18.0	16.5	15.0	18.1
	% Silt (0.063mm - 0.0312mm) (%)	28.8	17.1	26.6	16.8	26.8
	% Silt (0.0312mm - 0.004mm) (%)	32.5	20.5	30.8	24.7	29.1
	% Clay (<4um) (%)	4.3	4.5	5.6	6.2	6.9
	Texture	Silt loam	Sandy loam	Silt loam	Sandy loam	Silt loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	7.7	6.1	9.2	8.9	3.43
Metals	Aluminum (Al) (mg/kg)	3030	4420	4300	3900	16000
	Antimony (Sb) (mg/kg)	0.23	0.12	0.25	0.22	0.57
	Arsenic (As) (mg/kg)	1.93	3.09	2.48	3.23	10.2
	Barium (Ba) (mg/kg)	145	161	201	167	164
	Beryllium (Be) (mg/kg)	0.35	0.43	0.44	0.44	0.88
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	0.24
	Boron (B) (mg/kg)	9.2	9.2	10.6	9.2	15.2
	Cadmium (Cd) (mg/kg)	9.39	8.36	8.80	9.08	1.31
	Calcium (Ca) (mg/kg)	278000	243000	255000	216000	17100
	Chromium (Cr) (mg/kg)	4.24	6.42	6.77	5.90	20.3
	Cobalt (Co) (mg/kg)	191	247	232	191	8.16
	Copper (Cu) (mg/kg)	5.46	7.42	8.59	8.52	27.5
	Iron (Fe) (mg/kg)	3340	4980	4300	4790	20900
	Lead (Pb) (mg/kg)	2.23	3.56	3.35	3.96	16.3
	Lithium (Li) (mg/kg)	3.8	5.1	4.3	4.2	21.3
	Magnesium (Mg) (mg/kg)	6170	6370	6190	6170	6850
	Manganese (Mn) (mg/kg)	1530	1610	1490	1360	551
	Mercury (Hg) (mg/kg)	0.0172	0.0237	0.0266	0.0251	0.0487
	Molybdenum (Mo) (mg/kg)	0.57	0.77	0.80	0.71	5.78
	Nickel (Ni) (mg/kg)	223	219	228	201	31.4
	Phosphorus (P) (mg/kg)	241	276	285	330	1130
	Potassium (K) (mg/kg)	840	1080	1140	1010	3140
	Selenium (Se) (mg/kg)	2.86	2.13	4.88	2.74	1.02

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-11	L2505739-12	L2505739-13	L2505739-14	L2505739-15
	Description	SE	SE	SE	SE	SE
	Sampled Date	11-SEP-20	11-SEP-20	12-SEP-20	12-SEP-20	12-SEP-20
	Sampled Time	10:33	14:55	10:26	11:37	14:03
	Client ID	RG_MI25_SE-2_2020-09-11_1033	RG_MI25_SE-3_2020-09-11_1455	RG_MIUCO_SE-1_2020-09-12_1026	RG_MIUCO_SE-2_2020-09-12_1137	RG_MIUCO_SE-3_2020-09-12_1403
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	57.4	55.3	60.6	69.8	39.3
	pH (1:2 soil:water) (pH)	7.94	8.11	7.91	7.93	8.14
Particle Size	% Gravel (>2mm) (%)	<1.0	<1.0	<1.0	<1.0	<1.0
	% Sand (2.00mm - 1.00mm) (%)	4.4	<1.0	<1.0	2.8	1.7
	% Sand (1.00mm - 0.50mm) (%)	15.5	<1.0	1.6	4.9	3.4
	% Sand (0.50mm - 0.25mm) (%)	28.1	2.7	5.1	6.0	14.2
	% Sand (0.25mm - 0.125mm) (%)	17.9	13.3	10.2	6.4	29.7
	% Sand (0.125mm - 0.063mm) (%)	9.0	20.5	17.3	12.7	24.1
	% Silt (0.063mm - 0.0312mm) (%)	7.8	26.6	27.1	28.8	12.4
	% Silt (0.0312mm - 0.004mm) (%)	10.5	28.8	31.1	33.1	10.3
	% Clay (<4um) (%)	6.1	7.1	7.1	5.2	3.2
	Texture	Loamy sand	Silt loam	Silt loam	Silt loam	Loamy sand
Organic / Inorganic Carbon	Total Organic Carbon (%)	1.96	2.88	3.37	5.22	1.42
Metals	Aluminum (Al) (mg/kg)	15400	15900	15900	14100	15400
	Antimony (Sb) (mg/kg)	0.63	0.54	0.27	0.15	0.20
	Arsenic (As) (mg/kg)	11.5	10.3	7.54	6.43	7.01
	Barium (Ba) (mg/kg)	171	164	208	229	223
	Beryllium (Be) (mg/kg)	0.93	0.90	0.86	0.85	0.83
	Bismuth (Bi) (mg/kg)	0.25	0.22	0.20	<0.20	<0.20
	Boron (B) (mg/kg)	13.0	16.0	17.3	15.1	16.1
	Cadmium (Cd) (mg/kg)	1.47	1.31	0.861	0.880	0.610
	Calcium (Ca) (mg/kg)	16700	16500	17900	32600	18800
	Chromium (Cr) (mg/kg)	19.8	19.9	20.0	18.3	18.3
	Cobalt (Co) (mg/kg)	9.43	8.10	8.12	6.55	7.20
	Copper (Cu) (mg/kg)	29.4	27.3	19.5	18.3	16.2
	Iron (Fe) (mg/kg)	24800	21600	21200	18800	20200
	Lead (Pb) (mg/kg)	18.3	15.2	12.3	10.7	11.3
	Lithium (Li) (mg/kg)	23.5	22.2	20.5	18.6	20.1
	Magnesium (Mg) (mg/kg)	6570	6780	7050	8050	6540
	Manganese (Mn) (mg/kg)	593	508	607	264	342
	Mercury (Hg) (mg/kg)	0.0416	0.0448	0.0330	0.0342	0.0211
	Molybdenum (Mo) (mg/kg)	5.87	6.02	2.31	1.85	2.01
	Nickel (Ni) (mg/kg)	33.7	31.5	24.2	21.9	20.9
	Phosphorus (P) (mg/kg)	1240	1210	1290	1170	1300
	Potassium (K) (mg/kg)	2740	3180	3590	3310	3610
	Selenium (Se) (mg/kg)	1.02	1.04	0.82	1.12	0.49

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-16	L2505739-17	L2505739-18	L2505739-19	L2505739-20
	Description	SE	SE	SE	SE	SE
	Sampled Date	12-SEP-20	12-SEP-20	15-SEP-20	15-SEP-20	15-SEP-20
	Sampled Time	13:48	13:25	08:01	08:05	08:25
	Client ID	RG_MIUCO_SE-4_2020-09-12_1348	RG_MIUCO_SE-5_2020-09-12_1325	RG_MIDCO_SE-1_2020-09-15_0801	RG_MIDCO_SE-2_2020-09-15_0805	RG_MIDCO_SE-3_2020-09-15_0825
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	46.2	43.7	66.7	79.5	77.4
	pH (1:2 soil:water) (pH)	8.10	8.00	7.96	7.98	8.09
Particle Size	% Gravel (>2mm) (%)	<1.0	<1.0	<1.0	<1.0	<1.0
	% Sand (2.00mm - 1.00mm) (%)	1.0	<1.0	1.6	1.7	1.4
	% Sand (1.00mm - 0.50mm) (%)	2.9	2.3	7.2	6.5	13.7
	% Sand (0.50mm - 0.25mm) (%)	14.4	10.2	17.1	4.4	22.1
	% Sand (0.25mm - 0.125mm) (%)	31.4	21.0	14.0	5.9	18.0
	% Sand (0.125mm - 0.063mm) (%)	22.7	22.4	9.2	9.5	10.2
	% Silt (0.063mm - 0.0312mm) (%)	12.0	18.6	20.8	29.3	13.5
	% Silt (0.0312mm - 0.004mm) (%)	11.0	18.9	25.1	36.4	16.8
	% Clay (<4um) (%)	4.1	5.4	4.7	6.3	4.3
	Texture	Loamy sand	Sandy loam	Sandy loam	Silt loam	Sandy loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	2.04	2.38	3.5	4.7	4.33
Metals	Aluminum (Al) (mg/kg)	15100	15800	10800	9710	12800
	Antimony (Sb) (mg/kg)	0.33	0.34	0.36	0.31	0.37
	Arsenic (As) (mg/kg)	8.05	7.56	6.28	4.98	6.56
	Barium (Ba) (mg/kg)	220	173	134	147	148
	Beryllium (Be) (mg/kg)	0.89	0.90	0.74	0.60	0.78
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	16.1	16.2	14.3	14.9	17.0
	Cadmium (Cd) (mg/kg)	0.675	0.765	1.39	1.96	1.58
	Calcium (Ca) (mg/kg)	12600	12700	71300	96800	80300
	Chromium (Cr) (mg/kg)	19.0	19.3	13.9	13.1	16.4
	Cobalt (Co) (mg/kg)	8.22	8.27	71.5	73.3	79.0
	Copper (Cu) (mg/kg)	17.9	18.7	14.2	12.5	15.9
	Iron (Fe) (mg/kg)	21500	20800	17500	13800	17700
	Lead (Pb) (mg/kg)	11.8	11.8	9.49	7.80	10.2
	Lithium (Li) (mg/kg)	21.3	21.2	17.4	13.9	18.2
	Magnesium (Mg) (mg/kg)	6420	6620	6480	6830	7440
	Manganese (Mn) (mg/kg)	396	430	904	664	652
	Mercury (Hg) (mg/kg)	0.0253	0.0251	0.0230	0.0285	0.0262
	Molybdenum (Mo) (mg/kg)	2.37	2.38	1.78	1.65	1.84
	Nickel (Ni) (mg/kg)	22.8	23.5	113	128	127
	Phosphorus (P) (mg/kg)	1270	1350	1040	965	1160
	Potassium (K) (mg/kg)	3410	3470	2440	2280	2900
	Selenium (Se) (mg/kg)	0.53	0.58	1.89	2.80	2.15

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-21	L2505739-22	L2505739-23	L2505739-24	L2505739-25
	Description	SE	SE	SE	SE	SE
	Sampled Date	15-SEP-20	15-SEP-20	15-SEP-20	15-SEP-20	15-SEP-20
	Sampled Time	08:40	11:18	08:05	11:18	17:14
	Client ID	RG_MIDCO_SE-4_2020-09-15_0840	RG_MIDCO_SE-5_2020-09-15_1118	RG_RIVER_SE-2_2020-09-15_0805	RG_RIVER_SE-5_2020-09-15_1118	RG_MIDAG_SE-1_2020-09-15_1714
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	78.3	58.3	78.8	52.9	85.5
	pH (1:2 soil:water) (pH)	8.00	8.07	8.15	8.05	7.80
Particle Size	% Gravel (>2mm) (%)	<1.0	<1.0	<1.0	<1.0	9.8
	% Sand (2.00mm - 1.00mm) (%)	<1.0	2.6	3.0	3.1	<1.0
	% Sand (1.00mm - 0.50mm) (%)	1.5	8.0	6.8	7.1	1.5
	% Sand (0.50mm - 0.25mm) (%)	5.2	11.0	4.4	10.8	2.4
	% Sand (0.25mm - 0.125mm) (%)	13.4	10.4	5.7	10.5	3.3
	% Sand (0.125mm - 0.063mm) (%)	14.7	16.3	9.1	15.0	5.2
	% Silt (0.063mm - 0.0312mm) (%)	28.0	22.3	30.1	23.4	31.8
	% Silt (0.0312mm - 0.004mm) (%)	30.9	24.2	35.5	25.6	37.4
	% Clay (<4um) (%)	5.8	5.1	5.4	4.4	8.2
	Texture	Silt loam	Sandy loam	Silt loam	Sandy loam	Silt loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	4.8	3.47	4.8	3.67	8.45
Metals	Aluminum (Al) (mg/kg)	9880	15100	11600	14400	9420
	Antimony (Sb) (mg/kg)	0.29	0.37	0.24	0.39	0.34
	Arsenic (As) (mg/kg)	5.31	7.52	5.95	7.29	5.50
	Barium (Ba) (mg/kg)	148	141	163	145	158
	Beryllium (Be) (mg/kg)	0.61	0.80	0.72	0.84	0.62
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	15.8	16.6	17.1	16.5	13.9
	Cadmium (Cd) (mg/kg)	1.75	1.65	2.08	1.65	1.25
	Calcium (Ca) (mg/kg)	86300	38400	96400	40400	91000
	Chromium (Cr) (mg/kg)	13.3	19.2	15.5	17.9	16.6
	Cobalt (Co) (mg/kg)	111	40.1	80.4	39.0	38.5
	Copper (Cu) (mg/kg)	12.7	18.2	13.5	17.5	12.0
	Iron (Fe) (mg/kg)	13600	19600	14700	20900	12400
	Lead (Pb) (mg/kg)	7.65	10.5	8.17	11.1	7.77
	Lithium (Li) (mg/kg)	13.3	18.6	15.2	19.6	11.7
	Magnesium (Mg) (mg/kg)	6770	7690	7530	7950	9190
	Manganese (Mn) (mg/kg)	788	685	775	666	412
	Mercury (Hg) (mg/kg)	0.0256	0.0254	0.0250	0.0271	0.0367
	Molybdenum (Mo) (mg/kg)	1.54	2.09	1.45	2.15	1.34
	Nickel (Ni) (mg/kg)	148	92.2	140	88.7	77.0
	Phosphorus (P) (mg/kg)	962	1150	958	1250	994
	Potassium (K) (mg/kg)	2480	3500	2940	3170	2450
	Selenium (Se) (mg/kg)	2.92	1.73	2.87	1.75	4.65

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2505739-26	L2505739-27	L2505739-28	L2505739-29	L2505739-30
	Description	SE	SE	SE	SE	SE
	Sampled Date	15-SEP-20	16-SEP-20	16-SEP-20	16-SEP-20	16-SEP-20
	Sampled Time	17:23	11:45	12:05	14:57	08:05
	Client ID	RG_MIDAG_SE-2_2020-09-15_1723	RG_MIULE_SE-1_2020-09-16_1145	RG_MIULE_SE-2_2020-09-16_1205	RG_MIULE_SE-3_2020-09-16_1457	RG_MIDAG_SE-3_2020-09-16_0805
SOIL						
Physical Tests	Moisture (%)	77.2	56.5	42.3	73.8	73.9
	pH (1:2 soil:water) (pH)	7.90	8.14	8.09	7.87	7.90
Particle Size	% Gravel (>2mm) (%)	<1.0	<1.0	<1.0	<1.0	<1.0
	% Sand (2.00mm - 1.00mm) (%)	1.7	<1.0	<1.0	<1.0	<1.0
	% Sand (1.00mm - 0.50mm) (%)	6.7	<1.0	1.8	2.7	6.3
	% Sand (0.50mm - 0.25mm) (%)	8.5	8.6	2.9	12.4	13.5
	% Sand (0.25mm - 0.125mm) (%)	9.0	18.2	10.8	24.4	11.5
	% Sand (0.125mm - 0.063mm) (%)	8.7	18.3	20.1	18.1	9.5
	% Silt (0.063mm - 0.0312mm) (%)	27.8	23.5	27.7	20.0	22.2
	% Silt (0.0312mm - 0.004mm) (%)	31.5	25.5	30.4	18.8	27.8
	% Clay (<4um) (%)	5.3	4.5	5.4	3.2	8.5
	Texture	Silt loam	Sandy loam	Silt loam	Sandy loam	Silt loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	5.97	2.89	3.42	6.95	6.29
Metals	Aluminum (Al) (mg/kg)	10200	9910	10500	9290	11200
	Antimony (Sb) (mg/kg)	0.36	0.58	0.67	0.35	<0.10
	Arsenic (As) (mg/kg)	6.27	6.05	8.51	6.47	6.76
	Barium (Ba) (mg/kg)	143	210	249	206	163
	Beryllium (Be) (mg/kg)	0.73	0.67	0.76	0.65	0.80
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	14.9	11.9	11.2	11.0	9.2
	Cadmium (Cd) (mg/kg)	1.13	1.13	1.32	0.994	1.26
	Calcium (Ca) (mg/kg)	72900	41900	44200	53700	55300
	Chromium (Cr) (mg/kg)	16.5	15.7	16.7	14.5	16.5
	Cobalt (Co) (mg/kg)	38.8	11.7	13.7	12.9	23.3
	Copper (Cu) (mg/kg)	12.7	12.6	16.1	11.7	15.3
	Iron (Fe) (mg/kg)	14100	14800	18000	14300	17000
	Lead (Pb) (mg/kg)	8.90	8.48	10.3	7.92	9.63
	Lithium (Li) (mg/kg)	13.6	12.7	14.5	11.7	13.8
	Magnesium (Mg) (mg/kg)	9430	9350	11000	8310	9480
	Manganese (Mn) (mg/kg)	445	202	306	290	406
	Mercury (Hg) (mg/kg)	0.0331	0.0352	0.0409	0.0316	0.0431
	Molybdenum (Mo) (mg/kg)	1.53	1.43	1.83	1.46	1.14
	Nickel (Ni) (mg/kg)	74.9	34.8	40.7	35.6	58.9
	Phosphorus (P) (mg/kg)	998	1080	1210	1060	1010
	Potassium (K) (mg/kg)	2610	2460	2390	2400	2770
	Selenium (Se) (mg/kg)	3.26	2.02	1.27	1.92	5.69

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-31	L2505739-32	L2505739-33	L2505739-34	L2505739-35
	Description	SE	SE	SE	SE	SE
	Sampled Date	16-SEP-20	16-SEP-20	16-SEP-20	17-SEP-20	17-SEP-20
	Sampled Time	09:22	09:32	12:08	14:20	15:40
	Client ID	RG_MIDAG_SE-4_2020-09-16_0922	RG_MIDAG_SE-5_2020-09-16_0932	RG_RIVER_SE-2_2020-09-16_1208	RG_LE1_SE-1_2020-09-17_1420	RG_LE1_SE-2_2020-09-17_1540
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	76.6	75.3	40.0	43.4	42.5
	pH (1:2 soil:water) (pH)	7.95	7.97	8.12	7.66	7.40
Particle Size	% Gravel (>2mm) (%)	<1.0	<1.0	<1.0	<1.0	<1.0
	% Sand (2.00mm - 1.00mm) (%)	1.4	<1.0	<1.0	<1.0	<1.0
	% Sand (1.00mm - 0.50mm) (%)	12.0	2.2	<1.0	1.1	2.1
	% Sand (0.50mm - 0.25mm) (%)	14.7	6.5	<1.0	6.5	9.3
	% Sand (0.25mm - 0.125mm) (%)	11.3	11.3	12.0	23.9	31.4
	% Sand (0.125mm - 0.063mm) (%)	9.0	12.3	22.6	27.8	23.8
	% Silt (0.063mm - 0.0312mm) (%)	21.6	28.7	26.0	18.2	14.6
	% Silt (0.0312mm - 0.004mm) (%)	24.5	32.0	31.3	16.6	14.1
	% Clay (<4um) (%)	5.2	5.5	7.4	5.2	4.5
	Texture	Sandy loam	Silt loam	Silt loam	Sandy loam	Sandy loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	6.11	5.84	3.34	2.89	5.79
Metals	Aluminum (Al) (mg/kg)	11000	10300	10000	9410	9650
	Antimony (Sb) (mg/kg)	0.16	0.28	0.59	1.09	1.14
	Arsenic (As) (mg/kg)	6.89	6.11	7.59	5.30	5.60
	Barium (Ba) (mg/kg)	126	135	224	302	313
	Beryllium (Be) (mg/kg)	0.75	0.71	0.69	0.59	0.66
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	12.0	13.2	11.7	<5.0	<5.0
	Cadmium (Cd) (mg/kg)	1.04	1.13	1.23	1.61	2.03
	Calcium (Ca) (mg/kg)	63400	65200	42500	5380	5170
	Chromium (Cr) (mg/kg)	16.0	15.8	15.4	17.5	18.5
	Cobalt (Co) (mg/kg)	30.4	33.5	12.3	5.55	5.99
	Copper (Cu) (mg/kg)	13.3	12.2	14.4	15.4	17.6
	Iron (Fe) (mg/kg)	15600	13600	16100	14500	14400
	Lead (Pb) (mg/kg)	8.60	7.89	9.12	8.48	9.12
	Lithium (Li) (mg/kg)	14.9	13.5	13.1	9.8	10.6
	Magnesium (Mg) (mg/kg)	9490	10800	10200	2550	2220
	Manganese (Mn) (mg/kg)	327	350	264	228	251
	Mercury (Hg) (mg/kg)	0.0335	0.457	0.0433	0.0654	0.0723
	Molybdenum (Mo) (mg/kg)	1.17	1.34	1.63	1.32	1.28
	Nickel (Ni) (mg/kg)	70.8	74.1	36.4	23.9	25.9
	Phosphorus (P) (mg/kg)	1050	1010	1070	1170	1090
	Potassium (K) (mg/kg)	2740	2560	2370	1680	1720
	Selenium (Se) (mg/kg)	2.45	3.19	1.24	0.76	1.01

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2505739-36	L2505739-37	L2505739-38	L2505739-39	L2505739-40
	Description	SE	SE	SE	SE	SE
	Sampled Date	17-SEP-20	17-SEP-20	17-SEP-20	17-SEP-20	17-SEP-20
	Sampled Time	15:50	08:15	08:40	08:40	12:33
	Client ID	RG_LE1_SE-3_2020-09-17_1550	RG_MIULE_SE-4_2020-09-17_0815	RG_MIULE_SE-5_2020-09-17_0840	RG_MIDAG_S2_SE-1_2020-09-17_0840	RG_MIDAG_S2_SE-2_2020-09-17_1233
SOIL						
Physical Tests	Moisture (%)	35.4	63.5	78.6	78.7	77.4
	pH (1:2 soil:water) (pH)	7.91	8.09	7.67	7.90	7.72
Particle Size	% Gravel (>2mm) (%)	<1.0	<1.0	<1.0	<1.0 PSAL	<1.0
	% Sand (2.00mm - 1.00mm) (%)	<1.0	<1.0	<1.0	<1.0 PSAL	<1.0
	% Sand (1.00mm - 0.50mm) (%)	<1.0	1.2	2.5	<1.0 PSAL	<1.0
	% Sand (0.50mm - 0.25mm) (%)	9.8	4.8	7.1	1.3 PSAL	2.0
	% Sand (0.25mm - 0.125mm) (%)	24.8	9.9	11.5	4.9 PSAL	4.5
	% Sand (0.125mm - 0.063mm) (%)	28.3	16.1	19.7	8.6 PSAL	7.4
	% Silt (0.063mm - 0.0312mm) (%)	17.4	29.9	27.1	36.1 PSAL	35.9
	% Silt (0.0312mm - 0.004mm) (%)	14.5	32.9	26.0	40.8 PSAL	40.7
	% Clay (<4um) (%)	4.0	5.1	5.8	7.1 PSAL	7.2
	Texture	Sandy loam	Silt loam	Silt loam / Sandy loam	Silt loam	Silt loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	1.59	4.41	8.09	7.94	7.06
Metals	Aluminum (Al) (mg/kg)	10600	11500	7430	10200	10400
	Antimony (Sb) (mg/kg)	1.16	0.33	0.26	0.23	0.34
	Arsenic (As) (mg/kg)	5.97	6.47	4.79	6.26	5.86
	Barium (Ba) (mg/kg)	303	218	203	151	141
	Beryllium (Be) (mg/kg)	0.62	0.78	0.52	0.65	0.64
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	5.3	13.2	10.4	12.8	14.6
	Cadmium (Cd) (mg/kg)	1.54	1.29	0.974	1.14	1.04
	Calcium (Ca) (mg/kg)	4940	46300	84100	74400	77600
	Chromium (Cr) (mg/kg)	19.3	17.6	11.7	16.1	16.1
	Cobalt (Co) (mg/kg)	6.14	14.2	14.0	50.1	40.0
	Copper (Cu) (mg/kg)	15.1	14.5	9.43	12.8	12.7
	Iron (Fe) (mg/kg)	15300	16000	11400	13400	12800
	Lead (Pb) (mg/kg)	8.77	9.45	6.18	7.92	7.35
	Lithium (Li) (mg/kg)	10.8	14.4	9.2	12.9	12.2
	Magnesium (Mg) (mg/kg)	2510	9610	7660	10600	10200
	Manganese (Mn) (mg/kg)	273	229	248	486	392
	Mercury (Hg) (mg/kg)	0.0515	0.0441	0.0288	0.0432	0.0472
	Molybdenum (Mo) (mg/kg)	1.47	1.42	1.06	1.29	1.28
	Nickel (Ni) (mg/kg)	25.7	44.6	40.0	87.2	75.4
	Phosphorus (P) (mg/kg)	1290	1160	912	989	1090
	Potassium (K) (mg/kg)	1950	2880	1900	2500	2640
	Selenium (Se) (mg/kg)	0.60	1.94	2.81	3.20	3.15

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-41	L2505739-42	L2505739-43		
	Description	SE	SE	SE		
	Sampled Date	17-SEP-20	17-SEP-20	17-SEP-20		
	Sampled Time	13:14	14:57	15:14		
	Client ID	RG_MIDAG_S2_SE-3_2020-09-17_1341	RG_MIDAG_S2_SE-4_2020-09-17_1457	RG_MIDAG_S2_SE-5_2020-09-17_1514		
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	74.6	74.3	75.7		
	pH (1:2 soil:water) (pH)	7.90	8.00	7.74		
Particle Size	% Gravel (>2mm) (%)	<1.0	1.1	<1.0		
	% Sand (2.00mm - 1.00mm) (%)	<1.0	1.7	1.2		
	% Sand (1.00mm - 0.50mm) (%)	2.2	4.0	7.6		
	% Sand (0.50mm - 0.25mm) (%)	5.8	4.6	11.2		
	% Sand (0.25mm - 0.125mm) (%)	11.2	5.2	10.1		
	% Sand (0.125mm - 0.063mm) (%)	10.4	8.1	10.0		
	% Silt (0.063mm - 0.0312mm) (%)	29.6	32.9	24.6		
	% Silt (0.0312mm - 0.004mm) (%)	33.8	37.1	29.0		
	% Clay (<4um) (%)	6.2	5.3	5.9		
	Texture	Silt loam	Silt loam	Silt loam		
Organic / Inorganic Carbon	Total Organic Carbon (%)	8.83	8.53	7.33		
Metals	Aluminum (Al) (mg/kg)	9620	8770	10800		
	Antimony (Sb) (mg/kg)	0.43	0.44	0.42		
	Arsenic (As) (mg/kg)	6.99	6.31	6.94		
	Barium (Ba) (mg/kg)	141	138	137		
	Beryllium (Be) (mg/kg)	0.73	0.71	0.72		
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20		
	Boron (B) (mg/kg)	12.2	12.3	13.3		
	Cadmium (Cd) (mg/kg)	1.21	1.23	1.22		
	Calcium (Ca) (mg/kg)	48900	62500	50700		
	Chromium (Cr) (mg/kg)	15.2	14.3	16.5		
	Cobalt (Co) (mg/kg)	34.7	45.0	38.0		
	Copper (Cu) (mg/kg)	15.1	14.3	14.8		
	Iron (Fe) (mg/kg)	15100	13400	15200		
	Lead (Pb) (mg/kg)	9.07	8.39	8.87		
	Lithium (Li) (mg/kg)	14.0	12.5	14.1		
	Magnesium (Mg) (mg/kg)	9450	10500	9770		
	Manganese (Mn) (mg/kg)	482	477	511		
	Mercury (Hg) (mg/kg)	0.0412	0.0458	0.0367		
	Molybdenum (Mo) (mg/kg)	1.62	1.42	1.59		
	Nickel (Ni) (mg/kg)	64.2	86.3	65.3		
	Phosphorus (P) (mg/kg)	1070	1100	1080		
	Potassium (K) (mg/kg)	2160	1960	2590		
	Selenium (Se) (mg/kg)	2.64	2.62	2.83		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2505739-1	L2505739-2	L2505739-3	L2505739-4	L2505739-5
	Description	SE	SE	SE	SE	SE
	Sampled Date	10-SEP-20	13-SEP-20	12-SEP-20	11-SEP-20	12-SEP-20
	Sampled Time	16:22	09:46	11:37	10:16	16:14
	Client ID	RG_AGCK_SE-1_2020-09-10_1622	RG_RIVER_SE-5_2020-09-13_0946	RG_RIVER_SE-2_2020-09-12_1137	RG_RIVER_SE-1_2020-09-11_1016	RG_CORCK_SE-1_2020-09-12_1614
SOIL						
Metals	Silver (Ag) (mg/kg)	0.13	<0.10	0.12	0.20	<0.10
	Sodium (Na) (mg/kg)	149	313	89	94	361
	Strontium (Sr) (mg/kg)	157	307	72.2	49.4	392
	Sulfur (S) (mg/kg)	1100	3200	<1000	<1000	4000
	Thallium (Tl) (mg/kg)	0.693	0.263	0.401	0.804	0.191
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	25.2	12.7	21.8	22.7	10.1
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	0.681	1.75	0.638	0.983	2.11
	Vanadium (V) (mg/kg)	15.3	11.4	30.4	40.6	6.08
	Zinc (Zn) (mg/kg)	105	842	94.4	143	773
	Zirconium (Zr) (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	DLHM <0.025	DLCI <0.040	DLHM <0.0075	<0.0050	DLCI <0.020
	Acenaphthylene (mg/kg)	DLHM <0.025	DLCI <0.015	DLHM <0.0075	<0.0050	DLHM <0.0085
	Acridine (mg/kg)	DLHM <0.050	DLHM 0.081	DLHM <0.015	<0.010	DLCI <0.040
	Anthracene (mg/kg)	DLHM <0.020	DLHM <0.0060	DLHM <0.0060	<0.0040	DLHM <0.017
	Benz(a)anthracene (mg/kg)	DLHM <0.050	DLHM 0.055	DLHM <0.015	<0.010	DLHM 0.025
	Benzo(a)pyrene (mg/kg)	DLHM <0.050	DLHM 0.040	DLHM <0.015	<0.010	DLHM 0.019
	Benzo(b&j)fluoranthene (mg/kg)	DLHM <0.050	DLHM 0.169	DLHM 0.032	0.014	DLHM 0.070
	Benzo(b+j+k)fluoranthene (mg/kg)	DLHM <0.075	DLHM 0.169	DLHM 0.032	<0.015	DLHM 0.070
	Benzo(e)pyrene (mg/kg)	DLHM <0.050	DLHM 0.205	DLHM 0.030	0.016	DLHM 0.090
	Benzo(g,h,i)perylene (mg/kg)	DLHM <0.050	DLHM 0.096	DLHM <0.015	<0.010	DLHM 0.043
	Benzo(k)fluoranthene (mg/kg)	DLHM <0.050	DLHM <0.015	DLHM <0.015	<0.010	DLHM <0.017
	Chrysene (mg/kg)	DLHM 0.064	DLHM 0.271	DLHM 0.058	0.033	DLHM 0.121
	Dibenz(a,h)anthracene (mg/kg)	DLHM <0.025	DLCI <0.025	DLHM <0.0075	<0.0050	DLHM <0.017
	Fluoranthene (mg/kg)	DLHM <0.050	DLHM 0.057	DLHM <0.015	0.012	DLHM 0.020
	Fluorene (mg/kg)	DLHM <0.050	DLHM 0.141	DLHM 0.017	<0.010	DLHM 0.065
	Indeno(1,2,3-c,d)pyrene (mg/kg)	DLHM <0.050	DLHM 0.015	DLHM <0.015	<0.010	DLHM <0.017
	1-Methylnaphthalene (mg/kg)	DLHM 0.094	DLHM 0.955	DLHM 0.122	<0.050	DLHM 0.429
	2-Methylnaphthalene (mg/kg)	DLHM 0.120	DLHM 1.60	DLHM 0.180	0.015	DLHM 0.717
	Naphthalene (mg/kg)	DLHM 0.061	DLHM 0.558	DLHM 0.057	<0.010	DLHM 0.230
	Perylene (mg/kg)	DLHM <0.050	DLHM <0.015	DLHM <0.015	<0.010	DLHM <0.017
	Phenanthrene (mg/kg)	DLHM 0.159	DLHM 0.753	DLHM 0.138	0.029	DLHM 0.334
	Pyrene (mg/kg)	DLHM <0.050	DLHM 0.089	DLHM 0.019	0.015	DLHM 0.039
	Quinoline (mg/kg)	DLHM <0.050	DLHM <0.015	DLHM <0.015	<0.050	DLHM <0.017
	Surrogate: d10-Acenaphthene (%)	99.9	110.8	109.5	107.2	107.8

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-6	L2505739-7	L2505739-8	L2505739-9	L2505739-10
	Description	SE	SE	SE	SE	SE
	Sampled Date	12-SEP-20	12-SEP-20	13-SEP-20	13-SEP-20	11-SEP-20
	Sampled Time	16:57	17:04	09:36	09:46	10:16
	Client ID	RG_CORCK_SE-2_2020-09-12_1657	RG_CORCK_SE-3_2020-09-12_1704	RG_CORCK_SE-4_2020-09-13_0936	RG_CORCK_SE-5_2020-09-13_0946	RG_MI25_SE-1_2020-09-11_1016
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	<0.10	<0.10	<0.10	<0.10	0.17
	Sodium (Na) (mg/kg)	433	324	405	328	89
	Strontium (Sr) (mg/kg)	411	321	351	295	47.8
	Sulfur (S) (mg/kg)	4700	3600	4400	3200	<1000
	Thallium (Tl) (mg/kg)	0.165	0.308	0.241	0.258	0.756
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	10.3	10.9	11.5	9.8	22.2
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	2.13	1.83	2.10	1.74	0.929
	Vanadium (V) (mg/kg)	8.51	12.5	13.0	12.1	38.4
	Zinc (Zn) (mg/kg)	922	777	852	849	136
	Zirconium (Zr) (mg/kg)	<1.0	<1.0	<1.0	<1.0	1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	DLCI <0.035	DLCI <0.060	DLCI <0.060	0.0488	<0.0050
	Acenaphthylene (mg/kg)	DLCI <0.0090	DLCI <0.0060	DLCI <0.015	0.0123	<0.0050
	Acridine (mg/kg)	DLCI <0.070	DLCI <0.10	DLCI <0.13	DLCI <0.10	<0.010
	Anthracene (mg/kg)	DLHM <0.0060	0.0123	DLCI <0.020	0.0062	<0.0040
	Benz(a)anthracene (mg/kg)	DLHM 0.040	0.056	DLHM 0.070	0.055	<0.010
	Benzo(a)pyrene (mg/kg)	DLHM 0.027	0.047	DLHM 0.050	0.038	<0.010
	Benzo(b&j)fluoranthene (mg/kg)	DLHM 0.118	0.179	DLHM 0.217	0.170	0.011
	Benzo(b+j+k)fluoranthene (mg/kg)	DLHM 0.118	0.179	DLHM 0.217	0.170	<0.015
	Benzo(e)pyrene (mg/kg)	DLHM 0.150	0.228	DLHM 0.270	0.203	0.014
	Benzo(g,h,i)perylene (mg/kg)	DLHM 0.071	0.106	DLHM 0.137	0.092	<0.010
	Benzo(k)fluoranthene (mg/kg)	DLHM <0.015	<0.010	DLHM <0.025	<0.010	<0.010
	Chrysene (mg/kg)	DLHM 0.193	0.285	DLHM 0.362	0.277	0.025
	Dibenz(a,h)anthracene (mg/kg)	DLHM 0.019	0.0264	DLHM 0.034	0.0246	<0.0050
	Fluoranthene (mg/kg)	DLHM 0.032	0.052	DLHM 0.071	0.053	<0.010
	Fluorene (mg/kg)	DLHM 0.106	0.165	DLHM 0.219	0.139	<0.010
	Indeno(1,2,3-c,d)pyrene (mg/kg)	DLHM 0.022	0.029	DLHM 0.032	0.025	<0.010
	1-Methylnaphthalene (mg/kg)	DLHM 0.690	0.988	DLHM 1.20	0.943	<0.050
	2-Methylnaphthalene (mg/kg)	DLHM 1.16	1.67	DLHM 2.05	1.58	0.013
	Naphthalene (mg/kg)	DLHM 0.387	0.561	DLHM 0.682	0.555	<0.010
	Perylene (mg/kg)	DLHM <0.015	<0.010	DLHM <0.025	<0.010	<0.010
	Phenanthrene (mg/kg)	DLHM 0.553	0.813	DLHM 0.972	0.777	0.024
	Pyrene (mg/kg)	DLHM 0.064	0.095	DLHM 0.111	0.090	0.010
	Quinoline (mg/kg)	DLHM <0.015	<0.050	DLHM <0.025	<0.050	<0.050
	Surrogate: d10-Acenaphthene (%)	101.7	111.1	118.1	108.4	98.6

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-11	L2505739-12	L2505739-13	L2505739-14	L2505739-15
	Description	SE	SE	SE	SE	SE
	Sampled Date	11-SEP-20	11-SEP-20	12-SEP-20	12-SEP-20	12-SEP-20
	Sampled Time	10:33	14:55	10:26	11:37	14:03
	Client ID	RG_MI25_SE-2_2020-09-11_1033	RG_MI25_SE-3_2020-09-11_1455	RG_MIUCO_SE-1_2020-09-12_1026	RG_MIUCO_SE-2_2020-09-12_1137	RG_MIUCO_SE-3_2020-09-12_1403
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	0.15	0.16	0.13	0.12	<0.10
	Sodium (Na) (mg/kg)	86	87	86	87	84
	Strontium (Sr) (mg/kg)	49.5	49.7	51.7	73.0	50.0
	Sulfur (S) (mg/kg)	<1000	<1000	<1000	<1000	<1000
	Thallium (Tl) (mg/kg)	0.768	0.819	0.438	0.417	0.361
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	17.8	21.1	19.6	11.7	12.3
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	0.877	0.941	0.701	0.650	0.629
	Vanadium (V) (mg/kg)	36.1	38.1	32.8	30.8	30.8
	Zinc (Zn) (mg/kg)	155	138	99.1	92.5	87.5
	Zirconium (Zr) (mg/kg)	1.1	<1.0	<1.0	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0080 DLCI	<0.0050
	Acenaphthylene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0080 DLCI	<0.0050
	Acridine (mg/kg)	<0.010	<0.010	<0.010	<0.016 DLCI	<0.010
	Anthracene (mg/kg)	<0.0040	<0.0040	<0.0040	<0.0064 DLCI	<0.0040
	Benz(a)anthracene (mg/kg)	<0.010	<0.010	<0.010	<0.016 DLCI	<0.010
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.016 DLCI	<0.010
	Benzo(b&j)fluoranthene (mg/kg)	<0.010	<0.010	0.010	0.028 DLCI	<0.010
	Benzo(b+j+k)fluoranthene (mg/kg)	<0.015	<0.015	<0.015	0.028 DLHM	<0.015
	Benzo(e)pyrene (mg/kg)	0.011	0.012	0.014	0.031 DLCI	<0.010
	Benzo(g,h,i)perylene (mg/kg)	<0.010	<0.010	<0.010	<0.016 DLCI	<0.010
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.016 DLCI	<0.010
	Chrysene (mg/kg)	0.019	<0.026 DLCI	<0.030 DLCI	0.055 DLCI	0.017
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0080 DLCI	<0.0050
	Fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.016 DLCI	<0.010
	Fluorene (mg/kg)	<0.010	<0.010	<0.010	<0.016 DLCI	<0.010
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.016 DLCI	<0.010
	1-Methylnaphthalene (mg/kg)	<0.050	<0.050	<0.050	0.115 DLCI	<0.050
	2-Methylnaphthalene (mg/kg)	<0.010	0.011	0.027	0.164 DLCI	0.022
	Naphthalene (mg/kg)	<0.010	<0.010	0.016	0.055 DLCI	<0.010
	Perylene (mg/kg)	<0.010	<0.010	0.023	<0.016 DLCI	<0.010
	Phenanthrene (mg/kg)	0.016	0.023	0.037	0.130 DLCI	0.027
	Pyrene (mg/kg)	<0.010	<0.010	<0.010	0.018 DLCI	<0.010
	Quinoline (mg/kg)	<0.050	<0.050	<0.050	<0.016 DLCI	<0.050
	Surrogate: d10-Acenaphthene (%)	110.7	102.2	104.5	110.9	105.8

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte					
	Sample ID	L2505739-16	L2505739-17	L2505739-18	L2505739-19	L2505739-20
	Description	SE	SE	SE	SE	SE
	Sampled Date	12-SEP-20	12-SEP-20	15-SEP-20	15-SEP-20	15-SEP-20
	Sampled Time	13:48	13:25	08:01	08:05	08:25
	Client ID	RG_MIUCO_SE-4_2020-09-12_1348	RG_MIUCO_SE-5_2020-09-12_1325	RG_MIDCO_SE-1_2020-09-15_0801	RG_MIDCO_SE-2_2020-09-15_0805	RG_MIDCO_SE-3_2020-09-15_0825
SOIL						
Metals	Silver (Ag) (mg/kg)	0.10	<0.10	<0.10	<0.10	<0.10
	Sodium (Na) (mg/kg)	81	79	206	270	210
	Strontium (Sr) (mg/kg)	42.1	37.5	123	163	140
	Sulfur (S) (mg/kg)	<1000	<1000	1400	1800	1500
	Thallium (Tl) (mg/kg)	0.378	0.391	0.322	0.311	0.369
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	17.5	21.3	22.3	26.2	20.6
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	0.584	0.661	0.797	0.850	0.944
	Vanadium (V) (mg/kg)	31.9	32.8	23.7	22.5	27.5
	Zinc (Zn) (mg/kg)	94.8	97.1	157	200	173
	Zirconium (Zr) (mg/kg)	<1.0	1.1	<1.0	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0050	<0.0050	DLHM 0.0076	DLCI <0.030	DLHM <0.011
	Acenaphthylene (mg/kg)	<0.0050	<0.0050	DLHM <0.0075	DLHM <0.011	DLHM <0.011
	Acridine (mg/kg)	<0.010	<0.010	DLHM <0.015	DLCI <0.040	DLCI <0.030
	Anthracene (mg/kg)	<0.0040	<0.0040	DLHM <0.0060	DLHM <0.0088	DLHM <0.022
	Benz(a)anthracene (mg/kg)	<0.010	<0.010	DLHM <0.015	DLHM 0.028	DLHM <0.022
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	DLHM <0.015	DLHM <0.022	DLHM <0.022
	Benzo(b&j)fluoranthene (mg/kg)	<0.010	<0.010	DLHM 0.034	DLHM 0.086	DLHM 0.051
	Benzo(b+j+k)fluoranthene (mg/kg)	<0.015	<0.015	DLHM 0.034	DLHM 0.086	DLHM 0.051
	Benzo(e)pyrene (mg/kg)	<0.010	<0.010	DLHM 0.041	DLHM 0.099	DLHM 0.059
	Benzo(g,h,i)perylene (mg/kg)	<0.010	<0.010	DLHM <0.015	DLHM 0.046	DLHM 0.027
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	DLHM <0.015	DLHM <0.022	DLHM <0.022
	Chrysene (mg/kg)	0.015	0.015	DLHM 0.057	DLHM 0.145	DLHM 0.090
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	<0.0050	DLHM <0.0075	DLHM <0.022	DLHM <0.022
	Fluoranthene (mg/kg)	<0.010	<0.010	DLHM <0.015	DLHM 0.023	DLHM <0.022
	Fluorene (mg/kg)	<0.010	<0.010	DLHM 0.024	DLHM 0.069	DLHM 0.037
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	DLHM <0.015	DLHM <0.022	DLHM <0.022
	1-Methylnaphthalene (mg/kg)	<0.050	<0.050	DLHM 0.154	DLHM 0.400	DLHM 0.230
	2-Methylnaphthalene (mg/kg)	0.012	0.014	DLHM 0.242	DLHM 0.649	DLHM 0.368
	Naphthalene (mg/kg)	<0.010	<0.010	DLHM 0.094	DLHM 0.238	DLHM 0.147
	Perylene (mg/kg)	0.012	0.013	DLHM <0.015	DLHM <0.022	DLHM <0.022
	Phenanthrene (mg/kg)	0.022	0.021	DLHM 0.145	DLHM 0.384	DLHM 0.230
	Pyrene (mg/kg)	<0.010	<0.010	DLHM 0.019	DLHM 0.045	DLHM 0.027
	Quinoline (mg/kg)	<0.050	<0.050	DLHM <0.015	DLHM <0.022	DLHM <0.022
	Surrogate: d10-Acenaphthene (%)	104.8	104.6	104.4	107.4	107.4

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-21	L2505739-22	L2505739-23	L2505739-24	L2505739-25
	Description	SE	SE	SE	SE	SE
	Sampled Date	15-SEP-20	15-SEP-20	15-SEP-20	15-SEP-20	15-SEP-20
	Sampled Time	08:40	11:18	08:05	11:18	17:14
	Client ID	RG_MIDCO_SE-4_2020-09-15_0840	RG_MIDCO_SE-5_2020-09-15_1118	RG_RIVER_SE-2_2020-09-15_0805	RG_RIVER_SE-5_2020-09-15_1118	RG_MIDAG_SE-1_2020-09-15_1714
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	<0.10	<0.10	<0.10	<0.10	0.13
	Sodium (Na) (mg/kg)	249	162	254	153	199
	Strontium (Sr) (mg/kg)	141	76.1	158	83.3	133
	Sulfur (S) (mg/kg)	1800	<1000	2000	<1000	1500
	Thallium (Tl) (mg/kg)	0.317	0.369	0.330	0.392	0.403
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	18.2	16.5	16.2	22.8	16.0
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	0.899	0.747	0.868	0.800	0.857
	Vanadium (V) (mg/kg)	22.6	31.7	25.4	30.5	25.8
	Zinc (Zn) (mg/kg)	204	185	215	184	117
	Zirconium (Zr) (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	DLCI <0.020	DLCI <0.010	DLHM <0.010	DLCI <0.010	DLHM <0.018
	Acenaphthylene (mg/kg)	DLHM <0.013	<0.0050	DLHM <0.010	<0.0050	DLHM <0.018
	Acridine (mg/kg)	DLHM <0.055	DLCI <0.015	DLHM <0.020	DLCI <0.020	DLHM <0.035
	Anthracene (mg/kg)	DLHM <0.010	<0.0040	DLHM <0.0080	<0.0040	DLHM <0.014
	Benz(a)anthracene (mg/kg)	DLCI <0.035	<0.010	DLHM <0.020	DLCI <0.020	DLHM <0.035
	Benzo(a)pyrene (mg/kg)	DLHM <0.025	<0.010	DLHM <0.020	<0.010	DLHM <0.035
	Benzo(b&j)fluoranthene (mg/kg)	DLHM 0.048	0.032	DLHM 0.045	0.042	DLHM 0.046
	Benzo(b+j+k)fluoranthene (mg/kg)	0.048	0.032	DLHM 0.045	0.042	DLHM <0.055
	Benzo(e)pyrene (mg/kg)	DLHM 0.056	0.039	DLHM 0.052	0.047	DLHM 0.048
	Benzo(g,h,i)perylene (mg/kg)	DLHM 0.034	0.018	DLHM 0.022	0.019	DLHM <0.035
	Benzo(k)fluoranthene (mg/kg)	DLHM <0.025	<0.010	DLHM <0.020	<0.010	DLHM <0.035
	Chrysene (mg/kg)	DLHM 0.081	0.061	DLHM 0.073	0.077	DLCI <0.090
	Dibenz(a,h)anthracene (mg/kg)	DLCI <0.020	DLCI <0.0060	DLHM <0.010	<0.0050	DLHM <0.035
	Fluoranthene (mg/kg)	DLCI <0.035	0.011	DLHM <0.020	0.016	DLHM 0.037
	Fluorene (mg/kg)	DLHM 0.037	0.024	DLHM 0.032	0.022	DLHM <0.035
	Indeno(1,2,3-c,d)pyrene (mg/kg)	DLHM <0.025	<0.010	DLHM <0.020	<0.010	DLHM <0.035
	1-Methylnaphthalene (mg/kg)	DLHM 0.251	0.157	DLHM 0.216	0.167	DLHM 0.118
	2-Methylnaphthalene (mg/kg)	DLHM 0.410	0.248	DLHM 0.348	0.261	DLHM 0.176
	Naphthalene (mg/kg)	DLHM 0.154	0.096	DLHM 0.132	0.099	DLHM 0.074
	Perylene (mg/kg)	DLHM <0.025	0.012	DLHM <0.020	0.019	DLHM <0.035
	Phenanthrene (mg/kg)	DLHM 0.242	0.161	DLHM 0.209	0.174	DLHM 0.177
	Pyrene (mg/kg)	DLHM 0.031	0.019	DLHM 0.024	0.023	DLHM 0.038
	Quinoline (mg/kg)	DLHM <0.025	<0.050	DLHM <0.020	<0.050	DLHM <0.035
	Surrogate: d10-Acenaphthene (%)	120.0	114.1	116.3	113.7	117.7

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2505739-26	L2505739-27	L2505739-28	L2505739-29	L2505739-30
	Description	SE	SE	SE	SE	SE
	Sampled Date	15-SEP-20	16-SEP-20	16-SEP-20	16-SEP-20	16-SEP-20
	Sampled Time	17:23	11:45	12:05	14:57	08:05
	Client ID	RG_MIDAG_SE-2_2020-09-15_1723	RG_MIULE_SE-1_2020-09-16_1145	RG_MIULE_SE-2_2020-09-16_1205	RG_MIULE_SE-3_2020-09-16_1457	RG_MIDAG_SE-3_2020-09-16_0805
SOIL						
Metals	Silver (Ag) (mg/kg)	0.13	0.12	0.17	0.12	0.14
	Sodium (Na) (mg/kg)	185	100	103	121	120
	Strontium (Sr) (mg/kg)	115	73.9	73.6	86.7	86.8
	Sulfur (S) (mg/kg)	1000	<1000	<1000	<1000	1400
	Thallium (Tl) (mg/kg)	0.421	0.400	0.497	0.352	0.434
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	18.7	29.6	31.8	13.3	7.4
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	0.842	0.724	0.785	0.765	0.810
	Vanadium (V) (mg/kg)	27.3	32.2	34.2	30.7	28.7
	Zinc (Zn) (mg/kg)	126	110	129	100	130
	Zirconium (Zr) (mg/kg)	<1.0	<1.0	1.1	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	DLCI <0.020	<0.0050	DLCI <0.010	DLHM <0.010	DLCI <0.012
	Acenaphthylene (mg/kg)	DLHM <0.010	<0.0050	<0.0050	DLHM <0.010	DLHM <0.010
	Acridine (mg/kg)	DLHM <0.020	<0.010	DLCI <0.020	DLHM <0.020	DLHM <0.020
	Anthracene (mg/kg)	DLHM <0.0080	<0.0040	<0.0040	DLHM <0.0080	DLHM <0.0080
	Benz(a)anthracene (mg/kg)	DLHM <0.020	<0.010	<0.010	DLHM <0.020	DLHM <0.020
	Benzo(a)pyrene (mg/kg)	DLHM <0.020	<0.010	<0.010	DLHM <0.020	DLHM <0.020
	Benzo(b&j)fluoranthene (mg/kg)	DLHM 0.068	0.031	0.046	DLHM 0.038	DLHM 0.084
	Benzo(b+j+k)fluoranthene (mg/kg)	DLHM 0.068	0.031	0.046	DLHM 0.038	DLHM 0.084
	Benzo(e)pyrene (mg/kg)	DLHM 0.069	0.032	0.048	DLHM 0.041	DLHM 0.082
	Benzo(g,h,i)perylene (mg/kg)	DLHM 0.026	0.011	0.017	DLHM <0.020	DLHM 0.028
	Benzo(k)fluoranthene (mg/kg)	DLHM <0.020	<0.010	<0.010	DLHM <0.020	DLHM <0.020
	Chrysene (mg/kg)	DLHM 0.112	0.060	0.083	DLHM 0.069	DLHM 0.133
	Dibenz(a,h)anthracene (mg/kg)	DLHM <0.010	<0.0050	DLCI <0.0060	DLHM <0.010	DLHM <0.010
	Fluoranthene (mg/kg)	DLHM 0.040	0.017	0.027	DLHM 0.023	DLHM 0.044
	Fluorene (mg/kg)	DLHM 0.037	DLCI <0.020	0.020	DLHM <0.020	DLHM 0.032
	Indeno(1,2,3-c,d)pyrene (mg/kg)	DLHM <0.020	<0.010	<0.010	DLHM <0.020	DLHM <0.020
	1-Methylnaphthalene (mg/kg)	DLHM 0.216	0.086	0.120	DLHM 0.140	DLHM 0.224
	2-Methylnaphthalene (mg/kg)	DLHM 0.325	0.132	0.185	DLHM 0.207	DLHM 0.328
	Naphthalene (mg/kg)	DLHM 0.135	0.061	0.082	DLHM 0.091	DLHM 0.144
	Perylene (mg/kg)	DLHM <0.020	<0.010	<0.010	DLHM <0.020	DLHM <0.020
	Phenanthrene (mg/kg)	DLHM 0.282	0.136	0.180	DLHM 0.186	DLHM 0.262
	Pyrene (mg/kg)	DLHM 0.042	0.021	0.028	DLHM 0.025	DLHM 0.050
	Quinoline (mg/kg)	DLHM <0.020	<0.050	<0.050	DLHM <0.020	DLHM <0.020
	Surrogate: d10-Acenaphthene (%)	113.8	110.1	107.0	112.8	113.0

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-31	L2505739-32	L2505739-33	L2505739-34	L2505739-35
	Description	SE	SE	SE	SE	SE
	Sampled Date	16-SEP-20	16-SEP-20	16-SEP-20	17-SEP-20	17-SEP-20
	Sampled Time	09:22	09:32	12:08	14:20	15:40
	Client ID	RG_MIDAG_SE-4_2020-09-16_0922	RG_MIDAG_SE-5_2020-09-16_0932	RG_RIVER_SE-2_2020-09-16_1208	RG_LE1_SE-1_2020-09-17_1420	RG_LE1_SE-2_2020-09-17_1540
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	0.12	0.12	0.15	0.25	0.31
	Sodium (Na) (mg/kg)	140	186	99	<50	<50
	Strontium (Sr) (mg/kg)	96.2	99.5	69.9	39.7	43.7
	Sulfur (S) (mg/kg)	<1000	<1000	<1000	<1000	<1000
	Thallium (Tl) (mg/kg)	0.432	0.443	0.447	0.233	0.243
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	8.0	14.4	28.4	68.0	56.8
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	0.806	0.812	0.682	1.20	1.34
	Vanadium (V) (mg/kg)	27.0	26.8	32.3	52.2	54.2
	Zinc (Zn) (mg/kg)	118	128	113	103	107
	Zirconium (Zr) (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.030 DLCI	<0.010 DLHM	<0.0050	<0.0050	<0.0050
	Acenaphthylene (mg/kg)	<0.010 DLHM	<0.010 DLHM	<0.0050	<0.0050	<0.0050
	Acridine (mg/kg)	<0.021 DLCI	<0.020 DLHM	<0.010	<0.010	<0.015 DLCI
	Anthracene (mg/kg)	<0.0080 DLHM	<0.0080 DLHM	<0.0040	<0.0040	<0.0040
	Benz(a)anthracene (mg/kg)	<0.040 DLCI	<0.020 DLHM	<0.010	0.018	0.024
	Benzo(a)pyrene (mg/kg)	<0.020 DLHM	<0.020 DLHM	<0.010	<0.010	<0.010
	Benzo(b&j)fluoranthene (mg/kg)	0.083 DLHM	0.059 DLHM	0.041	0.025	0.031
	Benzo(b+j+k)fluoranthene (mg/kg)	0.083 DLHM	0.059 DLHM	0.041	0.025	0.031
	Benzo(e)pyrene (mg/kg)	0.081 DLHM	0.065 DLHM	0.043	0.028	0.033
	Benzo(g,h,i)perylene (mg/kg)	0.030 DLHM	0.026 DLHM	0.016	0.013	0.016
	Benzo(k)fluoranthene (mg/kg)	<0.020 DLHM	<0.020 DLHM	<0.010	<0.010	<0.010
	Chrysene (mg/kg)	0.148 DLHM	0.095 DLHM	0.076	0.059	0.078
	Dibenz(a,h)anthracene (mg/kg)	<0.010 DLHM	<0.010 DLHM	<0.0050	<0.0050	<0.0060 DLCI
	Fluoranthene (mg/kg)	0.119 DLHM	0.032 DLHM	0.023	0.019	0.022
	Fluorene (mg/kg)	0.048 DLHM	<0.020 DLHM	0.019	<0.010	<0.010
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.020 DLHM	<0.020 DLHM	<0.010	<0.010	<0.010
	1-Methylnaphthalene (mg/kg)	0.239 DLHM	0.191 DLHM	0.125	0.060	0.096
	2-Methylnaphthalene (mg/kg)	0.360 DLHM	0.288 DLHM	0.190	0.060	0.088
	Naphthalene (mg/kg)	0.157 DLHM	0.122 DLHM	0.086	0.033	0.039
	Perylene (mg/kg)	<0.020 DLHM	<0.020 DLHM	<0.010	<0.010	<0.010
	Phenanthrene (mg/kg)	0.382 DLHM	0.230 DLHM	0.175	0.143	0.201
	Pyrene (mg/kg)	0.101 DLHM	0.031 DLHM	0.025	0.025	0.033
	Quinoline (mg/kg)	<0.020 DLHM	<0.020 DLHM	<0.050	<0.050	<0.050
	Surrogate: d10-Acenaphthene (%)	110.2	111.5	106.2	113.7	111.8

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-36	L2505739-37	L2505739-38	L2505739-39	L2505739-40
	Description	SE	SE	SE	SE	SE
	Sampled Date	17-SEP-20	17-SEP-20	17-SEP-20	17-SEP-20	17-SEP-20
	Sampled Time	15:50	08:15	08:40	08:40	12:33
	Client ID	RG_LE1_SE-3_2020-09-17_1550	RG_MIULE_SE-4_2020-09-17_0815	RG_MIULE_SE-5_2020-09-17_0840	RG_MIDAG_S2_SE-1_2020-09-17_0840	RG_MIDAG_S2_SE-2_2020-09-17_1233
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	0.21	0.16	0.10	0.13	0.14
	Sodium (Na) (mg/kg)	<50	125	167	188	191
	Strontium (Sr) (mg/kg)	41.4	80.2	116	113	120
	Sulfur (S) (mg/kg)	<1000	<1000	1300	1100	1000
	Thallium (Tl) (mg/kg)	0.242	0.457	0.283	0.451	0.414
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	67.2	13.3	12.2	12.5	23.7
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	1.22	0.807	0.766	0.923	0.837
	Vanadium (V) (mg/kg)	58.8	34.7	24.0	26.8	27.4
	Zinc (Zn) (mg/kg)	109	124	88.9	123	118
	Zirconium (Zr) (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0050	<0.011 DLCI	<0.010 DLHM	<0.016 DLCI	<0.020 DLCI
	Acenaphthylene (mg/kg)	<0.0050	<0.0050	<0.010 DLHM	<0.010 DLHM	<0.010 DLHM
	Acridine (mg/kg)	<0.010	0.010	<0.020 DLHM	<0.025 DLCI	<0.022 DLCI
	Anthracene (mg/kg)	<0.0040	<0.0040	<0.0080 DLHM	<0.0080 DLHM	<0.0080 DLHM
	Benz(a)anthracene (mg/kg)	<0.015 DLCI	0.014	<0.020 DLHM	<0.020 DLHM	0.022 DLHM
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	<0.020 DLHM	<0.020 DLHM	<0.020 DLHM
	Benzo(b&j)fluoranthene (mg/kg)	0.019	0.054	0.040 DLHM	0.077 DLHM	0.068 DLHM
	Benzo(b+j+k)fluoranthene (mg/kg)	0.019	0.054	0.040 DLHM	0.077 DLHM	0.068 DLHM
	Benzo(e)pyrene (mg/kg)	0.022	0.053	0.044 DLHM	0.079 DLHM	0.073 DLHM
	Benzo(g,h,i)perylene (mg/kg)	0.011	0.018	<0.020 DLHM	0.031 DLHM	0.025 DLHM
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.020 DLHM	<0.020 DLHM	<0.020 DLHM
	Chrysene (mg/kg)	0.043	0.094	0.076 DLHM	0.135 DLHM	0.112 DLHM
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	<0.0070 DLCI	<0.010 DLHM	<0.010 DLHM	<0.010 DLHM
	Fluoranthene (mg/kg)	0.010	0.035	0.036 DLHM	0.036 DLHM	0.031 DLHM
	Fluorene (mg/kg)	<0.010	0.024	0.026 DLHM	0.048 DLHM	0.028 DLHM
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.020 DLHM	<0.020 DLHM	<0.020 DLHM
	1-Methylnaphthalene (mg/kg)	<0.050	0.147	0.139 DLHM	0.276 DLHM	0.224 DLHM
	2-Methylnaphthalene (mg/kg)	0.037	0.224	0.211 DLHM	0.414 DLHM	0.336 DLHM
	Naphthalene (mg/kg)	0.017	0.101	0.109 DLHM	0.174 DLHM	0.150 DLHM
	Perylene (mg/kg)	<0.010	0.012	<0.020 DLHM	<0.020 DLHM	<0.020 DLHM
	Phenanthrene (mg/kg)	0.096	0.226	0.197 DLHM	0.334 DLHM	0.273 DLHM
	Pyrene (mg/kg)	0.018	0.034	0.039 DLHM	0.046 DLHM	0.041 DLHM
	Quinoline (mg/kg)	<0.050	<0.050	<0.020 DLHM	<0.020 DLHM	<0.020 DLHM
	Surrogate: d10-Acenaphthene (%)	108.7	109.4	110.2	108.9	110.4

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-41	L2505739-42	L2505739-43		
	Description	SE	SE	SE		
	Sampled Date	17-SEP-20	17-SEP-20	17-SEP-20		
	Sampled Time	13:14	14:57	15:14		
	Client ID	RG_MIDAG_S2_SE-3_2020-09-17_1341	RG_MIDAG_S2_SE-4_2020-09-17_1457	RG_MIDAG_S2_SE-5_2020-09-17_1514		
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	0.14	0.16	0.13		
	Sodium (Na) (mg/kg)	139	159	148		
	Strontium (Sr) (mg/kg)	81.4	99.8	86.3		
	Sulfur (S) (mg/kg)	<1000	<1000	<1000		
	Thallium (Tl) (mg/kg)	0.490	0.476	0.501		
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0		
	Titanium (Ti) (mg/kg)	23.3	23.5	20.3		
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50		
	Uranium (U) (mg/kg)	0.897	0.926	0.830		
	Vanadium (V) (mg/kg)	26.0	23.9	28.2		
	Zinc (Zn) (mg/kg)	128	117	129		
	Zirconium (Zr) (mg/kg)	<1.0	<1.0	<1.0		
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	DLCI <0.015	DLCI <0.017	DLCI <0.018		
	Acenaphthylene (mg/kg)	DLHM <0.010	DLHM <0.010	DLHM <0.010		
	Acridine (mg/kg)	DLCI <0.026	DLCI <0.035	DLCI <0.030		
	Anthracene (mg/kg)	DLHM <0.0080	DLHM <0.0080	DLHM <0.0080		
	Benz(a)anthracene (mg/kg)	DLHM 0.030	DLHM 0.028	DLHM 0.025		
	Benzo(a)pyrene (mg/kg)	DLHM <0.020	DLHM <0.020	DLHM <0.020		
	Benzo(b&j)fluoranthene (mg/kg)	DLHM 0.078	DLHM 0.101	DLHM 0.100		
	Benzo(b+j+k)fluoranthene (mg/kg)	DLHM 0.078	DLHM 0.101	DLHM 0.100		
	Benzo(e)pyrene (mg/kg)	DLHM 0.073	DLHM 0.103	DLHM 0.098		
	Benzo(g,h,i)perylene (mg/kg)	DLHM 0.031	DLHM 0.036	DLHM 0.039		
	Benzo(k)fluoranthene (mg/kg)	DLHM <0.020	DLHM <0.020	DLHM <0.020		
	Chrysene (mg/kg)	DLHM 0.123	DLHM 0.168	DLHM 0.177		
	Dibenz(a,h)anthracene (mg/kg)	DLHM <0.010	DLCI <0.015	DLCI <0.011		
	Fluoranthene (mg/kg)	DLHM 0.054	DLHM 0.048	DLHM 0.041		
	Fluorene (mg/kg)	DLHM 0.036	DLCI <0.042	DLHM 0.044		
	Indeno(1,2,3-c,d)pyrene (mg/kg)	DLHM <0.020	DLHM <0.020	DLHM <0.020		
	1-Methylnaphthalene (mg/kg)	DLHM 0.236	DLHM 0.310	DLHM 0.303		
	2-Methylnaphthalene (mg/kg)	DLHM 0.363	DLHM 0.467	DLHM 0.454		
	Naphthalene (mg/kg)	DLHM 0.141	DLHM 0.194	DLHM 0.194		
	Perylene (mg/kg)	DLHM <0.020	DLHM <0.020	DLCI <0.021		
	Phenanthrene (mg/kg)	DLHM 0.268	DLHM 0.401	DLHM 0.391		
	Pyrene (mg/kg)	DLHM 0.049	DLHM 0.056	DLHM 0.051		
	Quinoline (mg/kg)	DLHM <0.020	DLHM <0.020	DLHM <0.020		
	Surrogate: d10-Acenaphthene (%)	108.1	119.5	118.0		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-1	L2505739-2	L2505739-3	L2505739-4	L2505739-5
	Description	SE	SE	SE	SE	SE
	Sampled Date	10-SEP-20	13-SEP-20	12-SEP-20	11-SEP-20	12-SEP-20
	Sampled Time	16:22	09:46	11:37	10:16	16:14
	Client ID	RG_AGCK_SE-1_2020-09-10_1622	RG_RIVER_SE-5_2020-09-13_0946	RG_RIVER_SE-2_2020-09-12_1137	RG_RIVER_SE-1_2020-09-11_1016	RG_CORCK_SE-1_2020-09-12_1614
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	112.1	114.5	115.2	113.5	115.1
	Surrogate: d8-Naphthalene (%)	98.6	106.0	106.2	102.1	105.4
	Surrogate: d10-Phenanthrene (%)	102.5	106.1	107.7	105.7	106.6
	IACR:Coarse	<0.050	<0.050	<0.050	<0.050	<0.050
	IACR:Fine	0.060	0.093	<0.050	<0.050	<0.050
	B(a)P Total Potency Equivalent (mg/kg)	0.048	0.081	<0.020	<0.020	0.040
	IACR (CCME)	0.55	1.58	0.34	0.17	0.72

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2505739-6	L2505739-7	L2505739-8	L2505739-9	L2505739-10
	Description	SE	SE	SE	SE	SE
	Sampled Date	12-SEP-20	12-SEP-20	13-SEP-20	13-SEP-20	11-SEP-20
	Sampled Time	16:57	17:04	09:36	09:46	10:16
	Client ID	RG_CORCK_SE-2_2020-09-12_1657	RG_CORCK_SE-3_2020-09-12_1704	RG_CORCK_SE-4_2020-09-13_0936	RG_CORCK_SE-5_2020-09-13_0946	RG_MI25_SE-1_2020-09-11_1016
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	109.3	117.5	128.4	113.9	108.4
	Surrogate: d8-Naphthalene (%)	100.1	108.9	115.3	105.5	97.1
	Surrogate: d10-Phenanthrene (%)	101.2	109.2	117.9	104.7	98.2
	IACR:Coarse	<0.050	0.050	0.067	<0.050	<0.050
	IACR:Fine	0.071	0.097	0.128	0.092	<0.050
	B(a)P Total Potency Equivalent (mg/kg)	0.068	0.104	0.122	0.092	<0.020
	IACR (CCME)	1.17	1.72	2.14	1.63	0.15

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-11	L2505739-12	L2505739-13	L2505739-14	L2505739-15
	Description	SE	SE	SE	SE	SE
	Sampled Date	11-SEP-20	11-SEP-20	12-SEP-20	12-SEP-20	12-SEP-20
	Sampled Time	10:33	14:55	10:26	11:37	14:03
	Client ID	RG_MI25_SE-2_2020-09-11_1033	RG_MI25_SE-3_2020-09-11_1455	RG_MIUCO_SE-1_2020-09-12_1026	RG_MIUCO_SE-2_2020-09-12_1137	RG_MIUCO_SE-3_2020-09-12_1403
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	116.8	106.8	111.6	117.6	111.8
	Surrogate: d8-Naphthalene (%)	108.4	99.2	103.7	109.3	103.0
	Surrogate: d10-Phenanthrene (%)	109.2	99.2	102.3	109.3	104.2
	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)	<0.15	<0.15	<0.15	0.32	<0.15

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-16	L2505739-17	L2505739-18	L2505739-19	L2505739-20
	Description	SE	SE	SE	SE	SE
	Sampled Date	12-SEP-20	12-SEP-20	15-SEP-20	15-SEP-20	15-SEP-20
	Sampled Time	13:48	13:25	08:01	08:05	08:25
	Client ID	RG_MIUCO_SE-4_2020-09-12_1348	RG_MIUCO_SE-5_2020-09-12_1325	RG_MIDCO_SE-1_2020-09-15_0801	RG_MIDCO_SE-2_2020-09-15_0805	RG_MIDCO_SE-3_2020-09-15_0825
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	109.7	109.8	110.3	118.1	114.4
	Surrogate: d8-Naphthalene (%)	101.9	101.8	103.5	106.2	103.3
	Surrogate: d10-Phenanthrene (%)	101.9	102.1	102.0	109.3	106.3
	IACR:Coarse	<0.050	<0.050	<0.050	<0.050	<0.050
	IACR:Fine	<0.050	<0.050	<0.050	0.058	<0.050
	B(a)P Total Potency Equivalent (mg/kg)	<0.020	<0.020	<0.020	0.037	0.032
	IACR (CCME)	<0.15	<0.15	0.35	0.85	0.55

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-21	L2505739-22	L2505739-23	L2505739-24	L2505739-25
	Description	SE	SE	SE	SE	SE
	Sampled Date	15-SEP-20	15-SEP-20	15-SEP-20	15-SEP-20	15-SEP-20
	Sampled Time	08:40	11:18	08:05	11:18	17:14
	Client ID	RG_MIDCO_SE-4_2020-09-15_0840	RG_MIDCO_SE-5_2020-09-15_1118	RG_RIVER_SE-2_2020-09-15_0805	RG_RIVER_SE-5_2020-09-15_1118	RG_MIDAG_SE-1_2020-09-15_1714
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	125.2	119.0	124.7	124.1	127.3
	Surrogate: d8-Naphthalene (%)	119.6	111.7	116.3	114.0	117.7
	Surrogate: d10-Phenanthrene (%)	116.7	112.3	114.5	113.2	116.9
	IACR:Coarse	<0.050	<0.050	<0.050	<0.050	<0.050
	IACR:Fine	<0.050	<0.050	<0.050	<0.050	0.053
	B(a)P Total Potency Equivalent (mg/kg)	0.033	<0.020	0.023	<0.020	0.045
	IACR (CCME)	0.56	0.31	0.47	0.39	0.60

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-26	L2505739-27	L2505739-28	L2505739-29	L2505739-30
	Description	SE	SE	SE	SE	SE
	Sampled Date	15-SEP-20	16-SEP-20	16-SEP-20	16-SEP-20	16-SEP-20
	Sampled Time	17:23	11:45	12:05	14:57	08:05
	Client ID	RG_MIDAG_SE-2_2020-09-15_1723	RG_MIULE_SE-1_2020-09-16_1145	RG_MIULE_SE-2_2020-09-16_1205	RG_MIULE_SE-3_2020-09-16_1457	RG_MIDAG_SE-3_2020-09-16_0805
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	122.4	121.1	114.5	122.6	124.2
	Surrogate: d8-Naphthalene (%)	112.5	108.8	103.9	113.1	112.3
	Surrogate: d10-Phenanthrene (%)	113.1	111.1	105.9	111.7	114.6
	IACR:Coarse	<0.050	<0.050	<0.050	<0.050	<0.050
	IACR:Fine	<0.050	<0.050	<0.050	<0.050	0.052
	B(a)P Total Potency Equivalent (mg/kg)	0.026	<0.020	<0.020	0.023	0.028
	IACR (CCME)	0.62	0.30	0.40	0.42	0.74

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-31	L2505739-32	L2505739-33	L2505739-34	L2505739-35
	Description	SE	SE	SE	SE	SE
	Sampled Date	16-SEP-20	16-SEP-20	16-SEP-20	17-SEP-20	17-SEP-20
	Sampled Time	09:22	09:32	12:08	14:20	15:40
	Client ID	RG_MIDAG_SE-4_2020-09-16_0922	RG_MIDAG_SE-5_2020-09-16_0932	RG_RIVER_SE-2_2020-09-16_1208	RG_LE1_SE-1_2020-09-17_1420	RG_LE1_SE-2_2020-09-17_1540
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	122.7	120.3	116.5	123.2	120.2
	Surrogate: d8-Naphthalene (%)	109.8	108.4	105.3	110.3	109.6
	Surrogate: d10-Phenanthrene (%)	111.0	111.6	107.6	112.4	113.4
	IACR:Coarse	<0.050	<0.050	<0.050	<0.050	<0.050
	IACR:Fine	0.053	<0.050	<0.050	<0.050	<0.050
	B(a)P Total Potency Equivalent (mg/kg)	0.029	0.025	<0.020	<0.020	<0.020
	IACR (CCME)	0.77	0.56	0.37	0.30	0.37

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-36	L2505739-37	L2505739-38	L2505739-39	L2505739-40
	Description	SE	SE	SE	SE	SE
	Sampled Date	17-SEP-20	17-SEP-20	17-SEP-20	17-SEP-20	17-SEP-20
	Sampled Time	15:50	08:15	08:40	08:40	12:33
	Client ID	RG_LE1_SE-3_2020-09-17_1550	RG_MIULE_SE-4_2020-09-17_0815	RG_MIULE_SE-5_2020-09-17_0840	RG_MIDAG_S2_SE-1_2020-09-17_0840	RG_MIDAG_S2_SE-2_2020-09-17_1233
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	115.6	117.1	120.6	119.1	120.8
	Surrogate: d8-Naphthalene (%)	105.7	109.0	108.8	107.7	108.6
	Surrogate: d10-Phenanthrene (%)	106.8	109.6	111.8	110.3	111.5
	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	0.023	0.027	0.027
	IACR (CCME)	0.22	0.49	0.43	0.70	0.66

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-41	L2505739-42	L2505739-43		
	Description	SE	SE	SE		
	Sampled Date	17-SEP-20	17-SEP-20	17-SEP-20		
	Sampled Time	13:14	14:57	15:14		
	Client ID	RG_MIDAG_S2_SE-3_2020-09-17_1341	RG_MIDAG_S2_SE-4_2020-09-17_1457	RG_MIDAG_S2_SE-5_2020-09-17_1514		
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	118.0	120.1	120.6		
	Surrogate: d8-Naphthalene (%)	104.5	112.3	112.9		
	Surrogate: d10-Phenanthrene (%)	109.4	119.8	120.8		
	IACR:Coarse	<0.050	<0.050	<0.050		
	IACR:Fine	0.052	0.061	0.061		
	B(a)P Total Potency Equivalent (mg/kg)	0.029	0.034	0.032		
	IACR (CCME)	0.76	0.92	0.91		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Additional Comments for Sample Listed:

Samplenum	Matrix	Report Remarks	Sample Comments
L2505739-10	Soil	Note: Watery sample	
L2505739-11	Soil	Note: Watery sample	
L2505739-12	Soil	Note: Watery sample	
L2505739-13	Soil	Note: Watery sample	
L2505739-15	Soil	Note: Watery sample	
L2505739-16	Soil	Note: Watery sample	
L2505739-17	Soil	Note: Watery sample	
L2505739-22	Soil	Note: Watery sample, non-homo	
L2505739-24	Soil	Note: Watery sample	
L2505739-27	Soil	Note: Watery sample	
L2505739-28	Soil	Note: Watery sample	
L2505739-33	Soil	Note: Watery sample	
L2505739-34	Soil	Note: Watery sample	
L2505739-35	Soil	Note: Watery sample	
L2505739-36	Soil	Note: Watery sample	
L2505739-37	Soil	Note: Watery sample	
L2505739-4	Soil	Note: Watery sample	
L2505739-7	Soil	Note: Watery sample	
L2505739-9	Soil	Note: Watery sample	

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 PSA (100g minimum is standard). Measurement Uncertainty for PSA results may be higher than usual.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-TIC-PCT-SK	Soil	Total Inorganic Carbon in Soil	CSSS (2008) P216-217

A known quantity of acetic acid is consumed by reaction with carbonates in the soil. The pH of the resulting solution is measured and compared against a standard curve relating pH to weight of carbonate.

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

Reference Information

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:

CMO LAEMP Sept 2020

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TIC-PCT-SK	**Soil**							
Batch R5242124								
WG3410168-4 IRM		**08-109_SOIL**						
Inorganic Carbon			96.4		%		80-120	29-SEP-20
WG3410168-2 LCS		**0.5**						
Inorganic Carbon			96.7		%		90-110	29-SEP-20
WG3410168-3 MB								
Inorganic Carbon			<0.050		%		0.05	29-SEP-20
Batch R5242125								
WG3410167-1 DUP		**L2505739-10**						
Inorganic Carbon		0.462	0.468		%	1.3	20	29-SEP-20
WG3410167-4 IRM		**08-109_SOIL**						
Inorganic Carbon			95.6		%		80-120	29-SEP-20
WG3410167-2 LCS		**0.5**						
Inorganic Carbon			98.4		%		90-110	29-SEP-20
WG3410167-3 MB								
Inorganic Carbon			<0.050		%		0.05	29-SEP-20
Batch R5242126								
WG3410163-4 IRM		**08-109_SOIL**						
Inorganic Carbon			96.2		%		80-120	29-SEP-20
WG3410163-2 LCS		**0.5**						
Inorganic Carbon			98.2		%		90-110	29-SEP-20
WG3410163-3 MB								
Inorganic Carbon			<0.050		%		0.05	29-SEP-20
C-TOT-LECO-SK	**Soil**							
Batch R5239017								
WG3410120-1 DUP		**L2505739-30**						
Total Carbon by Combustion		7.99	8.22		%	2.8	20	26-SEP-20
WG3410120-2 IRM		**08-109_SOIL**						
Total Carbon by Combustion			94.2		%		80-120	26-SEP-20
WG3410120-4 LCS		**SULFADIAZINE**						
Total Carbon by Combustion			100.3		%		90-110	26-SEP-20
WG3410120-3 MB								
Total Carbon by Combustion			<0.05		%		0.05	26-SEP-20
Batch R5239018								
WG3410118-1 DUP		**L2505739-10**						
Total Carbon by Combustion		3.89	3.93		%	0.9	20	26-SEP-20
WG3410118-2 IRM		**08-109_SOIL**						
Total Carbon by Combustion			104.7		%		80-120	26-SEP-20
WG3410118-4 LCS		**SULFADIAZINE**						

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-LECO-SK	**Soil**							
Batch R5239018								
WG3410118-4 LCS		**SULFADIAZINE**						
Total Carbon by Combustion			99.9		%		90-110	26-SEP-20
WG3410118-3 MB								
Total Carbon by Combustion			<0.05		%		0.05	26-SEP-20
Batch R5239836								
WG3410125-2 IRM		**08-109_SOIL**						
Total Carbon by Combustion			93.2		%		80-120	26-SEP-20
WG3410125-4 LCS		**SULFADIAZINE**						
Total Carbon by Combustion			101.4		%		90-110	26-SEP-20
WG3410125-3 MB								
Total Carbon by Combustion			<0.05		%		0.05	26-SEP-20
HG-200.2-CVAA-CL	**Soil**							
Batch R5235220								
WG3411243-10 CRM		**TILL-1**						
Mercury (Hg)			97.2		%		70-130	24-SEP-20
WG3411243-9 LCS								
Mercury (Hg)			101.0		%		80-120	24-SEP-20
WG3411243-7 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	24-SEP-20
Batch R5237235								
WG3411243-15 CRM		**TILL-1**						
Mercury (Hg)			108.0		%		70-130	25-SEP-20
WG3411243-20 CRM		**TILL-1**						
Mercury (Hg)			97.4		%		70-130	25-SEP-20
WG3411243-16 DUP		**L2505739-5**						
Mercury (Hg)		0.0295	0.0269		mg/kg	9.1	40	25-SEP-20
WG3411243-21 DUP		**L2505739-28**						
Mercury (Hg)		0.0409	0.0395		mg/kg	3.4	40	25-SEP-20
WG3411243-14 LCS								
Mercury (Hg)			98.8		%		80-120	25-SEP-20
WG3411243-19 LCS								
Mercury (Hg)			103.0		%		80-120	25-SEP-20
WG3411243-12 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	25-SEP-20
WG3411243-17 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	25-SEP-20
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 R5235087								
WG3411243-10 CRM		**TILL-1**						
Aluminum (Al)			102.2		%		70-130	24-SEP-20
Antimony (Sb)			98.5		%		70-130	24-SEP-20
Arsenic (As)			98.1		%		70-130	24-SEP-20
Barium (Ba)			95.5		%		70-130	24-SEP-20
Beryllium (Be)			93.1		%		70-130	24-SEP-20
Bismuth (Bi)			89.5		%		70-130	24-SEP-20
Boron (B)			2.9		mg/kg		0-8.2	24-SEP-20
Cadmium (Cd)			101.7		%		70-130	24-SEP-20
Calcium (Ca)			103.2		%		70-130	24-SEP-20
Chromium (Cr)			103.8		%		70-130	24-SEP-20
Cobalt (Co)			102.2		%		70-130	24-SEP-20
Copper (Cu)			101.1		%		70-130	24-SEP-20
Iron (Fe)			101.0		%		70-130	24-SEP-20
Lead (Pb)			92.3		%		70-130	24-SEP-20
Lithium (Li)			97.6		%		70-130	24-SEP-20
Magnesium (Mg)			108.3		%		70-130	24-SEP-20
Manganese (Mn)			100.1		%		70-130	24-SEP-20
Molybdenum (Mo)			97.9		%		70-130	24-SEP-20
Nickel (Ni)			104.4		%		70-130	24-SEP-20
Phosphorus (P)			92.4		%		70-130	24-SEP-20
Potassium (K)			107.5		%		70-130	24-SEP-20
Selenium (Se)			0.32		mg/kg		0.11-0.51	24-SEP-20
Silver (Ag)			0.22		mg/kg		0.13-0.33	24-SEP-20
Sodium (Na)			105.9		%		70-130	24-SEP-20
Strontium (Sr)			105.2		%		70-130	24-SEP-20
Thallium (Tl)			0.125		mg/kg		0.077-0.18	24-SEP-20
Tin (Sn)			1.0		mg/kg		0-3.1	24-SEP-20
Titanium (Ti)			121.5		%		70-130	24-SEP-20
Tungsten (W)			0.15		mg/kg		0-0.66	24-SEP-20
Uranium (U)			94.8		%		70-130	24-SEP-20
Vanadium (V)			102.2		%		70-130	24-SEP-20
Zinc (Zn)			104.7		%		70-130	24-SEP-20
Zirconium (Zr)			0.7		mg/kg		0-1.8	24-SEP-20
WG3411243-15 CRM		**TILL-1**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5235087								
WG3411243-15 CRM		**TILL-1**						
Aluminum (Al)			110.0		%		70-130	24-SEP-20
Antimony (Sb)			103.7		%		70-130	24-SEP-20
Arsenic (As)			101.5		%		70-130	24-SEP-20
Barium (Ba)			101.8		%		70-130	24-SEP-20
Beryllium (Be)			103.0		%		70-130	24-SEP-20
Bismuth (Bi)			97.1		%		70-130	24-SEP-20
Boron (B)			3.4		mg/kg		0-8.2	24-SEP-20
Cadmium (Cd)			100.2		%		70-130	24-SEP-20
Calcium (Ca)			107.0		%		70-130	24-SEP-20
Chromium (Cr)			107.9		%		70-130	24-SEP-20
Cobalt (Co)			103.3		%		70-130	24-SEP-20
Copper (Cu)			104.1		%		70-130	24-SEP-20
Iron (Fe)			103.6		%		70-130	24-SEP-20
Lead (Pb)			98.7		%		70-130	24-SEP-20
Lithium (Li)			102.4		%		70-130	24-SEP-20
Magnesium (Mg)			109.3		%		70-130	24-SEP-20
Manganese (Mn)			103.4		%		70-130	24-SEP-20
Molybdenum (Mo)			105.6		%		70-130	24-SEP-20
Nickel (Ni)			101.1		%		70-130	24-SEP-20
Phosphorus (P)			93.2		%		70-130	24-SEP-20
Potassium (K)			111.1		%		70-130	24-SEP-20
Selenium (Se)			0.34		mg/kg		0.11-0.51	24-SEP-20
Silver (Ag)			0.23		mg/kg		0.13-0.33	24-SEP-20
Sodium (Na)			101.9		%		70-130	24-SEP-20
Strontium (Sr)			109.8		%		70-130	24-SEP-20
Thallium (Tl)			0.130		mg/kg		0.077-0.18	24-SEP-20
Tin (Sn)			1.1		mg/kg		0-3.1	24-SEP-20
Titanium (Ti)			124.4		%		70-130	24-SEP-20
Tungsten (W)			0.14		mg/kg		0-0.66	24-SEP-20
Uranium (U)			100.5		%		70-130	24-SEP-20
Vanadium (V)			105.1		%		70-130	24-SEP-20
Zinc (Zn)			106.5		%		70-130	24-SEP-20
Zirconium (Zr)			0.7		mg/kg		0-1.8	24-SEP-20
WG3411243-20 CRM		**TILL-1**						

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5235087								
WG3411243-20 CRM		**TILL-1**						
Aluminum (Al)			110.9		%		70-130	24-SEP-20
Antimony (Sb)			99.8		%		70-130	24-SEP-20
Arsenic (As)			102.1		%		70-130	24-SEP-20
Barium (Ba)			103.9		%		70-130	24-SEP-20
Beryllium (Be)			99.0		%		70-130	24-SEP-20
Bismuth (Bi)			94.1		%		70-130	24-SEP-20
Boron (B)			3.6		mg/kg		0-8.2	24-SEP-20
Cadmium (Cd)			101.2		%		70-130	24-SEP-20
Calcium (Ca)			112.9		%		70-130	24-SEP-20
Chromium (Cr)			110.7		%		70-130	24-SEP-20
Cobalt (Co)			105.6		%		70-130	24-SEP-20
Copper (Cu)			107.4		%		70-130	24-SEP-20
Iron (Fe)			104.8		%		70-130	24-SEP-20
Lead (Pb)			96.7		%		70-130	24-SEP-20
Lithium (Li)			108.8		%		70-130	24-SEP-20
Magnesium (Mg)			113.8		%		70-130	24-SEP-20
Manganese (Mn)			108.5		%		70-130	24-SEP-20
Molybdenum (Mo)			101.2		%		70-130	24-SEP-20
Nickel (Ni)			104.1		%		70-130	24-SEP-20
Phosphorus (P)			96.6		%		70-130	24-SEP-20
Potassium (K)			118.5		%		70-130	24-SEP-20
Selenium (Se)			0.34		mg/kg		0.11-0.51	24-SEP-20
Silver (Ag)			0.22		mg/kg		0.13-0.33	24-SEP-20
Sodium (Na)			112.9		%		70-130	24-SEP-20
Strontium (Sr)			116.8		%		70-130	24-SEP-20
Thallium (Tl)			0.138		mg/kg		0.077-0.18	24-SEP-20
Tin (Sn)			1.1		mg/kg		0-3.1	24-SEP-20
Titanium (Ti)			128.7		%		70-130	24-SEP-20
Tungsten (W)			0.13		mg/kg		0-0.66	24-SEP-20
Uranium (U)			99.1		%		70-130	24-SEP-20
Vanadium (V)			108.3		%		70-130	24-SEP-20
Zinc (Zn)			106.4		%		70-130	24-SEP-20
Zirconium (Zr)			0.7		mg/kg		0-1.8	24-SEP-20
WG3411243-16 DUP		**L2505739-5**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5235087								
WG3411243-16 DUP		**L2505739-5**						
Aluminum (Al)		2010	2250		mg/kg	11	40	24-SEP-20
Antimony (Sb)		0.25	0.25		mg/kg	1.8	30	24-SEP-20
Arsenic (As)		1.61	1.59		mg/kg	1.2	30	24-SEP-20
Barium (Ba)		135	137		mg/kg	1.5	40	24-SEP-20
Beryllium (Be)		0.29	0.28		mg/kg	4.0	30	24-SEP-20
Bismuth (Bi)		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	24-SEP-20
Boron (B)		6.4	6.8		mg/kg	5.2	30	24-SEP-20
Cadmium (Cd)		7.94	8.25		mg/kg	3.9	30	24-SEP-20
Calcium (Ca)		289000	281000		mg/kg	2.5	30	24-SEP-20
Chromium (Cr)		3.18	3.20		mg/kg	0.7	30	24-SEP-20
Cobalt (Co)		244	260		mg/kg	6.3	30	24-SEP-20
Copper (Cu)		4.46	4.55		mg/kg	1.9	30	24-SEP-20
Iron (Fe)		2640	2570		mg/kg	2.7	30	24-SEP-20
Lead (Pb)		1.85	1.72		mg/kg	7.4	40	24-SEP-20
Lithium (Li)		3.2	3.2		mg/kg	1.7	30	24-SEP-20
Magnesium (Mg)		5760	5810		mg/kg	0.9	30	24-SEP-20
Manganese (Mn)		1640	1730		mg/kg	5.2	30	24-SEP-20
Molybdenum (Mo)		0.61	0.58		mg/kg	5.2	40	24-SEP-20
Nickel (Ni)		218	224		mg/kg	3.0	30	24-SEP-20
Phosphorus (P)		166	148		mg/kg	12	30	24-SEP-20
Potassium (K)		590	670		mg/kg	12	40	24-SEP-20
Selenium (Se)		1.56	1.64		mg/kg	5.3	30	24-SEP-20
Silver (Ag)		<0.10	<0.10	RPD-NA	mg/kg	N/A	40	24-SEP-20
Sodium (Na)		361	368		mg/kg	1.9	40	24-SEP-20
Strontium (Sr)		392	377		mg/kg	4.0	40	24-SEP-20
Sulfur (S)		4000	4000		mg/kg	0.0	30	24-SEP-20
Thallium (Tl)		0.191	0.205		mg/kg	6.7	30	24-SEP-20
Tin (Sn)		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	24-SEP-20
Titanium (Ti)		10.1	10.7		mg/kg	6.5	40	24-SEP-20
Tungsten (W)		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	24-SEP-20
Uranium (U)		2.11	2.05		mg/kg	3.0	30	24-SEP-20
Vanadium (V)		6.08	6.58		mg/kg	8.0	30	24-SEP-20
Zinc (Zn)		773	789		mg/kg	2.0	30	24-SEP-20
Zirconium (Zr)		<1.0	<1.0	RPD-NA	mg/kg	N/A	30	24-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5235087								
WG3411243-21 DUP		**L2505739-28**						
Aluminum (Al)		10500	10900		mg/kg	3.9	40	24-SEP-20
Antimony (Sb)		0.67	0.60		mg/kg	11	30	24-SEP-20
Arsenic (As)		8.51	7.73		mg/kg	9.7	30	24-SEP-20
Barium (Ba)		249	233		mg/kg	6.8	40	24-SEP-20
Beryllium (Be)		0.76	0.70		mg/kg	8.4	30	24-SEP-20
Bismuth (Bi)		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	24-SEP-20
Boron (B)		11.2	12.8		mg/kg	14	30	24-SEP-20
Cadmium (Cd)		1.32	1.28		mg/kg	3.2	30	24-SEP-20
Calcium (Ca)		44200	42700		mg/kg	3.4	30	24-SEP-20
Chromium (Cr)		16.7	16.9		mg/kg	1.4	30	24-SEP-20
Cobalt (Co)		13.7	12.8		mg/kg	6.7	30	24-SEP-20
Copper (Cu)		16.1	15.1		mg/kg	6.4	30	24-SEP-20
Iron (Fe)		18000	17100		mg/kg	5.3	30	24-SEP-20
Lead (Pb)		10.3	9.75		mg/kg	5.1	40	24-SEP-20
Lithium (Li)		14.5	14.0		mg/kg	3.3	30	24-SEP-20
Magnesium (Mg)		11000	10400		mg/kg	6.4	30	24-SEP-20
Manganese (Mn)		306	286		mg/kg	6.8	30	24-SEP-20
Molybdenum (Mo)		1.83	1.77		mg/kg	3.4	40	24-SEP-20
Nickel (Ni)		40.7	38.2		mg/kg	6.3	30	24-SEP-20
Phosphorus (P)		1210	1130		mg/kg	6.8	30	24-SEP-20
Potassium (K)		2390	2660		mg/kg	11	40	24-SEP-20
Selenium (Se)		1.27	1.33		mg/kg	4.5	30	24-SEP-20
Silver (Ag)		0.17	0.16		mg/kg	3.4	40	24-SEP-20
Sodium (Na)		103	107		mg/kg	4.5	40	24-SEP-20
Strontium (Sr)		73.6	72.4		mg/kg	1.6	40	24-SEP-20
Sulfur (S)		<1000	<1000	RPD-NA	mg/kg	N/A	30	24-SEP-20
Thallium (Tl)		0.497	0.487		mg/kg	2.1	30	24-SEP-20
Tin (Sn)		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	24-SEP-20
Titanium (Ti)		31.8	26.4		mg/kg	18	40	24-SEP-20
Tungsten (W)		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	24-SEP-20
Uranium (U)		0.785	0.727		mg/kg	7.7	30	24-SEP-20
Vanadium (V)		34.2	35.0		mg/kg	2.4	30	24-SEP-20
Zinc (Zn)		129	121		mg/kg	6.6	30	24-SEP-20
Zirconium (Zr)		1.1	<1.0	RPD-NA	mg/kg	N/A	30	24-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5235087								
WG3411243-14 LCS								
Aluminum (Al)			96.4		%		80-120	24-SEP-20
Antimony (Sb)			105.1		%		80-120	24-SEP-20
Arsenic (As)			95.9		%		80-120	24-SEP-20
Barium (Ba)			97.3		%		80-120	24-SEP-20
Beryllium (Be)			94.3		%		80-120	24-SEP-20
Bismuth (Bi)			94.8		%		80-120	24-SEP-20
Boron (B)			91.8		%		80-120	24-SEP-20
Cadmium (Cd)			95.3		%		80-120	24-SEP-20
Calcium (Ca)			92.6		%		80-120	24-SEP-20
Chromium (Cr)			95.1		%		80-120	24-SEP-20
Cobalt (Co)			94.9		%		80-120	24-SEP-20
Copper (Cu)			94.4		%		80-120	24-SEP-20
Iron (Fe)			110.2		%		80-120	24-SEP-20
Lead (Pb)			101.2		%		80-120	24-SEP-20
Lithium (Li)			96.6		%		80-120	24-SEP-20
Magnesium (Mg)			97.1		%		80-120	24-SEP-20
Manganese (Mn)			95.5		%		80-120	24-SEP-20
Molybdenum (Mo)			100.3		%		80-120	24-SEP-20
Nickel (Ni)			92.3		%		80-120	24-SEP-20
Potassium (K)			92.5		%		80-120	24-SEP-20
Selenium (Se)			96.5		%		80-120	24-SEP-20
Silver (Ag)			94.7		%		80-120	24-SEP-20
Sodium (Na)			94.3		%		80-120	24-SEP-20
Strontium (Sr)			96.0		%		80-120	24-SEP-20
Sulfur (S)			80.4		%		80-120	24-SEP-20
Thallium (Tl)			98.3		%		80-120	24-SEP-20
Tin (Sn)			94.4		%		80-120	24-SEP-20
Titanium (Ti)			92.8		%		80-120	24-SEP-20
Tungsten (W)			94.1		%		80-120	24-SEP-20
Uranium (U)			91.3		%		80-120	24-SEP-20
Vanadium (V)			96.4		%		80-120	24-SEP-20
Zinc (Zn)			95.4		%		80-120	24-SEP-20
Zirconium (Zr)			95.7		%		80-120	24-SEP-20
WG3411243-19 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5235087								
WG3411243-19 LCS								
Aluminum (Al)			100.9		%		80-120	24-SEP-20
Antimony (Sb)			107.6		%		80-120	24-SEP-20
Arsenic (As)			102.6		%		80-120	24-SEP-20
Barium (Ba)			104.6		%		80-120	24-SEP-20
Beryllium (Be)			96.1		%		80-120	24-SEP-20
Bismuth (Bi)			96.6		%		80-120	24-SEP-20
Boron (B)			94.2		%		80-120	24-SEP-20
Cadmium (Cd)			100.3		%		80-120	24-SEP-20
Calcium (Ca)			95.9		%		80-120	24-SEP-20
Chromium (Cr)			102.2		%		80-120	24-SEP-20
Cobalt (Co)			101.6		%		80-120	24-SEP-20
Copper (Cu)			101.1		%		80-120	24-SEP-20
Iron (Fe)			112.2		%		80-120	24-SEP-20
Lead (Pb)			102.3		%		80-120	24-SEP-20
Lithium (Li)			97.3		%		80-120	24-SEP-20
Magnesium (Mg)			107.4		%		80-120	24-SEP-20
Manganese (Mn)			100.7		%		80-120	24-SEP-20
Molybdenum (Mo)			104.3		%		80-120	24-SEP-20
Nickel (Ni)			97.9		%		80-120	24-SEP-20
Potassium (K)			97.7		%		80-120	24-SEP-20
Selenium (Se)			101.0		%		80-120	24-SEP-20
Silver (Ag)			98.0		%		80-120	24-SEP-20
Sodium (Na)			102.9		%		80-120	24-SEP-20
Strontium (Sr)			99.4		%		80-120	24-SEP-20
Sulfur (S)			87.2		%		80-120	24-SEP-20
Thallium (Tl)			98.7		%		80-120	24-SEP-20
Tin (Sn)			101.4		%		80-120	24-SEP-20
Titanium (Ti)			108.4		%		80-120	24-SEP-20
Tungsten (W)			96.0		%		80-120	24-SEP-20
Uranium (U)			90.1		%		80-120	24-SEP-20
Vanadium (V)			103.0		%		80-120	24-SEP-20
Zinc (Zn)			100.2		%		80-120	24-SEP-20
Zirconium (Zr)			98.9		%		80-120	24-SEP-20
WG3411243-9 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5235087								
WG3411243-9 LCS								
Aluminum (Al)			98.1		%		80-120	24-SEP-20
Antimony (Sb)			102.8		%		80-120	24-SEP-20
Arsenic (As)			100.7		%		80-120	24-SEP-20
Barium (Ba)			101.8		%		80-120	24-SEP-20
Beryllium (Be)			92.9		%		80-120	24-SEP-20
Bismuth (Bi)			93.6		%		80-120	24-SEP-20
Boron (B)			94.8		%		80-120	24-SEP-20
Cadmium (Cd)			98.4		%		80-120	24-SEP-20
Calcium (Ca)			94.8		%		80-120	24-SEP-20
Chromium (Cr)			98.1		%		80-120	24-SEP-20
Cobalt (Co)			99.7		%		80-120	24-SEP-20
Copper (Cu)			98.7		%		80-120	24-SEP-20
Iron (Fe)			115.6		%		80-120	24-SEP-20
Lead (Pb)			100.7		%		80-120	24-SEP-20
Lithium (Li)			93.7		%		80-120	24-SEP-20
Magnesium (Mg)			104.6		%		80-120	24-SEP-20
Manganese (Mn)			98.8		%		80-120	24-SEP-20
Molybdenum (Mo)			99.7		%		80-120	24-SEP-20
Nickel (Ni)			101.5		%		80-120	24-SEP-20
Potassium (K)			97.1		%		80-120	24-SEP-20
Selenium (Se)			100.1		%		80-120	24-SEP-20
Silver (Ag)			95.0		%		80-120	24-SEP-20
Sodium (Na)			96.2		%		80-120	24-SEP-20
Strontium (Sr)			101.0		%		80-120	24-SEP-20
Sulfur (S)			91.2		%		80-120	24-SEP-20
Thallium (Tl)			96.1		%		80-120	24-SEP-20
Tin (Sn)			99.0		%		80-120	24-SEP-20
Titanium (Ti)			96.9		%		80-120	24-SEP-20
Tungsten (W)			98.1		%		80-120	24-SEP-20
Uranium (U)			90.3		%		80-120	24-SEP-20
Vanadium (V)			99.6		%		80-120	24-SEP-20
Zinc (Zn)			99.2		%		80-120	24-SEP-20
Zirconium (Zr)			95.1		%		80-120	24-SEP-20
WG3411243-12 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5235087								
WG3411243-12 MB								
Aluminum (Al)			<50		mg/kg		50	24-SEP-20
Antimony (Sb)			<0.10		mg/kg		0.1	24-SEP-20
Arsenic (As)			<0.10		mg/kg		0.1	24-SEP-20
Barium (Ba)			<0.50		mg/kg		0.5	24-SEP-20
Beryllium (Be)			<0.10		mg/kg		0.1	24-SEP-20
Bismuth (Bi)			<0.20		mg/kg		0.2	24-SEP-20
Boron (B)			<5.0		mg/kg		5	24-SEP-20
Cadmium (Cd)			<0.020		mg/kg		0.02	24-SEP-20
Calcium (Ca)			<50		mg/kg		50	24-SEP-20
Chromium (Cr)			<0.50		mg/kg		0.5	24-SEP-20
Cobalt (Co)			<0.10		mg/kg		0.1	24-SEP-20
Copper (Cu)			<0.50		mg/kg		0.5	24-SEP-20
Iron (Fe)			<50		mg/kg		50	24-SEP-20
Lead (Pb)			<0.50		mg/kg		0.5	24-SEP-20
Lithium (Li)			<2.0		mg/kg		2	24-SEP-20
Magnesium (Mg)			<20		mg/kg		20	24-SEP-20
Manganese (Mn)			<1.0		mg/kg		1	24-SEP-20
Molybdenum (Mo)			<0.10		mg/kg		0.1	24-SEP-20
Nickel (Ni)			<0.50		mg/kg		0.5	24-SEP-20
Phosphorus (P)			<50		mg/kg		50	24-SEP-20
Potassium (K)			<100		mg/kg		100	24-SEP-20
Selenium (Se)			<0.20		mg/kg		0.2	24-SEP-20
Silver (Ag)			<0.10		mg/kg		0.1	24-SEP-20
Sodium (Na)			<50		mg/kg		50	24-SEP-20
Strontium (Sr)			<0.50		mg/kg		0.5	24-SEP-20
Sulfur (S)			<1000		mg/kg		1000	24-SEP-20
Thallium (Tl)			<0.050		mg/kg		0.05	24-SEP-20
Tin (Sn)			<2.0		mg/kg		2	24-SEP-20
Titanium (Ti)			<1.0		mg/kg		1	24-SEP-20
Tungsten (W)			<0.50		mg/kg		0.5	24-SEP-20
Uranium (U)			<0.050		mg/kg		0.05	24-SEP-20
Vanadium (V)			<0.20		mg/kg		0.2	24-SEP-20
Zinc (Zn)			<2.0		mg/kg		2	24-SEP-20
Zirconium (Zr)			<1.0		mg/kg		1	24-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5235087								
WG3411243-17 MB								
Aluminum (Al)			<50		mg/kg		50	24-SEP-20
Antimony (Sb)			<0.10		mg/kg		0.1	24-SEP-20
Arsenic (As)			<0.10		mg/kg		0.1	24-SEP-20
Barium (Ba)			<0.50		mg/kg		0.5	24-SEP-20
Beryllium (Be)			<0.10		mg/kg		0.1	24-SEP-20
Bismuth (Bi)			<0.20		mg/kg		0.2	24-SEP-20
Boron (B)			<5.0		mg/kg		5	24-SEP-20
Cadmium (Cd)			<0.020		mg/kg		0.02	24-SEP-20
Calcium (Ca)			<50		mg/kg		50	24-SEP-20
Chromium (Cr)			<0.50		mg/kg		0.5	24-SEP-20
Cobalt (Co)			<0.10		mg/kg		0.1	24-SEP-20
Copper (Cu)			<0.50		mg/kg		0.5	24-SEP-20
Iron (Fe)			<50		mg/kg		50	24-SEP-20
Lead (Pb)			<0.50		mg/kg		0.5	24-SEP-20
Lithium (Li)			<2.0		mg/kg		2	24-SEP-20
Magnesium (Mg)			<20		mg/kg		20	24-SEP-20
Manganese (Mn)			<1.0		mg/kg		1	24-SEP-20
Molybdenum (Mo)			<0.10		mg/kg		0.1	24-SEP-20
Nickel (Ni)			<0.50		mg/kg		0.5	24-SEP-20
Phosphorus (P)			<50		mg/kg		50	24-SEP-20
Potassium (K)			<100		mg/kg		100	24-SEP-20
Selenium (Se)			<0.20		mg/kg		0.2	24-SEP-20
Silver (Ag)			<0.10		mg/kg		0.1	24-SEP-20
Sodium (Na)			<50		mg/kg		50	24-SEP-20
Strontium (Sr)			<0.50		mg/kg		0.5	24-SEP-20
Sulfur (S)			<1000		mg/kg		1000	24-SEP-20
Thallium (Tl)			<0.050		mg/kg		0.05	24-SEP-20
Tin (Sn)			<2.0		mg/kg		2	24-SEP-20
Titanium (Ti)			<1.0		mg/kg		1	24-SEP-20
Tungsten (W)			<0.50		mg/kg		0.5	24-SEP-20
Uranium (U)			<0.050		mg/kg		0.05	24-SEP-20
Vanadium (V)			<0.20		mg/kg		0.2	24-SEP-20
Zinc (Zn)			<2.0		mg/kg		2	24-SEP-20
Zirconium (Zr)			<1.0		mg/kg		1	24-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5235087								
WG3411243-7 MB								
Aluminum (Al)			<50		mg/kg		50	24-SEP-20
Antimony (Sb)			<0.10		mg/kg		0.1	24-SEP-20
Arsenic (As)			<0.10		mg/kg		0.1	24-SEP-20
Barium (Ba)			<0.50		mg/kg		0.5	24-SEP-20
Beryllium (Be)			<0.10		mg/kg		0.1	24-SEP-20
Bismuth (Bi)			<0.20		mg/kg		0.2	24-SEP-20
Boron (B)			<5.0		mg/kg		5	24-SEP-20
Cadmium (Cd)			<0.020		mg/kg		0.02	24-SEP-20
Calcium (Ca)			<50		mg/kg		50	24-SEP-20
Chromium (Cr)			<0.50		mg/kg		0.5	24-SEP-20
Cobalt (Co)			<0.10		mg/kg		0.1	24-SEP-20
Copper (Cu)			<0.50		mg/kg		0.5	24-SEP-20
Iron (Fe)			<50		mg/kg		50	24-SEP-20
Lead (Pb)			<0.50		mg/kg		0.5	24-SEP-20
Lithium (Li)			<2.0		mg/kg		2	24-SEP-20
Magnesium (Mg)			<20		mg/kg		20	24-SEP-20
Manganese (Mn)			<1.0		mg/kg		1	24-SEP-20
Molybdenum (Mo)			<0.10		mg/kg		0.1	24-SEP-20
Nickel (Ni)			<0.50		mg/kg		0.5	24-SEP-20
Phosphorus (P)			<50		mg/kg		50	24-SEP-20
Potassium (K)			<100		mg/kg		100	24-SEP-20
Selenium (Se)			<0.20		mg/kg		0.2	24-SEP-20
Silver (Ag)			<0.10		mg/kg		0.1	24-SEP-20
Sodium (Na)			<50		mg/kg		50	24-SEP-20
Strontium (Sr)			<0.50		mg/kg		0.5	24-SEP-20
Sulfur (S)			<1000		mg/kg		1000	24-SEP-20
Thallium (Tl)			<0.050		mg/kg		0.05	24-SEP-20
Tin (Sn)			<2.0		mg/kg		2	24-SEP-20
Titanium (Ti)			<1.0		mg/kg		1	24-SEP-20
Tungsten (W)			<0.50		mg/kg		0.5	24-SEP-20
Uranium (U)			<0.050		mg/kg		0.05	24-SEP-20
Vanadium (V)			<0.20		mg/kg		0.2	24-SEP-20
Zinc (Zn)			<2.0		mg/kg		2	24-SEP-20
Zirconium (Zr)			<1.0		mg/kg		1	24-SEP-20

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Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-CL	**Soil**							
Batch R5235395								
WG3411246-3 DUP		**L2505739-1**						
Moisture		90.8	91.5		%	0.8	20	24-SEP-20
WG3411246-2 LCS								
Moisture			96.0		%		90-110	24-SEP-20
WG3411246-1 MB								
Moisture			<0.25		%		0.25	24-SEP-20
Batch R5235396								
WG3411397-3 DUP		**L2505739-21**						
Moisture		78.3	78.8		%	0.6	20	24-SEP-20
WG3411397-2 LCS								
Moisture			97.2		%		90-110	24-SEP-20
WG3411397-1 MB								
Moisture			<0.25		%		0.25	24-SEP-20
Batch R5238042								
WG3411562-2 LCS								
Moisture			98.3		%		90-110	24-SEP-20
WG3411562-1 MB								
Moisture			<0.25		%		0.25	24-SEP-20
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5237399								
WG3412702-9 DUP		**L2505739-1**						
Acenaphthene		<0.025	<0.025	RPD-NA	mg/kg	N/A	50	25-SEP-20
Acenaphthylene		<0.025	<0.025	RPD-NA	mg/kg	N/A	50	25-SEP-20
Anthracene		<0.020	<0.020	RPD-NA	mg/kg	N/A	50	25-SEP-20
Acridine		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	25-SEP-20
Benz(a)anthracene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	25-SEP-20
Benzo(a)pyrene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	25-SEP-20
Benzo(b&j)fluoranthene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	25-SEP-20
Benzo(e)pyrene		<0.050	0.050	RPD-NA	mg/kg	N/A	50	25-SEP-20
Benzo(g,h,i)perylene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	25-SEP-20
Benzo(k)fluoranthene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	25-SEP-20
Chrysene		0.064	<0.050	RPD-NA	mg/kg	N/A	50	25-SEP-20
Dibenz(a,h)anthracene		<0.025	<0.025	RPD-NA	mg/kg	N/A	50	25-SEP-20
Fluoranthene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	25-SEP-20
Fluorene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	25-SEP-20
Indeno(1,2,3-c,d)pyrene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	25-SEP-20
2-Methylnaphthalene		0.120	0.114		mg/kg	5.4	50	25-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5237399								
WG3412702-9 DUP		**L2505739-1**						
Naphthalene		0.061	0.077		mg/kg	23	50	25-SEP-20
Perylene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	25-SEP-20
Phenanthrene		0.159	0.154		mg/kg	3.7	50	25-SEP-20
Pyrene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	25-SEP-20
1-Methylnaphthalene		0.094	0.096		mg/kg	2.8	50	25-SEP-20
Quinoline		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	25-SEP-20
WG3412702-14 IRM		**ALS PAH RM2**						
Acenaphthene			93.6		%		60-130	25-SEP-20
Acenaphthylene			112.8		%		60-130	25-SEP-20
Anthracene			111.4		%		60-130	25-SEP-20
Acridine			97.0		%		60-130	25-SEP-20
Benz(a)anthracene			91.9		%		60-130	25-SEP-20
Benzo(a)pyrene			82.9		%		60-130	25-SEP-20
Benzo(b&j)fluoranthene			85.3		%		60-130	25-SEP-20
Benzo(e)pyrene			91.5		%		60-130	25-SEP-20
Benzo(g,h,i)perylene			81.8		%		60-130	25-SEP-20
Benzo(k)fluoranthene			78.2		%		60-130	25-SEP-20
Chrysene			89.4		%		60-130	25-SEP-20
Dibenz(a,h)anthracene			79.4		%		60-130	25-SEP-20
Fluoranthene			87.7		%		60-130	25-SEP-20
Fluorene			89.6		%		60-130	25-SEP-20
Indeno(1,2,3-c,d)pyrene			103.7		%		60-130	25-SEP-20
2-Methylnaphthalene			86.0		%		60-130	25-SEP-20
Naphthalene			89.0		%		50-130	25-SEP-20
Perylene			91.2		%		60-130	25-SEP-20
Phenanthrene			90.4		%		60-130	25-SEP-20
Pyrene			89.6		%		60-130	25-SEP-20
1-Methylnaphthalene			83.8		%		60-130	25-SEP-20
WG3412702-3 IRM		**ALS PAH RM2**						
Acenaphthene			88.8		%		60-130	25-SEP-20
Acenaphthylene			112.2		%		60-130	25-SEP-20
Anthracene			112.0		%		60-130	25-SEP-20
Acridine			110.3		%		60-130	25-SEP-20
Benz(a)anthracene			101.3		%		60-130	25-SEP-20
Benzo(a)pyrene			96.5		%		60-130	25-SEP-20

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5237399								
WG3412702-3 IRM		**ALS PAH RM2**						
Benzo(b&j)fluoranthene			98.1		%		60-130	25-SEP-20
Benzo(e)pyrene			101.5		%		60-130	25-SEP-20
Benzo(g,h,i)perylene			88.9		%		60-130	25-SEP-20
Benzo(k)fluoranthene			78.1		%		60-130	25-SEP-20
Chrysene			97.6		%		60-130	25-SEP-20
Dibenz(a,h)anthracene			87.1		%		60-130	25-SEP-20
Fluoranthene			88.8		%		60-130	25-SEP-20
Fluorene			87.0		%		60-130	25-SEP-20
Indeno(1,2,3-c,d)pyrene			112.6		%		60-130	25-SEP-20
2-Methylnaphthalene			83.2		%		60-130	25-SEP-20
Naphthalene			84.3		%		50-130	25-SEP-20
Perylene			95.7		%		60-130	25-SEP-20
Phenanthrene			90.2		%		60-130	25-SEP-20
Pyrene			90.8		%		60-130	25-SEP-20
1-Methylnaphthalene			80.1		%		60-130	25-SEP-20
WG3412702-5 IRM		**ALS PAH RM2**						
Acenaphthene			100.2		%		60-130	25-SEP-20
Acenaphthylene			120.7		%		60-130	25-SEP-20
Anthracene			121.6		%		60-130	25-SEP-20
Acridine			117.0		%		60-130	25-SEP-20
Benz(a)anthracene			110.7		%		60-130	25-SEP-20
Benzo(a)pyrene			103.2		%		60-130	25-SEP-20
Benzo(b&j)fluoranthene			109.9		%		60-130	25-SEP-20
Benzo(e)pyrene			112.2		%		60-130	25-SEP-20
Benzo(g,h,i)perylene			94.3		%		60-130	25-SEP-20
Benzo(k)fluoranthene			87.3		%		60-130	25-SEP-20
Chrysene			106.6		%		60-130	25-SEP-20
Dibenz(a,h)anthracene			93.8		%		60-130	25-SEP-20
Fluoranthene			100.7		%		60-130	25-SEP-20
Fluorene			100.1		%		60-130	25-SEP-20
Indeno(1,2,3-c,d)pyrene			120.8		%		60-130	25-SEP-20
2-Methylnaphthalene			96.0		%		60-130	25-SEP-20
Naphthalene			96.5		%		50-130	25-SEP-20
Perylene			98.7		%		60-130	25-SEP-20

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5237399								
WG3412702-5 IRM		**ALS PAH RM2**						
Phenanthrene			103.4		%		60-130	25-SEP-20
Pyrene			102.0		%		60-130	25-SEP-20
1-Methylnaphthalene			92.8		%		60-130	25-SEP-20
WG3412702-7 IRM		**ALS PAH RM2**						
Acenaphthene			97.3		%		60-130	25-SEP-20
Acenaphthylene			112.3		%		60-130	25-SEP-20
Anthracene			117.3		%		60-130	25-SEP-20
Acridine			102.3		%		60-130	25-SEP-20
Benz(a)anthracene			96.6		%		60-130	25-SEP-20
Benzo(a)pyrene			90.8		%		60-130	25-SEP-20
Benzo(b&j)fluoranthene			92.2		%		60-130	25-SEP-20
Benzo(e)pyrene			96.5		%		60-130	25-SEP-20
Benzo(g,h,i)perylene			86.8		%		60-130	25-SEP-20
Benzo(k)fluoranthene			75.2		%		60-130	25-SEP-20
Chrysene			95.2		%		60-130	25-SEP-20
Dibenz(a,h)anthracene			83.9		%		60-130	25-SEP-20
Fluoranthene			89.6		%		60-130	25-SEP-20
Fluorene			92.9		%		60-130	25-SEP-20
Indeno(1,2,3-c,d)pyrene			105.8		%		60-130	25-SEP-20
2-Methylnaphthalene			90.2		%		60-130	25-SEP-20
Naphthalene			95.7		%		50-130	25-SEP-20
Perylene			91.9		%		60-130	25-SEP-20
Phenanthrene			92.5		%		60-130	25-SEP-20
Pyrene			91.2		%		60-130	25-SEP-20
1-Methylnaphthalene			88.3		%		60-130	25-SEP-20
WG3412702-13 LCS								
Acenaphthene			90.0		%		60-130	25-SEP-20
Acenaphthylene			82.9		%		60-130	25-SEP-20
Anthracene			79.6		%		60-130	25-SEP-20
Acridine			76.9		%		60-130	25-SEP-20
Benz(a)anthracene			85.5		%		60-130	25-SEP-20
Benzo(a)pyrene			74.0		%		60-130	25-SEP-20
Benzo(b&j)fluoranthene			82.6		%		60-130	25-SEP-20
Benzo(e)pyrene			83.5		%		60-130	25-SEP-20
Benzo(g,h,i)perylene			79.1		%		60-130	25-SEP-20

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5237399								
WG3412702-13 LCS								
Benzo(k)fluoranthene			78.2		%		60-130	25-SEP-20
Chrysene			82.3		%		60-130	25-SEP-20
Dibenz(a,h)anthracene			79.2		%		60-130	25-SEP-20
Fluoranthene			85.9		%		60-130	25-SEP-20
Fluorene			84.0		%		60-130	25-SEP-20
Indeno(1,2,3-c,d)pyrene			77.3		%		60-130	25-SEP-20
2-Methylnaphthalene			89.5		%		60-130	25-SEP-20
Naphthalene			92.4		%		50-130	25-SEP-20
Perylene			78.7		%		60-130	25-SEP-20
Phenanthrene			88.6		%		60-130	25-SEP-20
Pyrene			87.4		%		60-130	25-SEP-20
1-Methylnaphthalene			87.2		%		60-130	25-SEP-20
Quinoline			81.4		%		60-130	25-SEP-20
WG3412702-2 LCS								
Acenaphthene			101.2		%		60-130	25-SEP-20
Acenaphthylene			92.1		%		60-130	25-SEP-20
Anthracene			91.0		%		60-130	25-SEP-20
Acridine			91.8		%		60-130	25-SEP-20
Benz(a)anthracene			102.6		%		60-130	25-SEP-20
Benzo(a)pyrene			91.2		%		60-130	25-SEP-20
Benzo(b&j)fluoranthene			103.8		%		60-130	25-SEP-20
Benzo(e)pyrene			100.9		%		60-130	25-SEP-20
Benzo(g,h,i)perylene			88.3		%		60-130	25-SEP-20
Benzo(k)fluoranthene			92.3		%		60-130	25-SEP-20
Chrysene			95.3		%		60-130	25-SEP-20
Dibenz(a,h)anthracene			91.6		%		60-130	25-SEP-20
Fluoranthene			96.4		%		60-130	25-SEP-20
Fluorene			93.8		%		60-130	25-SEP-20
Indeno(1,2,3-c,d)pyrene			96.6		%		60-130	25-SEP-20
2-Methylnaphthalene			99.5		%		60-130	25-SEP-20
Naphthalene			103.4		%		50-130	25-SEP-20
Perylene			92.5		%		60-130	25-SEP-20
Phenanthrene			102.6		%		60-130	25-SEP-20
Pyrene			100.1		%		60-130	25-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5237399								
WG3412702-2 LCS								
1-Methylnaphthalene			97.6		%		60-130	25-SEP-20
Quinoline			92.6		%		60-130	25-SEP-20
WG3412702-4 LCS								
Acenaphthene			102.6		%		60-130	25-SEP-20
Acenaphthylene			93.8		%		60-130	25-SEP-20
Anthracene			96.1		%		60-130	25-SEP-20
Acridine			95.0		%		60-130	25-SEP-20
Benz(a)anthracene			107.2		%		60-130	25-SEP-20
Benzo(a)pyrene			98.7		%		60-130	25-SEP-20
Benzo(b&j)fluoranthene			106.6		%		60-130	25-SEP-20
Benzo(e)pyrene			104.5		%		60-130	25-SEP-20
Benzo(g,h,i)perylene			89.9		%		60-130	25-SEP-20
Benzo(k)fluoranthene			97.2		%		60-130	25-SEP-20
Chrysene			98.3		%		60-130	25-SEP-20
Dibenz(a,h)anthracene			93.3		%		60-130	25-SEP-20
Fluoranthene			97.4		%		60-130	25-SEP-20
Fluorene			96.4		%		60-130	25-SEP-20
Indeno(1,2,3-c,d)pyrene			100.3		%		60-130	25-SEP-20
2-Methylnaphthalene			99.5		%		60-130	25-SEP-20
Naphthalene			103.8		%		50-130	25-SEP-20
Perylene			98.2		%		60-130	25-SEP-20
Phenanthrene			103.3		%		60-130	25-SEP-20
Pyrene			101.8		%		60-130	25-SEP-20
1-Methylnaphthalene			98.1		%		60-130	25-SEP-20
Quinoline			93.4		%		60-130	25-SEP-20
WG3412702-1 MB								
Acenaphthene			<0.0050		mg/kg		0.005	25-SEP-20
Acenaphthylene			<0.0050		mg/kg		0.005	25-SEP-20
Anthracene			<0.0040		mg/kg		0.004	25-SEP-20
Acridine			<0.010		mg/kg		0.01	25-SEP-20
Benz(a)anthracene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	25-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5237399								
WG3412702-1 MB								
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Chrysene			<0.010		mg/kg		0.01	25-SEP-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	25-SEP-20
Fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Fluorene			<0.010		mg/kg		0.01	25-SEP-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	25-SEP-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	25-SEP-20
Naphthalene			<0.010		mg/kg		0.01	25-SEP-20
Perylene			<0.010		mg/kg		0.01	25-SEP-20
Phenanthrene			<0.010		mg/kg		0.01	25-SEP-20
Pyrene			<0.010		mg/kg		0.01	25-SEP-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	25-SEP-20
Quinoline			<0.050		mg/kg		0.05	25-SEP-20
Surrogate: d8-Naphthalene			92.0		%		50-130	25-SEP-20
Surrogate: d10-Acenaphthene			95.1		%		60-130	25-SEP-20
Surrogate: d10-Phenanthrene			93.9		%		60-130	25-SEP-20
Surrogate: d12-Chrysene			106.2		%		60-130	25-SEP-20
WG3412702-11 MB								
Acenaphthene			<0.0050		mg/kg		0.005	25-SEP-20
Acenaphthylene			<0.0050		mg/kg		0.005	25-SEP-20
Anthracene			<0.0040		mg/kg		0.004	25-SEP-20
Acridine			<0.010		mg/kg		0.01	25-SEP-20
Benz(a)anthracene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Chrysene			<0.010		mg/kg		0.01	25-SEP-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	25-SEP-20
Fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Fluorene			<0.010		mg/kg		0.01	25-SEP-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	25-SEP-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	25-SEP-20

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5237399								
WG3412702-11 MB								
Naphthalene			<0.010		mg/kg		0.01	25-SEP-20
Perylene			<0.010		mg/kg		0.01	25-SEP-20
Phenanthrene			<0.010		mg/kg		0.01	25-SEP-20
Pyrene			<0.010		mg/kg		0.01	25-SEP-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	25-SEP-20
Quinoline			<0.050		mg/kg		0.05	25-SEP-20
Surrogate: d8-Naphthalene			96.3		%		50-130	25-SEP-20
Surrogate: d10-Acenaphthene			95.7		%		60-130	25-SEP-20
Surrogate: d10-Phenanthrene			95.7		%		60-130	25-SEP-20
Surrogate: d12-Chrysene			105.2		%		60-130	25-SEP-20
WG3412702-15 MB								
Acenaphthene			<0.0050		mg/kg		0.005	25-SEP-20
Acenaphthylene			<0.0050		mg/kg		0.005	25-SEP-20
Anthracene			<0.0040		mg/kg		0.004	25-SEP-20
Acridine			<0.010		mg/kg		0.01	25-SEP-20
Benz(a)anthracene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Chrysene			<0.010		mg/kg		0.01	25-SEP-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	25-SEP-20
Fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Fluorene			<0.010		mg/kg		0.01	25-SEP-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	25-SEP-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	25-SEP-20
Naphthalene			<0.010		mg/kg		0.01	25-SEP-20
Perylene			<0.010		mg/kg		0.01	25-SEP-20
Phenanthrene			<0.010		mg/kg		0.01	25-SEP-20
Pyrene			<0.010		mg/kg		0.01	25-SEP-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	25-SEP-20
Quinoline			<0.050		mg/kg		0.05	25-SEP-20
Surrogate: d8-Naphthalene			94.6		%		50-130	25-SEP-20

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5237399								
WG3412702-15 MB								
Surrogate: d10-Acenaphthene			95.8		%		60-130	25-SEP-20
Surrogate: d10-Phenanthrene			95.8		%		60-130	25-SEP-20
Surrogate: d12-Chrysene			107.1		%		60-130	25-SEP-20
WG3412702-8 MB								
Acenaphthene			<0.0050		mg/kg		0.005	25-SEP-20
Acenaphthylene			<0.0050		mg/kg		0.005	25-SEP-20
Anthracene			<0.0040		mg/kg		0.004	25-SEP-20
Acridine			<0.010		mg/kg		0.01	25-SEP-20
Benz(a)anthracene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Chrysene			<0.010		mg/kg		0.01	25-SEP-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	25-SEP-20
Fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Fluorene			<0.010		mg/kg		0.01	25-SEP-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	25-SEP-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	25-SEP-20
Naphthalene			<0.010		mg/kg		0.01	25-SEP-20
Perylene			<0.010		mg/kg		0.01	25-SEP-20
Phenanthrene			<0.010		mg/kg		0.01	25-SEP-20
Pyrene			<0.010		mg/kg		0.01	25-SEP-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	25-SEP-20
Quinoline			<0.050		mg/kg		0.05	25-SEP-20
Surrogate: d8-Naphthalene			97.9		%		50-130	25-SEP-20
Surrogate: d10-Acenaphthene			99.6		%		60-130	25-SEP-20
Surrogate: d10-Phenanthrene			99.8		%		60-130	25-SEP-20
Surrogate: d12-Chrysene			111.7		%		60-130	25-SEP-20
Batch R5238377								
WG3413082-8 DUP		**L2505739-21**						
Acenaphthene		<0.020	<0.020	RPD-NA	mg/kg	N/A	50	26-SEP-20
Acenaphthylene		<0.013	<0.013	RPD-NA	mg/kg	N/A	50	26-SEP-20

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5238377								
WG3413082-8 DUP		**L2505739-21**						
Anthracene		<0.010	<0.010	RPD-NA	mg/kg	N/A	50	26-SEP-20
Acridine		<0.055	<0.055	RPD-NA	mg/kg	N/A	50	26-SEP-20
Benz(a)anthracene		<0.035	<0.035	RPD-NA	mg/kg	N/A	50	26-SEP-20
Benzo(a)pyrene		<0.025	<0.025	RPD-NA	mg/kg	N/A	50	26-SEP-20
Benzo(b&j)fluoranthene		0.048	0.063		mg/kg	27	50	26-SEP-20
Benzo(e)pyrene		0.056	0.080		mg/kg	35	50	26-SEP-20
Benzo(g,h,i)perylene		0.034	0.042		mg/kg	21	50	26-SEP-20
Benzo(k)fluoranthene		<0.025	<0.025	RPD-NA	mg/kg	N/A	50	26-SEP-20
Chrysene		0.081	0.104		mg/kg	25	50	26-SEP-20
Dibenz(a,h)anthracene		<0.020	<0.020	RPD-NA	mg/kg	N/A	50	26-SEP-20
Fluoranthene		<0.035	<0.035	RPD-NA	mg/kg	N/A	50	26-SEP-20
Fluorene		0.037	0.052		mg/kg	33	50	26-SEP-20
Indeno(1,2,3-c,d)pyrene		<0.025	<0.025	RPD-NA	mg/kg	N/A	50	26-SEP-20
2-Methylnaphthalene		0.410	0.530		mg/kg	26	50	26-SEP-20
Naphthalene		0.154	0.198		mg/kg	25	50	26-SEP-20
Perylene		<0.025	<0.025	RPD-NA	mg/kg	N/A	50	26-SEP-20
Phenanthrene		0.242	0.321		mg/kg	28	50	26-SEP-20
Pyrene		0.031	0.050		mg/kg	46	50	26-SEP-20
1-Methylnaphthalene		0.251	0.333		mg/kg	28	50	26-SEP-20
Quinoline		<0.025	<0.025	RPD-NA	mg/kg	N/A	50	26-SEP-20
WG3413082-3 IRM		**ALS PAH RM2**						
Acenaphthene			102.6		%		60-130	26-SEP-20
Acenaphthylene			110.5		%		60-130	26-SEP-20
Anthracene			111.9		%		60-130	26-SEP-20
Acridine			104.0		%		60-130	26-SEP-20
Benz(a)anthracene			99.4		%		60-130	26-SEP-20
Benzo(a)pyrene			95.1		%		60-130	26-SEP-20
Benzo(b&j)fluoranthene			93.6		%		60-130	26-SEP-20
Benzo(e)pyrene			100.5		%		60-130	26-SEP-20
Benzo(g,h,i)perylene			90.7		%		60-130	26-SEP-20
Benzo(k)fluoranthene			82.0		%		60-130	26-SEP-20
Chrysene			98.8		%		60-130	26-SEP-20
Dibenz(a,h)anthracene			92.5		%		60-130	26-SEP-20
Fluoranthene			93.8		%		60-130	26-SEP-20

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5238377								
WG3413082-3 IRM		**ALS PAH RM2**						
Fluorene			97.9		%		60-130	26-SEP-20
Indeno(1,2,3-c,d)pyrene			114.6		%		60-130	26-SEP-20
2-Methylnaphthalene			92.2		%		60-130	26-SEP-20
Naphthalene			97.3		%		50-130	26-SEP-20
Perylene			93.2		%		60-130	26-SEP-20
Phenanthrene			96.5		%		60-130	26-SEP-20
Pyrene			95.9		%		60-130	26-SEP-20
1-Methylnaphthalene			91.3		%		60-130	26-SEP-20
WG3413082-5 IRM		**ALS PAH RM2**						
Acenaphthene			102.8		%		60-130	26-SEP-20
Acenaphthylene			112.1		%		60-130	26-SEP-20
Anthracene			112.4		%		60-130	26-SEP-20
Acridine			101.8		%		60-130	26-SEP-20
Benz(a)anthracene			99.5		%		60-130	26-SEP-20
Benzo(a)pyrene			93.4		%		60-130	26-SEP-20
Benzo(b&j)fluoranthene			93.3		%		60-130	26-SEP-20
Benzo(e)pyrene			99.6		%		60-130	26-SEP-20
Benzo(g,h,i)perylene			88.7		%		60-130	26-SEP-20
Benzo(k)fluoranthene			89.9		%		60-130	26-SEP-20
Chrysene			99.9		%		60-130	26-SEP-20
Dibenz(a,h)anthracene			86.7		%		60-130	26-SEP-20
Fluoranthene			94.7		%		60-130	26-SEP-20
Fluorene			97.0		%		60-130	26-SEP-20
Indeno(1,2,3-c,d)pyrene			108.7		%		60-130	26-SEP-20
2-Methylnaphthalene			94.1		%		60-130	26-SEP-20
Naphthalene			101.2		%		50-130	26-SEP-20
Perylene			89.0		%		60-130	26-SEP-20
Phenanthrene			96.6		%		60-130	26-SEP-20
Pyrene			96.2		%		60-130	26-SEP-20
1-Methylnaphthalene			93.0		%		60-130	26-SEP-20
WG3413082-9 IRM		**ALS PAH RM2**						
Acenaphthene			89.7		%		60-130	26-SEP-20
Acenaphthylene			102.9		%		60-130	26-SEP-20
Anthracene			105.1		%		60-130	26-SEP-20
Acridine			99.5		%		60-130	26-SEP-20

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5238377								
WG3413082-9 IRM		**ALS PAH RM2**						
Benz(a)anthracene			92.7		%		60-130	26-SEP-20
Benzo(a)pyrene			89.1		%		60-130	26-SEP-20
Benzo(b&j)fluoranthene			87.4		%		60-130	26-SEP-20
Benzo(e)pyrene			93.7		%		60-130	26-SEP-20
Benzo(g,h,i)perylene			80.0		%		60-130	26-SEP-20
Benzo(k)fluoranthene			69.2		%		60-130	26-SEP-20
Chrysene			89.3		%		60-130	26-SEP-20
Dibenz(a,h)anthracene			77.6		%		60-130	26-SEP-20
Fluoranthene			84.8		%		60-130	26-SEP-20
Fluorene			86.5		%		60-130	26-SEP-20
Indeno(1,2,3-c,d)pyrene			105.8		%		60-130	26-SEP-20
2-Methylnaphthalene			83.9		%		60-130	26-SEP-20
Naphthalene			84.9		%		50-130	26-SEP-20
Perylene			95.5		%		60-130	26-SEP-20
Phenanthrene			87.9		%		60-130	26-SEP-20
Pyrene			86.7		%		60-130	26-SEP-20
1-Methylnaphthalene			80.2		%		60-130	26-SEP-20
WG3413082-10 LCS								
Acenaphthene			100.3		%		60-130	26-SEP-20
Acenaphthylene			91.6		%		60-130	26-SEP-20
Anthracene			90.2		%		60-130	26-SEP-20
Acridine			87.5		%		60-130	26-SEP-20
Benz(a)anthracene			98.6		%		60-130	26-SEP-20
Benzo(a)pyrene			89.5		%		60-130	26-SEP-20
Benzo(b&j)fluoranthene			97.8		%		60-130	26-SEP-20
Benzo(e)pyrene			96.5		%		60-130	26-SEP-20
Benzo(g,h,i)perylene			87.1		%		60-130	26-SEP-20
Benzo(k)fluoranthene			90.2		%		60-130	26-SEP-20
Chrysene			93.2		%		60-130	26-SEP-20
Dibenz(a,h)anthracene			87.2		%		60-130	26-SEP-20
Fluoranthene			93.7		%		60-130	26-SEP-20
Fluorene			92.4		%		60-130	26-SEP-20
Indeno(1,2,3-c,d)pyrene			100.6		%		60-130	26-SEP-20
2-Methylnaphthalene			97.4		%		60-130	26-SEP-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5238377								
WG3413082-10 LCS								
Naphthalene			102.0		%		50-130	26-SEP-20
Perylene			90.5		%		60-130	26-SEP-20
Phenanthrene			99.3		%		60-130	26-SEP-20
Pyrene			97.8		%		60-130	26-SEP-20
1-Methylnaphthalene			95.4		%		60-130	26-SEP-20
Quinoline			90.7		%		60-130	26-SEP-20
WG3413082-4 LCS								
Acenaphthene			105.8		%		60-130	26-SEP-20
Acenaphthylene			102.6		%		60-130	26-SEP-20
Anthracene			102.1		%		60-130	26-SEP-20
Acridine			93.8		%		60-130	26-SEP-20
Benz(a)anthracene			106.1		%		60-130	26-SEP-20
Benzo(a)pyrene			97.2		%		60-130	26-SEP-20
Benzo(b&j)fluoranthene			102.0		%		60-130	26-SEP-20
Benzo(e)pyrene			105.7		%		60-130	26-SEP-20
Benzo(g,h,i)perylene			95.9		%		60-130	26-SEP-20
Benzo(k)fluoranthene			102.2		%		60-130	26-SEP-20
Chrysene			101.8		%		60-130	26-SEP-20
Dibenz(a,h)anthracene			94.7		%		60-130	26-SEP-20
Fluoranthene			102.5		%		60-130	26-SEP-20
Fluorene			100.0		%		60-130	26-SEP-20
Indeno(1,2,3-c,d)pyrene			106.3		%		60-130	26-SEP-20
2-Methylnaphthalene			103.2		%		60-130	26-SEP-20
Naphthalene			111.5		%		50-130	26-SEP-20
Perylene			97.9		%		60-130	26-SEP-20
Phenanthrene			106.7		%		60-130	26-SEP-20
Pyrene			105.6		%		60-130	26-SEP-20
1-Methylnaphthalene			104.4		%		60-130	26-SEP-20
Quinoline			97.6		%		60-130	26-SEP-20
WG3413082-6 LCS								
Acenaphthene			125.1		%		60-130	26-SEP-20
Acenaphthylene			115.0		%		60-130	26-SEP-20
Anthracene			110.9		%		60-130	26-SEP-20
Acridine			109.7		%		60-130	26-SEP-20
Benz(a)anthracene			121.5		%		60-130	26-SEP-20

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5238377								
WG3413082-6 LCS								
Benzo(a)pyrene			110.3		%		60-130	26-SEP-20
Benzo(b&j)fluoranthene			118.8		%		60-130	26-SEP-20
Benzo(e)pyrene			119.7		%		60-130	26-SEP-20
Benzo(g,h,i)perylene			108.8		%		60-130	26-SEP-20
Benzo(k)fluoranthene			113.1		%		60-130	26-SEP-20
Chrysene			116.3		%		60-130	26-SEP-20
Dibenz(a,h)anthracene			108.9		%		60-130	26-SEP-20
Fluoranthene			117.7		%		60-130	26-SEP-20
Fluorene			115.1		%		60-130	26-SEP-20
Indeno(1,2,3-c,d)pyrene			114.3		%		60-130	26-SEP-20
2-Methylnaphthalene			120.5		%		60-130	26-SEP-20
Naphthalene			122.7		%		50-130	26-SEP-20
Perylene			114.6		%		60-130	26-SEP-20
Phenanthrene			123.8		%		60-130	26-SEP-20
Pyrene			121.6		%		60-130	26-SEP-20
1-Methylnaphthalene			119.7		%		60-130	26-SEP-20
Quinoline			113.2		%		60-130	26-SEP-20
WG3413082-1 MB								
Acenaphthene			<0.0050		mg/kg		0.005	25-SEP-20
Acenaphthylene			<0.0050		mg/kg		0.005	25-SEP-20
Anthracene			<0.0040		mg/kg		0.004	25-SEP-20
Acridine			<0.010		mg/kg		0.01	25-SEP-20
Benz(a)anthracene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Chrysene			<0.010		mg/kg		0.01	25-SEP-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	25-SEP-20
Fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Fluorene			<0.010		mg/kg		0.01	25-SEP-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	25-SEP-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	25-SEP-20

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5238377								
WG3413082-1 MB								
Naphthalene			<0.010		mg/kg		0.01	25-SEP-20
Perylene			<0.010		mg/kg		0.01	25-SEP-20
Phenanthrene			<0.010		mg/kg		0.01	25-SEP-20
Pyrene			<0.010		mg/kg		0.01	25-SEP-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	25-SEP-20
Quinoline			<0.050		mg/kg		0.05	25-SEP-20
Surrogate: d8-Naphthalene			98.9		%		50-130	25-SEP-20
Surrogate: d10-Acenaphthene			101.0		%		60-130	25-SEP-20
Surrogate: d10-Phenanthrene			99.0		%		60-130	25-SEP-20
Surrogate: d12-Chrysene			106.6		%		60-130	25-SEP-20
WG3413082-7 MB								
Acenaphthene			<0.0050		mg/kg		0.005	26-SEP-20
Acenaphthylene			<0.0050		mg/kg		0.005	26-SEP-20
Anthracene			<0.0040		mg/kg		0.004	26-SEP-20
Acridine			<0.010		mg/kg		0.01	26-SEP-20
Benz(a)anthracene			<0.010		mg/kg		0.01	26-SEP-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	26-SEP-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	26-SEP-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	26-SEP-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	26-SEP-20
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	26-SEP-20
Chrysene			<0.010		mg/kg		0.01	26-SEP-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	26-SEP-20
Fluoranthene			<0.010		mg/kg		0.01	26-SEP-20
Fluorene			<0.010		mg/kg		0.01	26-SEP-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	26-SEP-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	26-SEP-20
Naphthalene			<0.010		mg/kg		0.01	26-SEP-20
Perylene			<0.010		mg/kg		0.01	26-SEP-20
Phenanthrene			<0.010		mg/kg		0.01	26-SEP-20
Pyrene			<0.010		mg/kg		0.01	26-SEP-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	26-SEP-20
Quinoline			<0.050		mg/kg		0.05	26-SEP-20
Surrogate: d8-Naphthalene			104.4		%		50-130	26-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5238377								
WG3413082-7 MB								
Surrogate: d10-Acenaphthene			108.2		%		60-130	26-SEP-20
Surrogate: d10-Phenanthrene			101.6		%		60-130	26-SEP-20
Surrogate: d12-Chrysene			110.0		%		60-130	26-SEP-20
PH-1:2-CL	**Soil**							
Batch R5238676								
WG3412993-3 DUP		**L2505739-10**						
pH (1:2 soil:water)		8.00	7.98	J	pH	0.02	0.2	26-SEP-20
WG3412993-6 DUP		**L2505739-28**						
pH (1:2 soil:water)		8.09	8.05	J	pH	0.04	0.2	26-SEP-20
WG3412993-2 IRM		**SAL-STD10**						
pH (1:2 soil:water)			7.70		pH		7.4-8	26-SEP-20
WG3412993-5 IRM		**SAL-STD10**						
pH (1:2 soil:water)			7.72		pH		7.4-8	26-SEP-20
WG3412993-8 IRM		**SAL-STD10**						
pH (1:2 soil:water)			7.70		pH		7.4-8	26-SEP-20
WG3412993-1 LCS								
pH (1:2 soil:water)			7.02		pH		6.8-7.2	26-SEP-20
WG3412993-4 LCS								
pH (1:2 soil:water)			7.01		pH		6.8-7.2	26-SEP-20
WG3412993-7 LCS								
pH (1:2 soil:water)			7.01		pH		6.8-7.2	26-SEP-20
PSA-PIPET-DETAIL-SK	**Soil**							
Batch R5241412								
WG3412285-1 DUP		**L2505739-7**						
% Gravel (>2mm)		1.2	1.2	J	%	0.0	5	28-SEP-20
% Sand (2.00mm - 1.00mm)		2.5	2.9	J	%	0.4	5	28-SEP-20
% Sand (1.00mm - 0.50mm)		4.4	4.4	J	%	0.0	5	28-SEP-20
% Sand (0.50mm - 0.25mm)		10.8	11.5	J	%	0.7	5	28-SEP-20
% Sand (0.25mm - 0.125mm)		21.0	21.3	J	%	0.4	5	28-SEP-20
% Sand (0.125mm - 0.063mm)		18.0	17.4	J	%	0.6	5	28-SEP-20
% Silt (0.063mm - 0.0312mm)		17.1	16.6	J	%	0.6	5	28-SEP-20
% Silt (0.0312mm - 0.004mm)		20.5	20.2	J	%	0.2	5	28-SEP-20
% Clay (<4um)		4.5	4.5	J	%	0.0	5	28-SEP-20
WG3412285-2 IRM		**2017-PSA**						
% Sand (2.00mm - 1.00mm)			2.7		%		0-7.6	28-SEP-20
% Sand (1.00mm - 0.50mm)			4.0		%		0-8.9	28-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PSA-PIPET-DETAIL-SK	**Soil**							
Batch R5241412								
WG3412285-2 IRM		**2017-PSA**						
% Sand (0.50mm - 0.25mm)			10.3		%		5.3-15.3	28-SEP-20
% Sand (0.25mm - 0.125mm)			14.9		%		10-20	28-SEP-20
% Sand (0.125mm - 0.063mm)			12.7		%		7.3-17.3	28-SEP-20
% Silt (0.063mm - 0.0312mm)			14.8		%		9.9-19.9	28-SEP-20
% Silt (0.0312mm - 0.004mm)			22.4		%		17.6-27.6	28-SEP-20
% Clay (<4um)			18.2		%		13.4-23.4	28-SEP-20
Batch R5241854								
WG3412289-1 DUP		**L2505739-26**						
% Gravel (>2mm)		<1.0	<1.0	RPD-NA	%	N/A	5	28-SEP-20
% Sand (2.00mm - 1.00mm)		1.7	1.8	J	%	0.1	5	28-SEP-20
% Sand (1.00mm - 0.50mm)		6.7	6.5	J	%	0.2	5	28-SEP-20
% Sand (0.50mm - 0.25mm)		8.5	9.8	J	%	1.2	5	28-SEP-20
% Sand (0.25mm - 0.125mm)		9.0	9.0	J	%	0.0	5	28-SEP-20
% Sand (0.125mm - 0.063mm)		8.7	8.6	J	%	0.1	5	28-SEP-20
% Silt (0.063mm - 0.0312mm)		27.8	27.4	J	%	0.5	5	28-SEP-20
% Silt (0.0312mm - 0.004mm)		31.5	30.8	J	%	0.7	5	28-SEP-20
% Clay (<4um)		5.3	5.5	J	%	0.1	5	28-SEP-20
WG3412289-2 IRM		**2017-PSA**						
% Sand (2.00mm - 1.00mm)			2.5		%		0-7.6	28-SEP-20
% Sand (1.00mm - 0.50mm)			4.0		%		0-8.9	28-SEP-20
% Sand (0.50mm - 0.25mm)			10.1		%		5.3-15.3	28-SEP-20
% Sand (0.25mm - 0.125mm)			15.5		%		10-20	28-SEP-20
% Sand (0.125mm - 0.063mm)			12.5		%		7.3-17.3	28-SEP-20
% Silt (0.063mm - 0.0312mm)			14.6		%		9.9-19.9	28-SEP-20
% Silt (0.0312mm - 0.004mm)			22.6		%		17.6-27.6	28-SEP-20
% Clay (<4um)			18.1		%		13.4-23.4	28-SEP-20
Batch R5242117								
WG3412291-2 IRM		**2017-PSA**						
% Sand (2.00mm - 1.00mm)			2.5		%		0-7.6	29-SEP-20
% Sand (1.00mm - 0.50mm)			3.8		%		0-8.9	29-SEP-20
% Sand (0.50mm - 0.25mm)			9.9		%		5.3-15.3	29-SEP-20
% Sand (0.25mm - 0.125mm)			14.9		%		10-20	29-SEP-20
% Sand (0.125mm - 0.063mm)			13.1		%		7.3-17.3	29-SEP-20
% Silt (0.063mm - 0.0312mm)			14.6		%		9.9-19.9	29-SEP-20
% Silt (0.0312mm - 0.004mm)			22.4		%		17.6-27.6	29-SEP-20

Quality Control Report

Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PSA-PIPET-DETAIL-SK		**Soil**							
Batch	**R5242117**								
WG3412291-2	**IRM**		**2017-PSA**						
% Clay (<4um)				18.7		%		13.4-23.4	29-SEP-20

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

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:	CMO LAEMP Sept 2020	TURNAROUND TIME:	

PROJECT/CLIENT INFO

Facility Name	REP		
Project Manager	Cait Good		
Email	cait.good@teck.com		
Address	421 Pine Avenue		
City	Sparwood	Province	BC
Postal Code	V0B 2G0	Country	Canada
Phone Number	250-425-8202		

LABORATORY

Lab Name	ALS Calgary		
Lab Contact	Lyudmyla Shvets		
Email	lyudmyla.shvets@alsglobal.com		
Address	2559 29 Street NE		
City	Calgary	Province	AB
Postal Code	T1Y 7B5	Country	Canada
Phone Number	1 403 407 1794		

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cait.good@teck.com	x	x	x
teckcoal@equisonline.com			x
lings@minnow.ca	x	x	x
carlie.meyer@teck.com	x	x	x
sweech@minnow.ca	x	x	x

PO number: 689999

SAMPLE DETAILS / **ANALYSIS REQUESTED** (Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)

L2505739-COFC

								FILTERED	N	N	N	N	N
								PRESERV.	NONE	NONE	NONE	NONE	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
1	RG_AGCK_SE-1_2020-09-10_1622	RG_AGCK	SE	No	10-Sep-20	16:22	G	2	X	X	X	X	X
2	RG_RIVER_SE-5_2020-09-13_0946	RG_RIVER	SE	No	13-Sep-20	9:46	G	2	X	X	X	X	X
3	RG_RIVER_SE-2_2020-09-12_1137	RG_RIVER	SE	No	12-Sep-20	11:37	G	2	X	X	X	X	X
4	RG_RIVER_SE-1_2020-09-11_1016	RG_RIVER	SE	No	11-Sep-20	10:16	G	2	X	X	X	X	X
5	RG_CORCK_SE-1_2020-09-12_1614	RG_CORCK	SE	No	12-Sep-20	16:14	G	2	X	X	X	X	X
6	RG_CORCK_SE-2_2020-09-12_1657	RG_CORCK	SE	No	12-Sep-20	16:57	G	2	X	X	X	X	X
7	RG_CORCK_SE-3_2020-09-12_1704	RG_CORCK	SE	No	12-Sep-20	17:04	G	2	X	X	X	X	X
8	RG_CORCK_SE-4_2020-09-13_0936	RG_CORCK	SE	No	13-Sep-20	9:36	G	2	X	X	X	X	X
9	RG_CORCK_SE-5_2020-09-13_0946	RG_CORCK	SE	No	13-Sep-20	9:46	G	2	X	X	X	X	X
10	RG_MI25_SE-1_2020-09-11_1016	RG_MI25	SE	No	11-Sep-20	10:16	G	2	X	X	X	X	X
11	RG_MI25_SE-2_2020-09-11_1033	RG_MI25	SE	No	11-Sep-20	10:33	G	2	X	X	X	X	X
12	RG_MI25_SE-3_2020-09-11_1455	RG_MI25	SE	No	11-Sep-20	14:55	G	2	X	X	X	X	X
13	RG_MIUCO_SE-1_2020-09-12_1026	RG_MIUCO	SE	No	12-Sep-20	10:26	G	2	X	X	X	X	X
14	RG_MIUCO_SE-2_2020-09-12_1137	RG_MIUCO	SE	No	12-Sep-20	11:37	G	2	X	X	X	X	X
15	RG_MIUCO_SE-3_2020-09-12_1403	RG_MIUCO	SE	No	12-Sep-20	14:03	G	2	X	X	X	X	X
16	RG_MIUCO_SE-4_2020-09-12_1348	RG_MIUCO	SE	No	12-Sep-20	13:48	G	2	X	X	X	X	X
17	RG_MIUCO_SE-5_2020-09-12_1325	RG_MIUCO	SE	No	12-Sep-20	13:25	G	2	X	X	X	X	X
18	RG_MIDCO_SE-1_2020-09-15_0801	RG_MIDCO	SE	No	15-Sep-20	8:01	G	2	X	X	X	X	X
19	RG_MIDCO_SE-2_2020-09-15_0805	RG_MIDCO	SE	No	15-Sep-20	8:05	G	2	X	X	X	X	X
20	RG_MIDCO_SE-3_2020-09-15_0825	RG_MIDCO	SE	No	15-Sep-20	8:25	G	2	X	X	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	
	Jennifer Ings	September 18, 2020	DK	9/19 0830
				5°C

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 18, 2020
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

Teck

COC ID: CMO LAEMP Sept 2020 | **TURNAROUND TIME:**

PROJECT/CLIENT INFO		LABORATORY	
Facility Name	REP	Lab Name	ALS Calgary
Project Manager	Cait Good	Lab Contact	Lyudmyla Shvets
Email	cait.good@teck.com	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
cait.good@teck.com	x	x	x
teckcoal@equisonline.com			x
jings@minnow.ca	x	x	x
carlie.meyer@teck.com	x	x	x
sweech@minnow.ca	x	x	x

PO number: 689999

L2505739-COFC

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.	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
Preserv.									NONE	NONE	NONE	NONE	NONE
21	RG_MIDCO_SE-4_2020-09-15_0840	RG_MIDCO	SE	No	15-Sep-20	8:40	G	2	X	X	X	X	X
22	RG_MIDCO_SE-5_2020-09-15_1118	RG_MIDCO	SE	No	15-Sep-20	11:18	G	2	X	X	X	X	X
23	RG_RIVER_SE-2_2020-09-15_0805	RG_RIVER	SE	No	15-Sep-20	8:05	G	2	X	X	X	X	X
24	RG_RIVER_SE-5_2020-09-15_1118	RG_RIVER	SE	No	15-Sep-20	11:18	G	2	X	X	X	X	X
25	RG_MIDAG_SE-1_2020-09-15_1714	RG_MIDAG	SE	No	15-Sep-20	17:14	G	2	X	X	X	X	X
26	RG_MIDAG_SE-2_2020-09-15_1723	RG_MIDAG	SE	No	15-Sep-20	17:23	G	2	X	X	X	X	X
27	RG_MIULE_SE-1_2020-09-16_1145	RG_MIULE	SE	No	16-Sep-20	11:45	G	2	X	X	X	X	X
28	RG_MIULE_SE-2_2020-09-16_1205	RG_MIULE	SE	No	16-Sep-20	12:05	G	2	X	X	X	X	X
29	RG_MIULE_SE-3_2020-09-16_1457	RG_MIULE	SE	No	16-Sep-20	14:57	G	2	X	X	X	X	X
30	RG_MIDAG_SE-3_2020-09-16_0805	RG_MIDAG	SE	No	16-Sep-20	8:05	G	2	X	X	X	X	X
31	RG_MIDAG_SE-4_2020-09-16_0922	RG_MIDAG	SE	No	16-Sep-20	9:22	G	2	X	X	X	X	X
32	RG_MIDAG_SE-5_2020-09-16_0932	RG_MIDAG	SE	No	16-Sep-20	9:32	G	2	X	X	X	X	X
33	RG_RIVER_SE-2_2020-09-16_1208	RG_RIVER	SE	No	16-Sep-20	12:08	G	2	X	X	X	X	X
34	RG_LE1_SE-1_2020-09-17_1420	RG_LE1	SE	No	17-Sep-20	14:20	G	2	X	X	X	X	X
35	RG_LE1_SE-2_2020-09-17_1540	RG_LE1	SE	No	17-Sep-20	15:40	G	2	X	X	X	X	X
36	RG_LE1_SE-3_2020-09-17_1550	RG_LE1	SE	No	17-Sep-20	15:50	G	2	X	X	X	X	X
37	RG_MIULE_SE-4_2020-09-17_0815	RG_MIULE	SE	No	9/17/2020	8:15	G	2	X	X	X	X	X
38	RG_MIULE_SE-5_2020-09-17_0840	RG_MIULE	SE	No	9/17/2020	8:40	G	2	X	X	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
RG. MIDAG-S2.SE-_2020	Jennifer Ings	September 18, 2020	DK	9/19 0830

NB 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		Date/Time	September 18, 2020
Emergency (1 Business Day) - 100% surcharge					
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 19-SEP-20
Report Date: 30-SEP-20 14:55 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2505739

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: CMO LAEMP Sept 2020
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-1	L2505739-2	L2505739-3	L2505739-4	L2505739-5
	Description	SE	SE	SE	SE	SE
	Sampled Date	10-SEP-20	13-SEP-20	12-SEP-20	11-SEP-20	12-SEP-20
	Sampled Time	16:22	09:46	11:37	10:16	16:14
	Client ID	RG_AGCK_SE-1_2020-09-10_1622	RG_RIVER_SE-5_2020-09-13_0946	RG_RIVER_SE-2_2020-09-12_1137	RG_RIVER_SE-1_2020-09-11_1016	RG_CORCK_SE-1_2020-09-12_1614
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	90.8	64.7	70.6	57.8	73.1
	pH (1:2 soil:water) (pH)	7.12	8.14	7.94	7.91	8.17
Particle Size	% Gravel (>2mm) (%)	1.5 PSAL	1.2	<1.0	<1.0	<1.0
	% Sand (2.00mm - 1.00mm) (%)	4.6 PSAL	3.1	1.3	<1.0	1.0
	% Sand (1.00mm - 0.50mm) (%)	7.7 PSAL	5.7	5.0	1.4	2.9
	% Sand (0.50mm - 0.25mm) (%)	6.8 PSAL	15.0	7.5	4.4	12.1
	% Sand (0.25mm - 0.125mm) (%)	7.0 PSAL	16.7	8.1	11.1	20.2
	% Sand (0.125mm - 0.063mm) (%)	8.3 PSAL	12.9	14.6	19.0	16.4
	% Silt (0.063mm - 0.0312mm) (%)	27.8 PSAL	17.2	26.4	27.0	21.9
	% Silt (0.0312mm - 0.004mm) (%)	29.0 PSAL	22.9	31.2	29.6	22.7
	% Clay (<4um) (%)	7.4 PSAL	5.2	5.8	6.9	2.9
	Texture	Silt loam	Sandy loam	Silt loam	Silt loam	Sandy loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	8.9	8.6	5.60	3.49	7.3
Metals	Aluminum (Al) (mg/kg)	3550	3630	14200	17100	2010
	Antimony (Sb) (mg/kg)	0.43	0.32	0.39	2.96	0.25
	Arsenic (As) (mg/kg)	6.07	3.06	7.05	11.1	1.61
	Barium (Ba) (mg/kg)	71.9	168	229	192	135
	Beryllium (Be) (mg/kg)	0.44	0.41	0.84	0.92	0.29
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	0.25	<0.20
	Boron (B) (mg/kg)	7.0	9.3	15.3	17.3	6.4
	Cadmium (Cd) (mg/kg)	0.558	9.13	0.869	1.39	7.94
	Calcium (Ca) (mg/kg)	138000	218000	32400	16600	289000
	Chromium (Cr) (mg/kg)	9.03	5.70	17.9	21.6	3.18
	Cobalt (Co) (mg/kg)	2.28	190	6.95	8.60	244
	Copper (Cu) (mg/kg)	6.40	7.49	19.2	29.4	4.46
	Iron (Fe) (mg/kg)	6170	4710	20200	21800	2640
	Lead (Pb) (mg/kg)	4.12	3.95	11.3	23.0	1.85
	Lithium (Li) (mg/kg)	4.6	4.0	18.9	23.7	3.2
	Magnesium (Mg) (mg/kg)	12300	6230	7630	6910	5760
	Manganese (Mn) (mg/kg)	111	1420	261	592	1640
	Mercury (Hg) (mg/kg)	0.0437	0.0552	0.0476	0.0606	0.0295
	Molybdenum (Mo) (mg/kg)	0.70	0.70	2.13	6.10	0.61
	Nickel (Ni) (mg/kg)	15.0	201	22.8	33.7	218
	Phosphorus (P) (mg/kg)	830	306	1110	1260	166
	Potassium (K) (mg/kg)	1090	960	3000	3360	590
	Selenium (Se) (mg/kg)	1.55	2.79	1.06	1.13	1.56

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-6	L2505739-7	L2505739-8	L2505739-9	L2505739-10
	Description	SE	SE	SE	SE	SE
	Sampled Date	12-SEP-20	12-SEP-20	13-SEP-20	13-SEP-20	11-SEP-20
	Sampled Time	16:57	17:04	09:36	09:46	10:16
	Client ID	RG_CORCK_SE-2_2020-09-12_1657	RG_CORCK_SE-3_2020-09-12_1704	RG_CORCK_SE-4_2020-09-13_0936	RG_CORCK_SE-5_2020-09-13_0946	RG_MI25_SE-1_2020-09-11_1016
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	70.2	57.2	79.6	61.7	56.0
	pH (1:2 soil:water) (pH)	8.10	8.22	8.00	8.16	8.00
Particle Size	% Gravel (>2mm) (%)	<1.0	1.2	<1.0	<1.0	<1.0
	% Sand (2.00mm - 1.00mm) (%)	<1.0	2.5	<1.0	<1.0	<1.0
	% Sand (1.00mm - 0.50mm) (%)	<1.0	4.4	1.1	5.2	1.5
	% Sand (0.50mm - 0.25mm) (%)	2.9	10.8	3.5	11.9	3.2
	% Sand (0.25mm - 0.125mm) (%)	13.3	21.0	14.7	18.9	14.0
	% Sand (0.125mm - 0.063mm) (%)	16.7	18.0	16.5	15.0	18.1
	% Silt (0.063mm - 0.0312mm) (%)	28.8	17.1	26.6	16.8	26.8
	% Silt (0.0312mm - 0.004mm) (%)	32.5	20.5	30.8	24.7	29.1
	% Clay (<4um) (%)	4.3	4.5	5.6	6.2	6.9
	Texture	Silt loam	Sandy loam	Silt loam	Sandy loam	Silt loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	7.7	6.1	9.2	8.9	3.43
Metals	Aluminum (Al) (mg/kg)	3030	4420	4300	3900	16000
	Antimony (Sb) (mg/kg)	0.23	0.12	0.25	0.22	0.57
	Arsenic (As) (mg/kg)	1.93	3.09	2.48	3.23	10.2
	Barium (Ba) (mg/kg)	145	161	201	167	164
	Beryllium (Be) (mg/kg)	0.35	0.43	0.44	0.44	0.88
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	0.24
	Boron (B) (mg/kg)	9.2	9.2	10.6	9.2	15.2
	Cadmium (Cd) (mg/kg)	9.39	8.36	8.80	9.08	1.31
	Calcium (Ca) (mg/kg)	278000	243000	255000	216000	17100
	Chromium (Cr) (mg/kg)	4.24	6.42	6.77	5.90	20.3
	Cobalt (Co) (mg/kg)	191	247	232	191	8.16
	Copper (Cu) (mg/kg)	5.46	7.42	8.59	8.52	27.5
	Iron (Fe) (mg/kg)	3340	4980	4300	4790	20900
	Lead (Pb) (mg/kg)	2.23	3.56	3.35	3.96	16.3
	Lithium (Li) (mg/kg)	3.8	5.1	4.3	4.2	21.3
	Magnesium (Mg) (mg/kg)	6170	6370	6190	6170	6850
	Manganese (Mn) (mg/kg)	1530	1610	1490	1360	551
	Mercury (Hg) (mg/kg)	0.0172	0.0237	0.0266	0.0251	0.0487
	Molybdenum (Mo) (mg/kg)	0.57	0.77	0.80	0.71	5.78
	Nickel (Ni) (mg/kg)	223	219	228	201	31.4
	Phosphorus (P) (mg/kg)	241	276	285	330	1130
	Potassium (K) (mg/kg)	840	1080	1140	1010	3140
	Selenium (Se) (mg/kg)	2.86	2.13	4.88	2.74	1.02

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2505739-11	L2505739-12	L2505739-13	L2505739-14	L2505739-15
	Description	SE	SE	SE	SE	SE
	Sampled Date	11-SEP-20	11-SEP-20	12-SEP-20	12-SEP-20	12-SEP-20
	Sampled Time	10:33	14:55	10:26	11:37	14:03
	Client ID	RG_MI25_SE-2_2020-09-11_1033	RG_MI25_SE-3_2020-09-11_1455	RG_MIUCO_SE-1_2020-09-12_1026	RG_MIUCO_SE-2_2020-09-12_1137	RG_MIUCO_SE-3_2020-09-12_1403
SOIL						
Physical Tests	Moisture (%)	57.4	55.3	60.6	69.8	39.3
	pH (1:2 soil:water) (pH)	7.94	8.11	7.91	7.93	8.14
Particle Size	% Gravel (>2mm) (%)	<1.0	<1.0	<1.0	<1.0	<1.0
	% Sand (2.00mm - 1.00mm) (%)	4.4	<1.0	<1.0	2.8	1.7
	% Sand (1.00mm - 0.50mm) (%)	15.5	<1.0	1.6	4.9	3.4
	% Sand (0.50mm - 0.25mm) (%)	28.1	2.7	5.1	6.0	14.2
	% Sand (0.25mm - 0.125mm) (%)	17.9	13.3	10.2	6.4	29.7
	% Sand (0.125mm - 0.063mm) (%)	9.0	20.5	17.3	12.7	24.1
	% Silt (0.063mm - 0.0312mm) (%)	7.8	26.6	27.1	28.8	12.4
	% Silt (0.0312mm - 0.004mm) (%)	10.5	28.8	31.1	33.1	10.3
	% Clay (<4um) (%)	6.1	7.1	7.1	5.2	3.2
	Texture	Loamy sand	Silt loam	Silt loam	Silt loam	Loamy sand
Organic / Inorganic Carbon	Total Organic Carbon (%)	1.96	2.88	3.37	5.22	1.42
Metals	Aluminum (Al) (mg/kg)	15400	15900	15900	14100	15400
	Antimony (Sb) (mg/kg)	0.63	0.54	0.27	0.15	0.20
	Arsenic (As) (mg/kg)	11.5	10.3	7.54	6.43	7.01
	Barium (Ba) (mg/kg)	171	164	208	229	223
	Beryllium (Be) (mg/kg)	0.93	0.90	0.86	0.85	0.83
	Bismuth (Bi) (mg/kg)	0.25	0.22	0.20	<0.20	<0.20
	Boron (B) (mg/kg)	13.0	16.0	17.3	15.1	16.1
	Cadmium (Cd) (mg/kg)	1.47	1.31	0.861	0.880	0.610
	Calcium (Ca) (mg/kg)	16700	16500	17900	32600	18800
	Chromium (Cr) (mg/kg)	19.8	19.9	20.0	18.3	18.3
	Cobalt (Co) (mg/kg)	9.43	8.10	8.12	6.55	7.20
	Copper (Cu) (mg/kg)	29.4	27.3	19.5	18.3	16.2
	Iron (Fe) (mg/kg)	24800	21600	21200	18800	20200
	Lead (Pb) (mg/kg)	18.3	15.2	12.3	10.7	11.3
	Lithium (Li) (mg/kg)	23.5	22.2	20.5	18.6	20.1
	Magnesium (Mg) (mg/kg)	6570	6780	7050	8050	6540
	Manganese (Mn) (mg/kg)	593	508	607	264	342
	Mercury (Hg) (mg/kg)	0.0416	0.0448	0.0330	0.0342	0.0211
	Molybdenum (Mo) (mg/kg)	5.87	6.02	2.31	1.85	2.01
	Nickel (Ni) (mg/kg)	33.7	31.5	24.2	21.9	20.9
	Phosphorus (P) (mg/kg)	1240	1210	1290	1170	1300
	Potassium (K) (mg/kg)	2740	3180	3590	3310	3610
	Selenium (Se) (mg/kg)	1.02	1.04	0.82	1.12	0.49

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2505739-16	L2505739-17	L2505739-18	L2505739-19	L2505739-20
	Description	SE	SE	SE	SE	SE
	Sampled Date	12-SEP-20	12-SEP-20	15-SEP-20	15-SEP-20	15-SEP-20
	Sampled Time	13:48	13:25	08:01	08:05	08:25
	Client ID	RG_MIUCO_SE-4_2020-09-12_1348	RG_MIUCO_SE-5_2020-09-12_1325	RG_MIDCO_SE-1_2020-09-15_0801	RG_MIDCO_SE-2_2020-09-15_0805	RG_MIDCO_SE-3_2020-09-15_0825
SOIL						
Physical Tests	Moisture (%)	46.2	43.7	66.7	79.5	77.4
	pH (1:2 soil:water) (pH)	8.10	8.00	7.96	7.98	8.09
Particle Size	% Gravel (>2mm) (%)	<1.0	<1.0	<1.0	<1.0	<1.0
	% Sand (2.00mm - 1.00mm) (%)	1.0	<1.0	1.6	1.7	1.4
	% Sand (1.00mm - 0.50mm) (%)	2.9	2.3	7.2	6.5	13.7
	% Sand (0.50mm - 0.25mm) (%)	14.4	10.2	17.1	4.4	22.1
	% Sand (0.25mm - 0.125mm) (%)	31.4	21.0	14.0	5.9	18.0
	% Sand (0.125mm - 0.063mm) (%)	22.7	22.4	9.2	9.5	10.2
	% Silt (0.063mm - 0.0312mm) (%)	12.0	18.6	20.8	29.3	13.5
	% Silt (0.0312mm - 0.004mm) (%)	11.0	18.9	25.1	36.4	16.8
	% Clay (<4um) (%)	4.1	5.4	4.7	6.3	4.3
	Texture	Loamy sand	Sandy loam	Sandy loam	Silt loam	Sandy loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	2.04	2.38	3.5	4.7	4.33
Metals	Aluminum (Al) (mg/kg)	15100	15800	10800	9710	12800
	Antimony (Sb) (mg/kg)	0.33	0.34	0.36	0.31	0.37
	Arsenic (As) (mg/kg)	8.05	7.56	6.28	4.98	6.56
	Barium (Ba) (mg/kg)	220	173	134	147	148
	Beryllium (Be) (mg/kg)	0.89	0.90	0.74	0.60	0.78
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	16.1	16.2	14.3	14.9	17.0
	Cadmium (Cd) (mg/kg)	0.675	0.765	1.39	1.96	1.58
	Calcium (Ca) (mg/kg)	12600	12700	71300	96800	80300
	Chromium (Cr) (mg/kg)	19.0	19.3	13.9	13.1	16.4
	Cobalt (Co) (mg/kg)	8.22	8.27	71.5	73.3	79.0
	Copper (Cu) (mg/kg)	17.9	18.7	14.2	12.5	15.9
	Iron (Fe) (mg/kg)	21500	20800	17500	13800	17700
	Lead (Pb) (mg/kg)	11.8	11.8	9.49	7.80	10.2
	Lithium (Li) (mg/kg)	21.3	21.2	17.4	13.9	18.2
	Magnesium (Mg) (mg/kg)	6420	6620	6480	6830	7440
	Manganese (Mn) (mg/kg)	396	430	904	664	652
	Mercury (Hg) (mg/kg)	0.0253	0.0251	0.0230	0.0285	0.0262
	Molybdenum (Mo) (mg/kg)	2.37	2.38	1.78	1.65	1.84
	Nickel (Ni) (mg/kg)	22.8	23.5	113	128	127
	Phosphorus (P) (mg/kg)	1270	1350	1040	965	1160
	Potassium (K) (mg/kg)	3410	3470	2440	2280	2900
	Selenium (Se) (mg/kg)	0.53	0.58	1.89	2.80	2.15

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-21	L2505739-22	L2505739-23	L2505739-24	L2505739-25
	Description	SE	SE	SE	SE	SE
	Sampled Date	15-SEP-20	15-SEP-20	15-SEP-20	15-SEP-20	15-SEP-20
	Sampled Time	08:40	11:18	08:05	11:18	17:14
	Client ID	RG_MIDCO_SE-4_2020-09-15_0840	RG_MIDCO_SE-5_2020-09-15_1118	RG_RIVER_SE-2_2020-09-15_0805	RG_RIVER_SE-5_2020-09-15_1118	RG_MIDAG_SE-1_2020-09-15_1714
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	78.3	58.3	78.8	52.9	85.5
	pH (1:2 soil:water) (pH)	8.00	8.07	8.15	8.05	7.80
Particle Size	% Gravel (>2mm) (%)	<1.0	<1.0	<1.0	<1.0	9.8
	% Sand (2.00mm - 1.00mm) (%)	<1.0	2.6	3.0	3.1	<1.0
	% Sand (1.00mm - 0.50mm) (%)	1.5	8.0	6.8	7.1	1.5
	% Sand (0.50mm - 0.25mm) (%)	5.2	11.0	4.4	10.8	2.4
	% Sand (0.25mm - 0.125mm) (%)	13.4	10.4	5.7	10.5	3.3
	% Sand (0.125mm - 0.063mm) (%)	14.7	16.3	9.1	15.0	5.2
	% Silt (0.063mm - 0.0312mm) (%)	28.0	22.3	30.1	23.4	31.8
	% Silt (0.0312mm - 0.004mm) (%)	30.9	24.2	35.5	25.6	37.4
	% Clay (<4um) (%)	5.8	5.1	5.4	4.4	8.2
	Texture	Silt loam	Sandy loam	Silt loam	Sandy loam	Silt loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	4.8	3.47	4.8	3.67	8.45
Metals	Aluminum (Al) (mg/kg)	9880	15100	11600	14400	9420
	Antimony (Sb) (mg/kg)	0.29	0.37	0.24	0.39	0.34
	Arsenic (As) (mg/kg)	5.31	7.52	5.95	7.29	5.50
	Barium (Ba) (mg/kg)	148	141	163	145	158
	Beryllium (Be) (mg/kg)	0.61	0.80	0.72	0.84	0.62
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	15.8	16.6	17.1	16.5	13.9
	Cadmium (Cd) (mg/kg)	1.75	1.65	2.08	1.65	1.25
	Calcium (Ca) (mg/kg)	86300	38400	96400	40400	91000
	Chromium (Cr) (mg/kg)	13.3	19.2	15.5	17.9	16.6
	Cobalt (Co) (mg/kg)	111	40.1	80.4	39.0	38.5
	Copper (Cu) (mg/kg)	12.7	18.2	13.5	17.5	12.0
	Iron (Fe) (mg/kg)	13600	19600	14700	20900	12400
	Lead (Pb) (mg/kg)	7.65	10.5	8.17	11.1	7.77
	Lithium (Li) (mg/kg)	13.3	18.6	15.2	19.6	11.7
	Magnesium (Mg) (mg/kg)	6770	7690	7530	7950	9190
	Manganese (Mn) (mg/kg)	788	685	775	666	412
	Mercury (Hg) (mg/kg)	0.0256	0.0254	0.0250	0.0271	0.0367
	Molybdenum (Mo) (mg/kg)	1.54	2.09	1.45	2.15	1.34
	Nickel (Ni) (mg/kg)	148	92.2	140	88.7	77.0
	Phosphorus (P) (mg/kg)	962	1150	958	1250	994
	Potassium (K) (mg/kg)	2480	3500	2940	3170	2450
	Selenium (Se) (mg/kg)	2.92	1.73	2.87	1.75	4.65

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2505739-26	L2505739-27	L2505739-28	L2505739-29	L2505739-30
	Description	SE	SE	SE	SE	SE
	Sampled Date	15-SEP-20	16-SEP-20	16-SEP-20	16-SEP-20	16-SEP-20
	Sampled Time	17:23	11:45	12:05	14:57	08:05
	Client ID	RG_MIDAG_SE-2_2020-09-15_1723	RG_MIULE_SE-1_2020-09-16_1145	RG_MIULE_SE-2_2020-09-16_1205	RG_MIULE_SE-3_2020-09-16_1457	RG_MIDAG_SE-3_2020-09-16_0805
SOIL						
Physical Tests	Moisture (%)	77.2	56.5	42.3	73.8	73.9
	pH (1:2 soil:water) (pH)	7.90	8.14	8.09	7.87	7.90
Particle Size	% Gravel (>2mm) (%)	<1.0	<1.0	<1.0	<1.0	<1.0
	% Sand (2.00mm - 1.00mm) (%)	1.7	<1.0	<1.0	<1.0	<1.0
	% Sand (1.00mm - 0.50mm) (%)	6.7	<1.0	1.8	2.7	6.3
	% Sand (0.50mm - 0.25mm) (%)	8.5	8.6	2.9	12.4	13.5
	% Sand (0.25mm - 0.125mm) (%)	9.0	18.2	10.8	24.4	11.5
	% Sand (0.125mm - 0.063mm) (%)	8.7	18.3	20.1	18.1	9.5
	% Silt (0.063mm - 0.0312mm) (%)	27.8	23.5	27.7	20.0	22.2
	% Silt (0.0312mm - 0.004mm) (%)	31.5	25.5	30.4	18.8	27.8
	% Clay (<4um) (%)	5.3	4.5	5.4	3.2	8.5
	Texture	Silt loam	Sandy loam	Silt loam	Sandy loam	Silt loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	5.97	2.89	3.42	6.95	6.29
Metals	Aluminum (Al) (mg/kg)	10200	9910	10500	9290	11200
	Antimony (Sb) (mg/kg)	0.36	0.58	0.67	0.35	<0.10
	Arsenic (As) (mg/kg)	6.27	6.05	8.51	6.47	6.76
	Barium (Ba) (mg/kg)	143	210	249	206	163
	Beryllium (Be) (mg/kg)	0.73	0.67	0.76	0.65	0.80
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	14.9	11.9	11.2	11.0	9.2
	Cadmium (Cd) (mg/kg)	1.13	1.13	1.32	0.994	1.26
	Calcium (Ca) (mg/kg)	72900	41900	44200	53700	55300
	Chromium (Cr) (mg/kg)	16.5	15.7	16.7	14.5	16.5
	Cobalt (Co) (mg/kg)	38.8	11.7	13.7	12.9	23.3
	Copper (Cu) (mg/kg)	12.7	12.6	16.1	11.7	15.3
	Iron (Fe) (mg/kg)	14100	14800	18000	14300	17000
	Lead (Pb) (mg/kg)	8.90	8.48	10.3	7.92	9.63
	Lithium (Li) (mg/kg)	13.6	12.7	14.5	11.7	13.8
	Magnesium (Mg) (mg/kg)	9430	9350	11000	8310	9480
	Manganese (Mn) (mg/kg)	445	202	306	290	406
	Mercury (Hg) (mg/kg)	0.0331	0.0352	0.0409	0.0316	0.0431
	Molybdenum (Mo) (mg/kg)	1.53	1.43	1.83	1.46	1.14
	Nickel (Ni) (mg/kg)	74.9	34.8	40.7	35.6	58.9
	Phosphorus (P) (mg/kg)	998	1080	1210	1060	1010
	Potassium (K) (mg/kg)	2610	2460	2390	2400	2770
	Selenium (Se) (mg/kg)	3.26	2.02	1.27	1.92	5.69

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-31	L2505739-32	L2505739-33	L2505739-34	L2505739-35
	Description	SE	SE	SE	SE	SE
	Sampled Date	16-SEP-20	16-SEP-20	16-SEP-20	17-SEP-20	17-SEP-20
	Sampled Time	09:22	09:32	12:08	14:20	15:40
	Client ID	RG_MIDAG_SE-4_2020-09-16_0922	RG_MIDAG_SE-5_2020-09-16_0932	RG_RIVER_SE-2_2020-09-16_1208	RG_LE1_SE-1_2020-09-17_1420	RG_LE1_SE-2_2020-09-17_1540
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	76.6	75.3	40.0	43.4	42.5
	pH (1:2 soil:water) (pH)	7.95	7.97	8.12	7.66	7.40
Particle Size	% Gravel (>2mm) (%)	<1.0	<1.0	<1.0	<1.0	<1.0
	% Sand (2.00mm - 1.00mm) (%)	1.4	<1.0	<1.0	<1.0	<1.0
	% Sand (1.00mm - 0.50mm) (%)	12.0	2.2	<1.0	1.1	2.1
	% Sand (0.50mm - 0.25mm) (%)	14.7	6.5	<1.0	6.5	9.3
	% Sand (0.25mm - 0.125mm) (%)	11.3	11.3	12.0	23.9	31.4
	% Sand (0.125mm - 0.063mm) (%)	9.0	12.3	22.6	27.8	23.8
	% Silt (0.063mm - 0.0312mm) (%)	21.6	28.7	26.0	18.2	14.6
	% Silt (0.0312mm - 0.004mm) (%)	24.5	32.0	31.3	16.6	14.1
	% Clay (<4um) (%)	5.2	5.5	7.4	5.2	4.5
	Texture	Sandy loam	Silt loam	Silt loam	Sandy loam	Sandy loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	6.11	5.84	3.34	2.89	5.79
Metals	Aluminum (Al) (mg/kg)	11000	10300	10000	9410	9650
	Antimony (Sb) (mg/kg)	0.16	0.28	0.59	1.09	1.14
	Arsenic (As) (mg/kg)	6.89	6.11	7.59	5.30	5.60
	Barium (Ba) (mg/kg)	126	135	224	302	313
	Beryllium (Be) (mg/kg)	0.75	0.71	0.69	0.59	0.66
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	12.0	13.2	11.7	<5.0	<5.0
	Cadmium (Cd) (mg/kg)	1.04	1.13	1.23	1.61	2.03
	Calcium (Ca) (mg/kg)	63400	65200	42500	5380	5170
	Chromium (Cr) (mg/kg)	16.0	15.8	15.4	17.5	18.5
	Cobalt (Co) (mg/kg)	30.4	33.5	12.3	5.55	5.99
	Copper (Cu) (mg/kg)	13.3	12.2	14.4	15.4	17.6
	Iron (Fe) (mg/kg)	15600	13600	16100	14500	14400
	Lead (Pb) (mg/kg)	8.60	7.89	9.12	8.48	9.12
	Lithium (Li) (mg/kg)	14.9	13.5	13.1	9.8	10.6
	Magnesium (Mg) (mg/kg)	9490	10800	10200	2550	2220
	Manganese (Mn) (mg/kg)	327	350	264	228	251
	Mercury (Hg) (mg/kg)	0.0335	0.457	0.0433	0.0654	0.0723
	Molybdenum (Mo) (mg/kg)	1.17	1.34	1.63	1.32	1.28
	Nickel (Ni) (mg/kg)	70.8	74.1	36.4	23.9	25.9
	Phosphorus (P) (mg/kg)	1050	1010	1070	1170	1090
	Potassium (K) (mg/kg)	2740	2560	2370	1680	1720
	Selenium (Se) (mg/kg)	2.45	3.19	1.24	0.76	1.01

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2505739-36	L2505739-37	L2505739-38	L2505739-39	L2505739-40
	Description	SE	SE	SE	SE	SE
	Sampled Date	17-SEP-20	17-SEP-20	17-SEP-20	17-SEP-20	17-SEP-20
	Sampled Time	15:50	08:15	08:40	08:40	12:33
	Client ID	RG_LE1_SE-3_2020-09-17_1550	RG_MIULE_SE-4_2020-09-17_0815	RG_MIULE_SE-5_2020-09-17_0840	RG_MIDAG_S2_SE-1_2020-09-17_0840	RG_MIDAG_S2_SE-2_2020-09-17_1233
SOIL						
Physical Tests	Moisture (%)	35.4	63.5	78.6	78.7	77.4
	pH (1:2 soil:water) (pH)	7.91	8.09	7.67	7.90	7.72
Particle Size	% Gravel (>2mm) (%)	<1.0	<1.0	<1.0	<1.0 PSAL	<1.0
	% Sand (2.00mm - 1.00mm) (%)	<1.0	<1.0	<1.0	<1.0 PSAL	<1.0
	% Sand (1.00mm - 0.50mm) (%)	<1.0	1.2	2.5	<1.0 PSAL	<1.0
	% Sand (0.50mm - 0.25mm) (%)	9.8	4.8	7.1	1.3 PSAL	2.0
	% Sand (0.25mm - 0.125mm) (%)	24.8	9.9	11.5	4.9 PSAL	4.5
	% Sand (0.125mm - 0.063mm) (%)	28.3	16.1	19.7	8.6 PSAL	7.4
	% Silt (0.063mm - 0.0312mm) (%)	17.4	29.9	27.1	36.1 PSAL	35.9
	% Silt (0.0312mm - 0.004mm) (%)	14.5	32.9	26.0	40.8 PSAL	40.7
	% Clay (<4um) (%)	4.0	5.1	5.8	7.1 PSAL	7.2
	Texture	Sandy loam	Silt loam	Silt loam / Sandy loam	Silt loam	Silt loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	1.59	4.41	8.09	7.94	7.06
Metals	Aluminum (Al) (mg/kg)	10600	11500	7430	10200	10400
	Antimony (Sb) (mg/kg)	1.16	0.33	0.26	0.23	0.34
	Arsenic (As) (mg/kg)	5.97	6.47	4.79	6.26	5.86
	Barium (Ba) (mg/kg)	303	218	203	151	141
	Beryllium (Be) (mg/kg)	0.62	0.78	0.52	0.65	0.64
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	5.3	13.2	10.4	12.8	14.6
	Cadmium (Cd) (mg/kg)	1.54	1.29	0.974	1.14	1.04
	Calcium (Ca) (mg/kg)	4940	46300	84100	74400	77600
	Chromium (Cr) (mg/kg)	19.3	17.6	11.7	16.1	16.1
	Cobalt (Co) (mg/kg)	6.14	14.2	14.0	50.1	40.0
	Copper (Cu) (mg/kg)	15.1	14.5	9.43	12.8	12.7
	Iron (Fe) (mg/kg)	15300	16000	11400	13400	12800
	Lead (Pb) (mg/kg)	8.77	9.45	6.18	7.92	7.35
	Lithium (Li) (mg/kg)	10.8	14.4	9.2	12.9	12.2
	Magnesium (Mg) (mg/kg)	2510	9610	7660	10600	10200
	Manganese (Mn) (mg/kg)	273	229	248	486	392
	Mercury (Hg) (mg/kg)	0.0515	0.0441	0.0288	0.0432	0.0472
	Molybdenum (Mo) (mg/kg)	1.47	1.42	1.06	1.29	1.28
	Nickel (Ni) (mg/kg)	25.7	44.6	40.0	87.2	75.4
	Phosphorus (P) (mg/kg)	1290	1160	912	989	1090
	Potassium (K) (mg/kg)	1950	2880	1900	2500	2640
	Selenium (Se) (mg/kg)	0.60	1.94	2.81	3.20	3.15

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-41	L2505739-42	L2505739-43		
	Description	SE	SE	SE		
	Sampled Date	17-SEP-20	17-SEP-20	17-SEP-20		
	Sampled Time	13:14	14:57	15:14		
	Client ID	RG_MIDAG_S2_SE-3_2020-09-17_1341	RG_MIDAG_S2_SE-4_2020-09-17_1457	RG_MIDAG_S2_SE-5_2020-09-17_1514		
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	74.6	74.3	75.7		
	pH (1:2 soil:water) (pH)	7.90	8.00	7.74		
Particle Size	% Gravel (>2mm) (%)	<1.0	1.1	<1.0		
	% Sand (2.00mm - 1.00mm) (%)	<1.0	1.7	1.2		
	% Sand (1.00mm - 0.50mm) (%)	2.2	4.0	7.6		
	% Sand (0.50mm - 0.25mm) (%)	5.8	4.6	11.2		
	% Sand (0.25mm - 0.125mm) (%)	11.2	5.2	10.1		
	% Sand (0.125mm - 0.063mm) (%)	10.4	8.1	10.0		
	% Silt (0.063mm - 0.0312mm) (%)	29.6	32.9	24.6		
	% Silt (0.0312mm - 0.004mm) (%)	33.8	37.1	29.0		
	% Clay (<4um) (%)	6.2	5.3	5.9		
	Texture	Silt loam	Silt loam	Silt loam		
Organic / Inorganic Carbon	Total Organic Carbon (%)	8.83	8.53	7.33		
Metals	Aluminum (Al) (mg/kg)	9620	8770	10800		
	Antimony (Sb) (mg/kg)	0.43	0.44	0.42		
	Arsenic (As) (mg/kg)	6.99	6.31	6.94		
	Barium (Ba) (mg/kg)	141	138	137		
	Beryllium (Be) (mg/kg)	0.73	0.71	0.72		
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20		
	Boron (B) (mg/kg)	12.2	12.3	13.3		
	Cadmium (Cd) (mg/kg)	1.21	1.23	1.22		
	Calcium (Ca) (mg/kg)	48900	62500	50700		
	Chromium (Cr) (mg/kg)	15.2	14.3	16.5		
	Cobalt (Co) (mg/kg)	34.7	45.0	38.0		
	Copper (Cu) (mg/kg)	15.1	14.3	14.8		
	Iron (Fe) (mg/kg)	15100	13400	15200		
	Lead (Pb) (mg/kg)	9.07	8.39	8.87		
	Lithium (Li) (mg/kg)	14.0	12.5	14.1		
	Magnesium (Mg) (mg/kg)	9450	10500	9770		
	Manganese (Mn) (mg/kg)	482	477	511		
	Mercury (Hg) (mg/kg)	0.0412	0.0458	0.0367		
	Molybdenum (Mo) (mg/kg)	1.62	1.42	1.59		
	Nickel (Ni) (mg/kg)	64.2	86.3	65.3		
	Phosphorus (P) (mg/kg)	1070	1100	1080		
	Potassium (K) (mg/kg)	2160	1960	2590		
	Selenium (Se) (mg/kg)	2.64	2.62	2.83		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2505739-1	L2505739-2	L2505739-3	L2505739-4	L2505739-5
	Description	SE	SE	SE	SE	SE
	Sampled Date	10-SEP-20	13-SEP-20	12-SEP-20	11-SEP-20	12-SEP-20
	Sampled Time	16:22	09:46	11:37	10:16	16:14
	Client ID	RG_AGCK_SE-1_2020-09-10_1622	RG_RIVER_SE-5_2020-09-13_0946	RG_RIVER_SE-2_2020-09-12_1137	RG_RIVER_SE-1_2020-09-11_1016	RG_CORCK_SE-1_2020-09-12_1614
SOIL						
Metals	Silver (Ag) (mg/kg)	0.13	<0.10	0.12	0.20	<0.10
	Sodium (Na) (mg/kg)	149	313	89	94	361
	Strontium (Sr) (mg/kg)	157	307	72.2	49.4	392
	Sulfur (S) (mg/kg)	1100	3200	<1000	<1000	4000
	Thallium (Tl) (mg/kg)	0.693	0.263	0.401	0.804	0.191
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	25.2	12.7	21.8	22.7	10.1
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	0.681	1.75	0.638	0.983	2.11
	Vanadium (V) (mg/kg)	15.3	11.4	30.4	40.6	6.08
	Zinc (Zn) (mg/kg)	105	842	94.4	143	773
	Zirconium (Zr) (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	DLHM <0.025	DLCI <0.040	DLHM <0.0075	<0.0050	DLCI <0.020
	Acenaphthylene (mg/kg)	DLHM <0.025	DLCI <0.015	DLHM <0.0075	<0.0050	DLHM <0.0085
	Acridine (mg/kg)	DLHM <0.050	DLHM 0.081	DLHM <0.015	<0.010	DLCI <0.040
	Anthracene (mg/kg)	DLHM <0.020	DLHM <0.0060	DLHM <0.0060	<0.0040	DLHM <0.017
	Benz(a)anthracene (mg/kg)	DLHM <0.050	DLHM 0.055	DLHM <0.015	<0.010	DLHM 0.025
	Benzo(a)pyrene (mg/kg)	DLHM <0.050	DLHM 0.040	DLHM <0.015	<0.010	DLHM 0.019
	Benzo(b&j)fluoranthene (mg/kg)	DLHM <0.050	DLHM 0.169	DLHM 0.032	0.014	DLHM 0.070
	Benzo(b+j+k)fluoranthene (mg/kg)	DLHM <0.075	DLHM 0.169	DLHM 0.032	<0.015	DLHM 0.070
	Benzo(e)pyrene (mg/kg)	DLHM <0.050	DLHM 0.205	DLHM 0.030	0.016	DLHM 0.090
	Benzo(g,h,i)perylene (mg/kg)	DLHM <0.050	DLHM 0.096	DLHM <0.015	<0.010	DLHM 0.043
	Benzo(k)fluoranthene (mg/kg)	DLHM <0.050	DLHM <0.015	DLHM <0.015	<0.010	DLHM <0.017
	Chrysene (mg/kg)	DLHM 0.064	DLHM 0.271	DLHM 0.058	0.033	DLHM 0.121
	Dibenz(a,h)anthracene (mg/kg)	DLHM <0.025	DLCI <0.025	DLHM <0.0075	<0.0050	DLHM <0.017
	Fluoranthene (mg/kg)	DLHM <0.050	DLHM 0.057	DLHM <0.015	0.012	DLHM 0.020
	Fluorene (mg/kg)	DLHM <0.050	DLHM 0.141	DLHM 0.017	<0.010	DLHM 0.065
	Indeno(1,2,3-c,d)pyrene (mg/kg)	DLHM <0.050	DLHM 0.015	DLHM <0.015	<0.010	DLHM <0.017
	1-Methylnaphthalene (mg/kg)	DLHM 0.094	DLHM 0.955	DLHM 0.122	<0.050	DLHM 0.429
	2-Methylnaphthalene (mg/kg)	DLHM 0.120	DLHM 1.60	DLHM 0.180	0.015	DLHM 0.717
	Naphthalene (mg/kg)	DLHM 0.061	DLHM 0.558	DLHM 0.057	<0.010	DLHM 0.230
	Perylene (mg/kg)	DLHM <0.050	DLHM <0.015	DLHM <0.015	<0.010	DLHM <0.017
	Phenanthrene (mg/kg)	DLHM 0.159	DLHM 0.753	DLHM 0.138	0.029	DLHM 0.334
	Pyrene (mg/kg)	DLHM <0.050	DLHM 0.089	DLHM 0.019	0.015	DLHM 0.039
	Quinoline (mg/kg)	DLHM <0.050	DLHM <0.015	DLHM <0.015	<0.050	DLHM <0.017
	Surrogate: d10-Acenaphthene (%)	99.9	110.8	109.5	107.2	107.8

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-6	L2505739-7	L2505739-8	L2505739-9	L2505739-10
	Description	SE	SE	SE	SE	SE
	Sampled Date	12-SEP-20	12-SEP-20	13-SEP-20	13-SEP-20	11-SEP-20
	Sampled Time	16:57	17:04	09:36	09:46	10:16
	Client ID	RG_CORCK_SE-2_2020-09-12_1657	RG_CORCK_SE-3_2020-09-12_1704	RG_CORCK_SE-4_2020-09-13_0936	RG_CORCK_SE-5_2020-09-13_0946	RG_MI25_SE-1_2020-09-11_1016
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	<0.10	<0.10	<0.10	<0.10	0.17
	Sodium (Na) (mg/kg)	433	324	405	328	89
	Strontium (Sr) (mg/kg)	411	321	351	295	47.8
	Sulfur (S) (mg/kg)	4700	3600	4400	3200	<1000
	Thallium (Tl) (mg/kg)	0.165	0.308	0.241	0.258	0.756
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	10.3	10.9	11.5	9.8	22.2
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	2.13	1.83	2.10	1.74	0.929
	Vanadium (V) (mg/kg)	8.51	12.5	13.0	12.1	38.4
	Zinc (Zn) (mg/kg)	922	777	852	849	136
	Zirconium (Zr) (mg/kg)	<1.0	<1.0	<1.0	<1.0	1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.035 DLCI	<0.060 DLCI	<0.060 DLCI	0.0488	<0.0050
	Acenaphthylene (mg/kg)	<0.0090 DLCI	<0.0060 DLCI	<0.015 DLCI	0.0123	<0.0050
	Acridine (mg/kg)	<0.070 DLCI	<0.10 DLCI	<0.13 DLCI	<0.10 DLCI	<0.010
	Anthracene (mg/kg)	<0.0060 DLHM	0.0123	<0.020 DLCI	0.0062	<0.0040
	Benz(a)anthracene (mg/kg)	0.040 DLHM	0.056	0.070 DLHM	0.055	<0.010
	Benzo(a)pyrene (mg/kg)	0.027 DLHM	0.047	0.050 DLHM	0.038	<0.010
	Benzo(b&j)fluoranthene (mg/kg)	0.118 DLHM	0.179	0.217 DLHM	0.170	0.011
	Benzo(b+j+k)fluoranthene (mg/kg)	0.118 DLHM	0.179	0.217 DLHM	0.170	<0.015
	Benzo(e)pyrene (mg/kg)	0.150 DLHM	0.228	0.270 DLHM	0.203	0.014
	Benzo(g,h,i)perylene (mg/kg)	0.071 DLHM	0.106	0.137 DLHM	0.092	<0.010
	Benzo(k)fluoranthene (mg/kg)	<0.015 DLHM	<0.010	<0.025 DLHM	<0.010	<0.010
	Chrysene (mg/kg)	0.193 DLHM	0.285	0.362 DLHM	0.277	0.025
	Dibenz(a,h)anthracene (mg/kg)	0.019 DLHM	0.0264	0.034 DLHM	0.0246	<0.0050
	Fluoranthene (mg/kg)	0.032 DLHM	0.052	0.071 DLHM	0.053	<0.010
	Fluorene (mg/kg)	0.106 DLHM	0.165	0.219 DLHM	0.139	<0.010
	Indeno(1,2,3-c,d)pyrene (mg/kg)	0.022 DLHM	0.029	0.032 DLHM	0.025	<0.010
	1-Methylnaphthalene (mg/kg)	0.690 DLHM	0.988	1.20 DLHM	0.943	<0.050
	2-Methylnaphthalene (mg/kg)	1.16 DLHM	1.67	2.05 DLHM	1.58	0.013
	Naphthalene (mg/kg)	0.387 DLHM	0.561	0.682 DLHM	0.555	<0.010
	Perylene (mg/kg)	<0.015 DLHM	<0.010	<0.025 DLHM	<0.010	<0.010
	Phenanthrene (mg/kg)	0.553 DLHM	0.813	0.972 DLHM	0.777	0.024
	Pyrene (mg/kg)	0.064 DLHM	0.095	0.111 DLHM	0.090	0.010
	Quinoline (mg/kg)	<0.015 DLHM	<0.050	<0.025 DLHM	<0.050	<0.050
	Surrogate: d10-Acenaphthene (%)	101.7	111.1	118.1	108.4	98.6

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-11	L2505739-12	L2505739-13	L2505739-14	L2505739-15
	Description	SE	SE	SE	SE	SE
	Sampled Date	11-SEP-20	11-SEP-20	12-SEP-20	12-SEP-20	12-SEP-20
	Sampled Time	10:33	14:55	10:26	11:37	14:03
	Client ID	RG_MI25_SE-2_2020-09-11_1033	RG_MI25_SE-3_2020-09-11_1455	RG_MIUCO_SE-1_2020-09-12_1026	RG_MIUCO_SE-2_2020-09-12_1137	RG_MIUCO_SE-3_2020-09-12_1403
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	0.15	0.16	0.13	0.12	<0.10
	Sodium (Na) (mg/kg)	86	87	86	87	84
	Strontium (Sr) (mg/kg)	49.5	49.7	51.7	73.0	50.0
	Sulfur (S) (mg/kg)	<1000	<1000	<1000	<1000	<1000
	Thallium (Tl) (mg/kg)	0.768	0.819	0.438	0.417	0.361
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	17.8	21.1	19.6	11.7	12.3
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	0.877	0.941	0.701	0.650	0.629
	Vanadium (V) (mg/kg)	36.1	38.1	32.8	30.8	30.8
	Zinc (Zn) (mg/kg)	155	138	99.1	92.5	87.5
	Zirconium (Zr) (mg/kg)	1.1	<1.0	<1.0	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0080 DLCI	<0.0050
	Acenaphthylene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0080 DLCI	<0.0050
	Acridine (mg/kg)	<0.010	<0.010	<0.010	<0.016 DLCI	<0.010
	Anthracene (mg/kg)	<0.0040	<0.0040	<0.0040	<0.0064 DLCI	<0.0040
	Benz(a)anthracene (mg/kg)	<0.010	<0.010	<0.010	<0.016 DLCI	<0.010
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.016 DLCI	<0.010
	Benzo(b&j)fluoranthene (mg/kg)	<0.010	<0.010	0.010	0.028 DLCI	<0.010
	Benzo(b+j+k)fluoranthene (mg/kg)	<0.015	<0.015	<0.015	0.028 DLHM	<0.015
	Benzo(e)pyrene (mg/kg)	0.011	0.012	0.014	0.031 DLCI	<0.010
	Benzo(g,h,i)perylene (mg/kg)	<0.010	<0.010	<0.010	<0.016 DLCI	<0.010
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.016 DLCI	<0.010
	Chrysene (mg/kg)	0.019	<0.026 DLCI	<0.030 DLCI	0.055 DLCI	0.017
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0080 DLCI	<0.0050
	Fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.016 DLCI	<0.010
	Fluorene (mg/kg)	<0.010	<0.010	<0.010	<0.016 DLCI	<0.010
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.016 DLCI	<0.010
	1-Methylnaphthalene (mg/kg)	<0.050	<0.050	<0.050	0.115 DLCI	<0.050
	2-Methylnaphthalene (mg/kg)	<0.010	0.011	0.027	0.164 DLCI	0.022
	Naphthalene (mg/kg)	<0.010	<0.010	0.016	0.055 DLCI	<0.010
	Perylene (mg/kg)	<0.010	<0.010	0.023	<0.016 DLCI	<0.010
	Phenanthrene (mg/kg)	0.016	0.023	0.037	0.130 DLCI	0.027
	Pyrene (mg/kg)	<0.010	<0.010	<0.010	0.018 DLCI	<0.010
	Quinoline (mg/kg)	<0.050	<0.050	<0.050	<0.016 DLCI	<0.050
	Surrogate: d10-Acenaphthene (%)	110.7	102.2	104.5	110.9	105.8

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-16	L2505739-17	L2505739-18	L2505739-19	L2505739-20
	Description	SE	SE	SE	SE	SE
	Sampled Date	12-SEP-20	12-SEP-20	15-SEP-20	15-SEP-20	15-SEP-20
	Sampled Time	13:48	13:25	08:01	08:05	08:25
	Client ID	RG_MIUCO_SE-4_2020-09-12_1348	RG_MIUCO_SE-5_2020-09-12_1325	RG_MIDCO_SE-1_2020-09-15_0801	RG_MIDCO_SE-2_2020-09-15_0805	RG_MIDCO_SE-3_2020-09-15_0825
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	0.10	<0.10	<0.10	<0.10	<0.10
	Sodium (Na) (mg/kg)	81	79	206	270	210
	Strontium (Sr) (mg/kg)	42.1	37.5	123	163	140
	Sulfur (S) (mg/kg)	<1000	<1000	1400	1800	1500
	Thallium (Tl) (mg/kg)	0.378	0.391	0.322	0.311	0.369
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	17.5	21.3	22.3	26.2	20.6
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	0.584	0.661	0.797	0.850	0.944
	Vanadium (V) (mg/kg)	31.9	32.8	23.7	22.5	27.5
	Zinc (Zn) (mg/kg)	94.8	97.1	157	200	173
	Zirconium (Zr) (mg/kg)	<1.0	1.1	<1.0	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0050	<0.0050	0.0076 DLHM	<0.030 DLCI	<0.011 DLHM
	Acenaphthylene (mg/kg)	<0.0050	<0.0050	<0.0075 DLHM	<0.011 DLHM	<0.011 DLHM
	Acridine (mg/kg)	<0.010	<0.010	<0.015 DLHM	<0.040 DLCI	<0.030 DLCI
	Anthracene (mg/kg)	<0.0040	<0.0040	<0.0060 DLHM	<0.0088 DLHM	<0.022 DLHM
	Benz(a)anthracene (mg/kg)	<0.010	<0.010	<0.015 DLHM	0.028 DLHM	<0.022 DLHM
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	<0.015 DLHM	<0.022 DLHM	<0.022 DLHM
	Benzo(b&j)fluoranthene (mg/kg)	<0.010	<0.010	0.034 DLHM	0.086 DLHM	0.051 DLHM
	Benzo(b+j+k)fluoranthene (mg/kg)	<0.015	<0.015	0.034 DLHM	0.086 DLHM	0.051 DLHM
	Benzo(e)pyrene (mg/kg)	<0.010	<0.010	0.041 DLHM	0.099 DLHM	0.059 DLHM
	Benzo(g,h,i)perylene (mg/kg)	<0.010	<0.010	<0.015 DLHM	0.046 DLHM	0.027 DLHM
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.015 DLHM	<0.022 DLHM	<0.022 DLHM
	Chrysene (mg/kg)	0.015	0.015	0.057 DLHM	0.145 DLHM	0.090 DLHM
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	<0.0050	<0.0075 DLHM	<0.022 DLHM	<0.022 DLHM
	Fluoranthene (mg/kg)	<0.010	<0.010	<0.015 DLHM	0.023 DLHM	<0.022 DLHM
	Fluorene (mg/kg)	<0.010	<0.010	0.024 DLHM	0.069 DLHM	0.037 DLHM
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.015 DLHM	<0.022 DLHM	<0.022 DLHM
	1-Methylnaphthalene (mg/kg)	<0.050	<0.050	0.154 DLHM	0.400 DLHM	0.230 DLHM
	2-Methylnaphthalene (mg/kg)	0.012	0.014	0.242 DLHM	0.649 DLHM	0.368 DLHM
	Naphthalene (mg/kg)	<0.010	<0.010	0.094 DLHM	0.238 DLHM	0.147 DLHM
	Perylene (mg/kg)	0.012	0.013	<0.015 DLHM	<0.022 DLHM	<0.022 DLHM
	Phenanthrene (mg/kg)	0.022	0.021	0.145 DLHM	0.384 DLHM	0.230 DLHM
	Pyrene (mg/kg)	<0.010	<0.010	0.019 DLHM	0.045 DLHM	0.027 DLHM
	Quinoline (mg/kg)	<0.050	<0.050	<0.015 DLHM	<0.022 DLHM	<0.022 DLHM
	Surrogate: d10-Acenaphthene (%)	104.8	104.6	104.4	107.4	107.4

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-21	L2505739-22	L2505739-23	L2505739-24	L2505739-25
	Description	SE	SE	SE	SE	SE
	Sampled Date	15-SEP-20	15-SEP-20	15-SEP-20	15-SEP-20	15-SEP-20
	Sampled Time	08:40	11:18	08:05	11:18	17:14
	Client ID	RG_MIDCO_SE-4_2020-09-15_0840	RG_MIDCO_SE-5_2020-09-15_1118	RG_RIVER_SE-2_2020-09-15_0805	RG_RIVER_SE-5_2020-09-15_1118	RG_MIDAG_SE-1_2020-09-15_1714
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	<0.10	<0.10	<0.10	<0.10	0.13
	Sodium (Na) (mg/kg)	249	162	254	153	199
	Strontium (Sr) (mg/kg)	141	76.1	158	83.3	133
	Sulfur (S) (mg/kg)	1800	<1000	2000	<1000	1500
	Thallium (Tl) (mg/kg)	0.317	0.369	0.330	0.392	0.403
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	18.2	16.5	16.2	22.8	16.0
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	0.899	0.747	0.868	0.800	0.857
	Vanadium (V) (mg/kg)	22.6	31.7	25.4	30.5	25.8
	Zinc (Zn) (mg/kg)	204	185	215	184	117
	Zirconium (Zr) (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.020 DLCI	<0.010 DLCI	<0.010 DLHM	<0.010 DLCI	<0.018 DLHM
	Acenaphthylene (mg/kg)	<0.013 DLHM	<0.0050	<0.010 DLHM	<0.0050	<0.018 DLHM
	Acridine (mg/kg)	<0.055 DLHM	<0.015 DLCI	<0.020 DLHM	<0.020 DLCI	<0.035 DLHM
	Anthracene (mg/kg)	<0.010 DLHM	<0.0040	<0.0080 DLHM	<0.0040	<0.014 DLHM
	Benz(a)anthracene (mg/kg)	<0.035 DLCI	<0.010	<0.020 DLHM	<0.020 DLCI	<0.035 DLHM
	Benzo(a)pyrene (mg/kg)	<0.025 DLHM	<0.010	<0.020 DLHM	<0.010	<0.035 DLHM
	Benzo(b&j)fluoranthene (mg/kg)	0.048 DLHM	0.032	0.045 DLHM	0.042	0.046 DLHM
	Benzo(b+j+k)fluoranthene (mg/kg)	0.048	0.032	0.045 DLHM	0.042	<0.055 DLHM
	Benzo(e)pyrene (mg/kg)	0.056 DLHM	0.039	0.052 DLHM	0.047	0.048 DLHM
	Benzo(g,h,i)perylene (mg/kg)	0.034 DLHM	0.018	0.022 DLHM	0.019	<0.035 DLHM
	Benzo(k)fluoranthene (mg/kg)	<0.025 DLHM	<0.010	<0.020 DLHM	<0.010	<0.035 DLHM
	Chrysene (mg/kg)	0.081 DLHM	0.061	0.073 DLHM	0.077	<0.090 DLCI
	Dibenz(a,h)anthracene (mg/kg)	<0.020 DLCI	<0.0060 DLCI	<0.010 DLHM	<0.0050	<0.035 DLHM
	Fluoranthene (mg/kg)	<0.035 DLCI	0.011	<0.020 DLHM	0.016	0.037 DLHM
	Fluorene (mg/kg)	0.037 DLHM	0.024	0.032 DLHM	0.022	<0.035 DLHM
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.025 DLHM	<0.010	<0.020 DLHM	<0.010	<0.035 DLHM
	1-Methylnaphthalene (mg/kg)	0.251 DLHM	0.157	0.216 DLHM	0.167	0.118 DLHM
	2-Methylnaphthalene (mg/kg)	0.410 DLHM	0.248	0.348 DLHM	0.261	0.176 DLHM
	Naphthalene (mg/kg)	0.154 DLHM	0.096	0.132 DLHM	0.099	0.074 DLHM
	Perylene (mg/kg)	<0.025 DLHM	0.012	<0.020 DLHM	0.019	<0.035 DLHM
	Phenanthrene (mg/kg)	0.242 DLHM	0.161	0.209 DLHM	0.174	0.177 DLHM
	Pyrene (mg/kg)	0.031 DLHM	0.019	0.024 DLHM	0.023	0.038 DLHM
	Quinoline (mg/kg)	<0.025 DLHM	<0.050	<0.020 DLHM	<0.050	<0.035 DLHM
	Surrogate: d10-Acenaphthene (%)	120.0	114.1	116.3	113.7	117.7

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2505739-26	L2505739-27	L2505739-28	L2505739-29	L2505739-30
	Description	SE	SE	SE	SE	SE
	Sampled Date	15-SEP-20	16-SEP-20	16-SEP-20	16-SEP-20	16-SEP-20
	Sampled Time	17:23	11:45	12:05	14:57	08:05
	Client ID	RG_MIDAG_SE-2_2020-09-15_1723	RG_MIULE_SE-1_2020-09-16_1145	RG_MIULE_SE-2_2020-09-16_1205	RG_MIULE_SE-3_2020-09-16_1457	RG_MIDAG_SE-3_2020-09-16_0805
SOIL						
Metals	Silver (Ag) (mg/kg)	0.13	0.12	0.17	0.12	0.14
	Sodium (Na) (mg/kg)	185	100	103	121	120
	Strontium (Sr) (mg/kg)	115	73.9	73.6	86.7	86.8
	Sulfur (S) (mg/kg)	1000	<1000	<1000	<1000	1400
	Thallium (Tl) (mg/kg)	0.421	0.400	0.497	0.352	0.434
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	18.7	29.6	31.8	13.3	7.4
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	0.842	0.724	0.785	0.765	0.810
	Vanadium (V) (mg/kg)	27.3	32.2	34.2	30.7	28.7
	Zinc (Zn) (mg/kg)	126	110	129	100	130
	Zirconium (Zr) (mg/kg)	<1.0	<1.0	1.1	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.020 DLCI	<0.0050	<0.010 DLCI	<0.010 DLHM	<0.012 DLCI
	Acenaphthylene (mg/kg)	<0.010 DLHM	<0.0050	<0.0050	<0.010 DLHM	<0.010 DLHM
	Acridine (mg/kg)	<0.020 DLHM	<0.010	<0.020 DLCI	<0.020 DLHM	<0.020 DLHM
	Anthracene (mg/kg)	<0.0080 DLHM	<0.0040	<0.0040	<0.0080 DLHM	<0.0080 DLHM
	Benz(a)anthracene (mg/kg)	<0.020 DLHM	<0.010	<0.010	<0.020 DLHM	<0.020 DLHM
	Benzo(a)pyrene (mg/kg)	<0.020 DLHM	<0.010	<0.010	<0.020 DLHM	<0.020 DLHM
	Benzo(b&j)fluoranthene (mg/kg)	0.068 DLHM	0.031	0.046	0.038 DLHM	0.084 DLHM
	Benzo(b+j+k)fluoranthene (mg/kg)	0.068 DLHM	0.031	0.046	0.038 DLHM	0.084 DLHM
	Benzo(e)pyrene (mg/kg)	0.069 DLHM	0.032	0.048	0.041 DLHM	0.082 DLHM
	Benzo(g,h,i)perylene (mg/kg)	0.026 DLHM	0.011	0.017	<0.020 DLHM	0.028 DLHM
	Benzo(k)fluoranthene (mg/kg)	<0.020 DLHM	<0.010	<0.010	<0.020 DLHM	<0.020 DLHM
	Chrysene (mg/kg)	0.112 DLHM	0.060	0.083	0.069 DLHM	0.133 DLHM
	Dibenz(a,h)anthracene (mg/kg)	<0.010 DLHM	<0.0050	<0.0060 DLCI	<0.010 DLHM	<0.010 DLHM
	Fluoranthene (mg/kg)	0.040 DLHM	0.017	0.027	0.023 DLHM	0.044 DLHM
	Fluorene (mg/kg)	0.037 DLHM	<0.020 DLCI	0.020	<0.020 DLHM	0.032 DLHM
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.020 DLHM	<0.010	<0.010	<0.020 DLHM	<0.020 DLHM
	1-Methylnaphthalene (mg/kg)	0.216 DLHM	0.086	0.120	0.140 DLHM	0.224 DLHM
	2-Methylnaphthalene (mg/kg)	0.325 DLHM	0.132	0.185	0.207 DLHM	0.328 DLHM
	Naphthalene (mg/kg)	0.135 DLHM	0.061	0.082	0.091 DLHM	0.144 DLHM
	Perylene (mg/kg)	<0.020 DLHM	<0.010	<0.010	<0.020 DLHM	<0.020 DLHM
	Phenanthrene (mg/kg)	0.282 DLHM	0.136	0.180	0.186 DLHM	0.262 DLHM
	Pyrene (mg/kg)	0.042 DLHM	0.021	0.028	0.025 DLHM	0.050 DLHM
	Quinoline (mg/kg)	<0.020 DLHM	<0.050	<0.050	<0.020 DLHM	<0.020 DLHM
	Surrogate: d10-Acenaphthene (%)	113.8	110.1	107.0	112.8	113.0

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2505739-31	L2505739-32	L2505739-33	L2505739-34	L2505739-35
	Description	SE	SE	SE	SE	SE
	Sampled Date	16-SEP-20	16-SEP-20	16-SEP-20	17-SEP-20	17-SEP-20
	Sampled Time	09:22	09:32	12:08	14:20	15:40
	Client ID	RG_MIDAG_SE-4_2020-09-16_0922	RG_MIDAG_SE-5_2020-09-16_0932	RG_RIVER_SE-2_2020-09-16_1208	RG_LE1_SE-1_2020-09-17_1420	RG_LE1_SE-2_2020-09-17_1540
SOIL						
Metals	Silver (Ag) (mg/kg)	0.12	0.12	0.15	0.25	0.31
	Sodium (Na) (mg/kg)	140	186	99	<50	<50
	Strontium (Sr) (mg/kg)	96.2	99.5	69.9	39.7	43.7
	Sulfur (S) (mg/kg)	<1000	<1000	<1000	<1000	<1000
	Thallium (Tl) (mg/kg)	0.432	0.443	0.447	0.233	0.243
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	8.0	14.4	28.4	68.0	56.8
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	0.806	0.812	0.682	1.20	1.34
	Vanadium (V) (mg/kg)	27.0	26.8	32.3	52.2	54.2
	Zinc (Zn) (mg/kg)	118	128	113	103	107
	Zirconium (Zr) (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.030 DLCI	<0.010 DLHM	<0.0050	<0.0050	<0.0050
	Acenaphthylene (mg/kg)	<0.010 DLHM	<0.010 DLHM	<0.0050	<0.0050	<0.0050
	Acridine (mg/kg)	<0.021 DLCI	<0.020 DLHM	<0.010	<0.010	<0.015 DLCI
	Anthracene (mg/kg)	<0.0080 DLHM	<0.0080 DLHM	<0.0040	<0.0040	<0.0040
	Benz(a)anthracene (mg/kg)	<0.040 DLCI	<0.020 DLHM	<0.010	0.018	0.024
	Benzo(a)pyrene (mg/kg)	<0.020 DLHM	<0.020 DLHM	<0.010	<0.010	<0.010
	Benzo(b&j)fluoranthene (mg/kg)	0.083 DLHM	0.059 DLHM	0.041	0.025	0.031
	Benzo(b+j+k)fluoranthene (mg/kg)	0.083 DLHM	0.059 DLHM	0.041	0.025	0.031
	Benzo(e)pyrene (mg/kg)	0.081 DLHM	0.065 DLHM	0.043	0.028	0.033
	Benzo(g,h,i)perylene (mg/kg)	0.030 DLHM	0.026 DLHM	0.016	0.013	0.016
	Benzo(k)fluoranthene (mg/kg)	<0.020 DLHM	<0.020 DLHM	<0.010	<0.010	<0.010
	Chrysene (mg/kg)	0.148 DLHM	0.095 DLHM	0.076	0.059	0.078
	Dibenz(a,h)anthracene (mg/kg)	<0.010 DLHM	<0.010 DLHM	<0.0050	<0.0050	<0.0060 DLCI
	Fluoranthene (mg/kg)	0.119 DLHM	0.032 DLHM	0.023	0.019	0.022
	Fluorene (mg/kg)	0.048 DLHM	<0.020 DLHM	0.019	<0.010	<0.010
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.020 DLHM	<0.020 DLHM	<0.010	<0.010	<0.010
	1-Methylnaphthalene (mg/kg)	0.239 DLHM	0.191 DLHM	0.125	0.060	0.096
	2-Methylnaphthalene (mg/kg)	0.360 DLHM	0.288 DLHM	0.190	0.060	0.088
	Naphthalene (mg/kg)	0.157 DLHM	0.122 DLHM	0.086	0.033	0.039
	Perylene (mg/kg)	<0.020 DLHM	<0.020 DLHM	<0.010	<0.010	<0.010
	Phenanthrene (mg/kg)	0.382 DLHM	0.230 DLHM	0.175	0.143	0.201
	Pyrene (mg/kg)	0.101 DLHM	0.031 DLHM	0.025	0.025	0.033
	Quinoline (mg/kg)	<0.020 DLHM	<0.020 DLHM	<0.050	<0.050	<0.050
	Surrogate: d10-Acenaphthene (%)	110.2	111.5	106.2	113.7	111.8

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-36	L2505739-37	L2505739-38	L2505739-39	L2505739-40
	Description	SE	SE	SE	SE	SE
	Sampled Date	17-SEP-20	17-SEP-20	17-SEP-20	17-SEP-20	17-SEP-20
	Sampled Time	15:50	08:15	08:40	08:40	12:33
	Client ID	RG_LE1_SE-3_2020-09-17_1550	RG_MIULE_SE-4_2020-09-17_0815	RG_MIULE_SE-5_2020-09-17_0840	RG_MIDAG_S2_SE-1_2020-09-17_0840	RG_MIDAG_S2_SE-2_2020-09-17_1233
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	0.21	0.16	0.10	0.13	0.14
	Sodium (Na) (mg/kg)	<50	125	167	188	191
	Strontium (Sr) (mg/kg)	41.4	80.2	116	113	120
	Sulfur (S) (mg/kg)	<1000	<1000	1300	1100	1000
	Thallium (Tl) (mg/kg)	0.242	0.457	0.283	0.451	0.414
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	67.2	13.3	12.2	12.5	23.7
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	1.22	0.807	0.766	0.923	0.837
	Vanadium (V) (mg/kg)	58.8	34.7	24.0	26.8	27.4
	Zinc (Zn) (mg/kg)	109	124	88.9	123	118
	Zirconium (Zr) (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0050	<0.011 DLCI	<0.010 DLHM	<0.016 DLCI	<0.020 DLCI
	Acenaphthylene (mg/kg)	<0.0050	<0.0050	<0.010 DLHM	<0.010 DLHM	<0.010 DLHM
	Acridine (mg/kg)	<0.010	0.010	<0.020 DLHM	<0.025 DLCI	<0.022 DLCI
	Anthracene (mg/kg)	<0.0040	<0.0040	<0.0080 DLHM	<0.0080 DLHM	<0.0080 DLHM
	Benz(a)anthracene (mg/kg)	<0.015 DLCI	0.014	<0.020 DLHM	<0.020 DLHM	0.022 DLHM
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	<0.020 DLHM	<0.020 DLHM	<0.020 DLHM
	Benzo(b&j)fluoranthene (mg/kg)	0.019	0.054	0.040 DLHM	0.077 DLHM	0.068 DLHM
	Benzo(b+j+k)fluoranthene (mg/kg)	0.019	0.054	0.040 DLHM	0.077 DLHM	0.068 DLHM
	Benzo(e)pyrene (mg/kg)	0.022	0.053	0.044 DLHM	0.079 DLHM	0.073 DLHM
	Benzo(g,h,i)perylene (mg/kg)	0.011	0.018	<0.020 DLHM	0.031 DLHM	0.025 DLHM
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.020 DLHM	<0.020 DLHM	<0.020 DLHM
	Chrysene (mg/kg)	0.043	0.094	0.076 DLHM	0.135 DLHM	0.112 DLHM
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	<0.0070 DLCI	<0.010 DLHM	<0.010 DLHM	<0.010 DLHM
	Fluoranthene (mg/kg)	0.010	0.035	0.036 DLHM	0.036 DLHM	0.031 DLHM
	Fluorene (mg/kg)	<0.010	0.024	0.026 DLHM	0.048 DLHM	0.028 DLHM
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.020 DLHM	<0.020 DLHM	<0.020 DLHM
	1-Methylnaphthalene (mg/kg)	<0.050	0.147	0.139 DLHM	0.276 DLHM	0.224 DLHM
	2-Methylnaphthalene (mg/kg)	0.037	0.224	0.211 DLHM	0.414 DLHM	0.336 DLHM
	Naphthalene (mg/kg)	0.017	0.101	0.109 DLHM	0.174 DLHM	0.150 DLHM
	Perylene (mg/kg)	<0.010	0.012	<0.020 DLHM	<0.020 DLHM	<0.020 DLHM
	Phenanthrene (mg/kg)	0.096	0.226	0.197 DLHM	0.334 DLHM	0.273 DLHM
	Pyrene (mg/kg)	0.018	0.034	0.039 DLHM	0.046 DLHM	0.041 DLHM
	Quinoline (mg/kg)	<0.050	<0.050	<0.020 DLHM	<0.020 DLHM	<0.020 DLHM
	Surrogate: d10-Acenaphthene (%)	108.7	109.4	110.2	108.9	110.4

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-41	L2505739-42	L2505739-43		
	Description	SE	SE	SE		
	Sampled Date	17-SEP-20	17-SEP-20	17-SEP-20		
	Sampled Time	13:14	14:57	15:14		
	Client ID	RG_MIDAG_S2_SE-3_2020-09-17_1341	RG_MIDAG_S2_SE-4_2020-09-17_1457	RG_MIDAG_S2_SE-5_2020-09-17_1514		
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	0.14	0.16	0.13		
	Sodium (Na) (mg/kg)	139	159	148		
	Strontium (Sr) (mg/kg)	81.4	99.8	86.3		
	Sulfur (S) (mg/kg)	<1000	<1000	<1000		
	Thallium (Tl) (mg/kg)	0.490	0.476	0.501		
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0		
	Titanium (Ti) (mg/kg)	23.3	23.5	20.3		
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50		
	Uranium (U) (mg/kg)	0.897	0.926	0.830		
	Vanadium (V) (mg/kg)	26.0	23.9	28.2		
	Zinc (Zn) (mg/kg)	128	117	129		
	Zirconium (Zr) (mg/kg)	<1.0	<1.0	<1.0		
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	DLCI <0.015	DLCI <0.017	DLCI <0.018		
	Acenaphthylene (mg/kg)	DLHM <0.010	DLHM <0.010	DLHM <0.010		
	Acridine (mg/kg)	DLCI <0.026	DLCI <0.035	DLCI <0.030		
	Anthracene (mg/kg)	DLHM <0.0080	DLHM <0.0080	DLHM <0.0080		
	Benz(a)anthracene (mg/kg)	DLHM 0.030	DLHM 0.028	DLHM 0.025		
	Benzo(a)pyrene (mg/kg)	DLHM <0.020	DLHM <0.020	DLHM <0.020		
	Benzo(b&j)fluoranthene (mg/kg)	DLHM 0.078	DLHM 0.101	DLHM 0.100		
	Benzo(b+j+k)fluoranthene (mg/kg)	DLHM 0.078	DLHM 0.101	DLHM 0.100		
	Benzo(e)pyrene (mg/kg)	DLHM 0.073	DLHM 0.103	DLHM 0.098		
	Benzo(g,h,i)perylene (mg/kg)	DLHM 0.031	DLHM 0.036	DLHM 0.039		
	Benzo(k)fluoranthene (mg/kg)	DLHM <0.020	DLHM <0.020	DLHM <0.020		
	Chrysene (mg/kg)	DLHM 0.123	DLHM 0.168	DLHM 0.177		
	Dibenz(a,h)anthracene (mg/kg)	DLHM <0.010	DLCI <0.015	DLCI <0.011		
	Fluoranthene (mg/kg)	DLHM 0.054	DLHM 0.048	DLHM 0.041		
	Fluorene (mg/kg)	DLHM 0.036	DLCI <0.042	DLHM 0.044		
	Indeno(1,2,3-c,d)pyrene (mg/kg)	DLHM <0.020	DLHM <0.020	DLHM <0.020		
	1-Methylnaphthalene (mg/kg)	DLHM 0.236	DLHM 0.310	DLHM 0.303		
	2-Methylnaphthalene (mg/kg)	DLHM 0.363	DLHM 0.467	DLHM 0.454		
	Naphthalene (mg/kg)	DLHM 0.141	DLHM 0.194	DLHM 0.194		
	Perylene (mg/kg)	DLHM <0.020	DLHM <0.020	DLCI <0.021		
	Phenanthrene (mg/kg)	DLHM 0.268	DLHM 0.401	DLHM 0.391		
	Pyrene (mg/kg)	DLHM 0.049	DLHM 0.056	DLHM 0.051		
	Quinoline (mg/kg)	DLHM <0.020	DLHM <0.020	DLHM <0.020		
	Surrogate: d10-Acenaphthene (%)	108.1	119.5	118.0		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-1	L2505739-2	L2505739-3	L2505739-4	L2505739-5
	Description	SE	SE	SE	SE	SE
	Sampled Date	10-SEP-20	13-SEP-20	12-SEP-20	11-SEP-20	12-SEP-20
	Sampled Time	16:22	09:46	11:37	10:16	16:14
	Client ID	RG_AGCK_SE-1_2020-09-10_1622	RG_RIVER_SE-5_2020-09-13_0946	RG_RIVER_SE-2_2020-09-12_1137	RG_RIVER_SE-1_2020-09-11_1016	RG_CORCK_SE-1_2020-09-12_1614
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	112.1	114.5	115.2	113.5	115.1
	Surrogate: d8-Naphthalene (%)	98.6	106.0	106.2	102.1	105.4
	Surrogate: d10-Phenanthrene (%)	102.5	106.1	107.7	105.7	106.6
	IACR:Coarse	<0.050	<0.050	<0.050	<0.050	<0.050
	IACR:Fine	0.060	0.093	<0.050	<0.050	<0.050
	B(a)P Total Potency Equivalent (mg/kg)	0.048	0.081	<0.020	<0.020	0.040
	IACR (CCME)	0.55	1.58	0.34	0.17	0.72

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-6	L2505739-7	L2505739-8	L2505739-9	L2505739-10
	Description	SE	SE	SE	SE	SE
	Sampled Date	12-SEP-20	12-SEP-20	13-SEP-20	13-SEP-20	11-SEP-20
	Sampled Time	16:57	17:04	09:36	09:46	10:16
	Client ID	RG_CORCK_SE-2_2020-09-12_1657	RG_CORCK_SE-3_2020-09-12_1704	RG_CORCK_SE-4_2020-09-13_0936	RG_CORCK_SE-5_2020-09-13_0946	RG_MI25_SE-1_2020-09-11_1016
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	109.3	117.5	128.4	113.9	108.4
	Surrogate: d8-Naphthalene (%)	100.1	108.9	115.3	105.5	97.1
	Surrogate: d10-Phenanthrene (%)	101.2	109.2	117.9	104.7	98.2
	IACR:Coarse	<0.050	0.050	0.067	<0.050	<0.050
	IACR:Fine	0.071	0.097	0.128	0.092	<0.050
	B(a)P Total Potency Equivalent (mg/kg)	0.068	0.104	0.122	0.092	<0.020
	IACR (CCME)	1.17	1.72	2.14	1.63	0.15

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-11	L2505739-12	L2505739-13	L2505739-14	L2505739-15
	Description	SE	SE	SE	SE	SE
	Sampled Date	11-SEP-20	11-SEP-20	12-SEP-20	12-SEP-20	12-SEP-20
	Sampled Time	10:33	14:55	10:26	11:37	14:03
	Client ID	RG_MI25_SE-2_2020-09-11_1033	RG_MI25_SE-3_2020-09-11_1455	RG_MIUCO_SE-1_2020-09-12_1026	RG_MIUCO_SE-2_2020-09-12_1137	RG_MIUCO_SE-3_2020-09-12_1403
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	116.8	106.8	111.6	117.6	111.8
	Surrogate: d8-Naphthalene (%)	108.4	99.2	103.7	109.3	103.0
	Surrogate: d10-Phenanthrene (%)	109.2	99.2	102.3	109.3	104.2
	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)	<0.15	<0.15	<0.15	0.32	<0.15

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-16	L2505739-17	L2505739-18	L2505739-19	L2505739-20
	Description	SE	SE	SE	SE	SE
	Sampled Date	12-SEP-20	12-SEP-20	15-SEP-20	15-SEP-20	15-SEP-20
	Sampled Time	13:48	13:25	08:01	08:05	08:25
	Client ID	RG_MIUCO_SE-4_2020-09-12_1348	RG_MIUCO_SE-5_2020-09-12_1325	RG_MIDCO_SE-1_2020-09-15_0801	RG_MIDCO_SE-2_2020-09-15_0805	RG_MIDCO_SE-3_2020-09-15_0825
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	109.7	109.8	110.3	118.1	114.4
	Surrogate: d8-Naphthalene (%)	101.9	101.8	103.5	106.2	103.3
	Surrogate: d10-Phenanthrene (%)	101.9	102.1	102.0	109.3	106.3
	IACR:Coarse	<0.050	<0.050	<0.050	<0.050	<0.050
	IACR:Fine	<0.050	<0.050	<0.050	0.058	<0.050
	B(a)P Total Potency Equivalent (mg/kg)	<0.020	<0.020	<0.020	0.037	0.032
	IACR (CCME)	<0.15	<0.15	0.35	0.85	0.55

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-21	L2505739-22	L2505739-23	L2505739-24	L2505739-25
	Description	SE	SE	SE	SE	SE
	Sampled Date	15-SEP-20	15-SEP-20	15-SEP-20	15-SEP-20	15-SEP-20
	Sampled Time	08:40	11:18	08:05	11:18	17:14
	Client ID	RG_MIDCO_SE-4_2020-09-15_0840	RG_MIDCO_SE-5_2020-09-15_1118	RG_RIVER_SE-2_2020-09-15_0805	RG_RIVER_SE-5_2020-09-15_1118	RG_MIDAG_SE-1_2020-09-15_1714
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	125.2	119.0	124.7	124.1	127.3
	Surrogate: d8-Naphthalene (%)	119.6	111.7	116.3	114.0	117.7
	Surrogate: d10-Phenanthrene (%)	116.7	112.3	114.5	113.2	116.9
	IACR:Coarse	<0.050	<0.050	<0.050	<0.050	<0.050
	IACR:Fine	<0.050	<0.050	<0.050	<0.050	0.053
	B(a)P Total Potency Equivalent (mg/kg)	0.033	<0.020	0.023	<0.020	0.045
	IACR (CCME)	0.56	0.31	0.47	0.39	0.60

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-26	L2505739-27	L2505739-28	L2505739-29	L2505739-30
	Description	SE	SE	SE	SE	SE
	Sampled Date	15-SEP-20	16-SEP-20	16-SEP-20	16-SEP-20	16-SEP-20
	Sampled Time	17:23	11:45	12:05	14:57	08:05
	Client ID	RG_MIDAG_SE-2_2020-09-15_1723	RG_MIULE_SE-1_2020-09-16_1145	RG_MIULE_SE-2_2020-09-16_1205	RG_MIULE_SE-3_2020-09-16_1457	RG_MIDAG_SE-3_2020-09-16_0805
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	122.4	121.1	114.5	122.6	124.2
	Surrogate: d8-Naphthalene (%)	112.5	108.8	103.9	113.1	112.3
	Surrogate: d10-Phenanthrene (%)	113.1	111.1	105.9	111.7	114.6
	IACR:Coarse	<0.050	<0.050	<0.050	<0.050	<0.050
	IACR:Fine	<0.050	<0.050	<0.050	<0.050	0.052
	B(a)P Total Potency Equivalent (mg/kg)	0.026	<0.020	<0.020	0.023	0.028
	IACR (CCME)	0.62	0.30	0.40	0.42	0.74

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID		L2505739-31	L2505739-32	L2505739-33	L2505739-34	L2505739-35
Description		SE	SE	SE	SE	SE
Sampled Date		16-SEP-20	16-SEP-20	16-SEP-20	17-SEP-20	17-SEP-20
Sampled Time		09:22	09:32	12:08	14:20	15:40
Client ID		RG_MIDAG_SE-4_2020-09-16_0922	RG_MIDAG_SE-5_2020-09-16_0932	RG_RIVER_SE-2_2020-09-16_1208	RG_LE1_SE-1_2020-09-17_1420	RG_LE1_SE-2_2020-09-17_1540
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	122.7	120.3	116.5	123.2	120.2
	Surrogate: d8-Naphthalene (%)	109.8	108.4	105.3	110.3	109.6
	Surrogate: d10-Phenanthrene (%)	111.0	111.6	107.6	112.4	113.4
	IACR:Coarse	<0.050	<0.050	<0.050	<0.050	<0.050
	IACR:Fine	0.053	<0.050	<0.050	<0.050	<0.050
	B(a)P Total Potency Equivalent (mg/kg)	0.029	0.025	<0.020	<0.020	<0.020
	IACR (CCME)	0.77	0.56	0.37	0.30	0.37

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-36	L2505739-37	L2505739-38	L2505739-39	L2505739-40
	Description	SE	SE	SE	SE	SE
	Sampled Date	17-SEP-20	17-SEP-20	17-SEP-20	17-SEP-20	17-SEP-20
	Sampled Time	15:50	08:15	08:40	08:40	12:33
	Client ID	RG_LE1_SE-3_2020-09-17_1550	RG_MIULE_SE-4_2020-09-17_0815	RG_MIULE_SE-5_2020-09-17_0840	RG_MIDAG_S2_SE-1_2020-09-17_0840	RG_MIDAG_S2_SE-2_2020-09-17_1233
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	115.6	117.1	120.6	119.1	120.8
	Surrogate: d8-Naphthalene (%)	105.7	109.0	108.8	107.7	108.6
	Surrogate: d10-Phenanthrene (%)	106.8	109.6	111.8	110.3	111.5
	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	0.023	0.027	0.027
	IACR (CCME)	0.22	0.49	0.43	0.70	0.66

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505739-41	L2505739-42	L2505739-43		
	Description	SE	SE	SE		
	Sampled Date	17-SEP-20	17-SEP-20	17-SEP-20		
	Sampled Time	13:14	14:57	15:14		
	Client ID	RG_MIDAG_S2_SE-3_2020-09-17_1341	RG_MIDAG_S2_SE-4_2020-09-17_1457	RG_MIDAG_S2_SE-5_2020-09-17_1514		
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	118.0	120.1	120.6		
	Surrogate: d8-Naphthalene (%)	104.5	112.3	112.9		
	Surrogate: d10-Phenanthrene (%)	109.4	119.8	120.8		
	IACR:Coarse	<0.050	<0.050	<0.050		
	IACR:Fine	0.052	0.061	0.061		
	B(a)P Total Potency Equivalent (mg/kg)	0.029	0.034	0.032		
	IACR (CCME)	0.76	0.92	0.91		

Reference Information

Additional Comments for Sample Listed:

Samplenum	Matrix	Report Remarks	Sample Comments
L2505739-10	Soil	Note: Watery sample	
L2505739-11	Soil	Note: Watery sample	
L2505739-12	Soil	Note: Watery sample	
L2505739-13	Soil	Note: Watery sample	
L2505739-15	Soil	Note: Watery sample	
L2505739-16	Soil	Note: Watery sample	
L2505739-17	Soil	Note: Watery sample	
L2505739-22	Soil	Note: Watery sample, non-homo	
L2505739-24	Soil	Note: Watery sample	
L2505739-27	Soil	Note: Watery sample	
L2505739-28	Soil	Note: Watery sample	
L2505739-33	Soil	Note: Watery sample	
L2505739-34	Soil	Note: Watery sample	
L2505739-35	Soil	Note: Watery sample	
L2505739-36	Soil	Note: Watery sample	
L2505739-37	Soil	Note: Watery sample	
L2505739-4	Soil	Note: Watery sample	
L2505739-7	Soil	Note: Watery sample	
L2505739-9	Soil	Note: Watery sample	

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 PSA (100g minimum is standard). Measurement Uncertainty for PSA results may be higher than usual.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-TIC-PCT-SK	Soil	Total Inorganic Carbon in Soil	CSSS (2008) P216-217

A known quantity of acetic acid is consumed by reaction with carbonates in the soil. The pH of the resulting solution is measured and compared against a standard curve relating pH to weight of carbonate.

C-TOC-CALC-SK	Soil	Total Organic Carbon Calculation	CSSS (2008) 21.2

Total Organic Carbon (TOC) is calculated by the difference between total carbon (TC) and total inorganic carbon. (TIC)

C-TOT-LECO-SK	Soil	Total Carbon by combustion method	CSSS (2008) 21.2

The sample is ignited in a combustion analyzer where carbon in the reduced CO2 gas is determined using a thermal conductivity detector.

HG-200.2-CVAA-CL	Soil	Mercury in Soil by CVAAS	EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAAS.

IC-CACO3-CALC-SK	Soil	Inorganic Carbon as CaCO3 Equivalent	Calculation
MET-200.2-CCMS-CL	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A (mod)

Soil/sediment is dried, disaggregated, and sieved (2 mm). Strong Acid Leachable Metals in the <2mm fraction are solubilized by heated digestion with nitric and hydrochloric acids. Instrumental analysis is by Collision / Reaction Cell ICPMS.

Limitations: This method is intended to liberate environmentally available metals. Silicate minerals are not solubilized. Some metals may be only partially recovered (matrix dependent), including Al, Ba, Be, Cr, S, Sr, Ti, Tl, V, W, and Zr. Elemental Sulfur may be poorly recovered by this method. Volatile forms of sulfur (e.g. sulfide, H2S) may be excluded if lost during sampling, storage, or digestion.

MOISTURE-CL	Soil	% Moisture	CCME PHC in Soil - Tier 1 (mod)

This analysis is carried out gravimetrically by drying the sample at 105 C

PAH-TMB-H/A-MS-CL	Soil	PAH Tumbler Extraction (Hexane/Acetone)	EPA 3570/8270-GC/MS

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3545 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure uses a mechanical shaking technique to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone. The extract is then solvent exchanged to toluene. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection (GC/MS). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation. Because the two isomers cannot be readily chromatographically separated, benzo(j)fluoranthene is

Reference Information

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:

CMO LAEMP Sept 2020

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TIC-PCT-SK	**Soil**							
Batch R5242124								
WG3410168-4 IRM		**08-109_SOIL**						
Inorganic Carbon			96.4		%		80-120	29-SEP-20
WG3410168-2 LCS		**0.5**						
Inorganic Carbon			96.7		%		90-110	29-SEP-20
WG3410168-3 MB								
Inorganic Carbon			<0.050		%		0.05	29-SEP-20
Batch R5242125								
WG3410167-1 DUP		**L2505739-10**						
Inorganic Carbon		0.462	0.468		%	1.3	20	29-SEP-20
WG3410167-4 IRM		**08-109_SOIL**						
Inorganic Carbon			95.6		%		80-120	29-SEP-20
WG3410167-2 LCS		**0.5**						
Inorganic Carbon			98.4		%		90-110	29-SEP-20
WG3410167-3 MB								
Inorganic Carbon			<0.050		%		0.05	29-SEP-20
Batch R5242126								
WG3410163-4 IRM		**08-109_SOIL**						
Inorganic Carbon			96.2		%		80-120	29-SEP-20
WG3410163-2 LCS		**0.5**						
Inorganic Carbon			98.2		%		90-110	29-SEP-20
WG3410163-3 MB								
Inorganic Carbon			<0.050		%		0.05	29-SEP-20
C-TOT-LECO-SK	**Soil**							
Batch R5239017								
WG3410120-1 DUP		**L2505739-30**						
Total Carbon by Combustion		7.99	8.22		%	2.8	20	26-SEP-20
WG3410120-2 IRM		**08-109_SOIL**						
Total Carbon by Combustion			94.2		%		80-120	26-SEP-20
WG3410120-4 LCS		**SULFADIAZINE**						
Total Carbon by Combustion			100.3		%		90-110	26-SEP-20
WG3410120-3 MB								
Total Carbon by Combustion			<0.05		%		0.05	26-SEP-20
Batch R5239018								
WG3410118-1 DUP		**L2505739-10**						
Total Carbon by Combustion		3.89	3.93		%	0.9	20	26-SEP-20
WG3410118-2 IRM		**08-109_SOIL**						
Total Carbon by Combustion			104.7		%		80-120	26-SEP-20
WG3410118-4 LCS		**SULFADIAZINE**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-LECO-SK	**Soil**							
Batch R5239018								
WG3410118-4 LCS		**SULFADIAZINE**						
Total Carbon by Combustion			99.9		%		90-110	26-SEP-20
WG3410118-3 MB								
Total Carbon by Combustion			<0.05		%		0.05	26-SEP-20
Batch R5239836								
WG3410125-2 IRM		**08-109_SOIL**						
Total Carbon by Combustion			93.2		%		80-120	26-SEP-20
WG3410125-4 LCS		**SULFADIAZINE**						
Total Carbon by Combustion			101.4		%		90-110	26-SEP-20
WG3410125-3 MB								
Total Carbon by Combustion			<0.05		%		0.05	26-SEP-20
HG-200.2-CVAA-CL	**Soil**							
Batch R5235220								
WG3411243-10 CRM		**TILL-1**						
Mercury (Hg)			97.2		%		70-130	24-SEP-20
WG3411243-9 LCS								
Mercury (Hg)			101.0		%		80-120	24-SEP-20
WG3411243-7 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	24-SEP-20
Batch R5237235								
WG3411243-15 CRM		**TILL-1**						
Mercury (Hg)			108.0		%		70-130	25-SEP-20
WG3411243-20 CRM		**TILL-1**						
Mercury (Hg)			97.4		%		70-130	25-SEP-20
WG3411243-16 DUP		**L2505739-5**						
Mercury (Hg)		0.0295	0.0269		mg/kg	9.1	40	25-SEP-20
WG3411243-21 DUP		**L2505739-28**						
Mercury (Hg)		0.0409	0.0395		mg/kg	3.4	40	25-SEP-20
WG3411243-14 LCS								
Mercury (Hg)			98.8		%		80-120	25-SEP-20
WG3411243-19 LCS								
Mercury (Hg)			103.0		%		80-120	25-SEP-20
WG3411243-12 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	25-SEP-20
WG3411243-17 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	25-SEP-20
MET-200.2-CCMS-CL	**Soil**							

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5235087								
WG3411243-10 CRM		**TILL-1**						
Aluminum (Al)			102.2		%		70-130	24-SEP-20
Antimony (Sb)			98.5		%		70-130	24-SEP-20
Arsenic (As)			98.1		%		70-130	24-SEP-20
Barium (Ba)			95.5		%		70-130	24-SEP-20
Beryllium (Be)			93.1		%		70-130	24-SEP-20
Bismuth (Bi)			89.5		%		70-130	24-SEP-20
Boron (B)			2.9		mg/kg		0-8.2	24-SEP-20
Cadmium (Cd)			101.7		%		70-130	24-SEP-20
Calcium (Ca)			103.2		%		70-130	24-SEP-20
Chromium (Cr)			103.8		%		70-130	24-SEP-20
Cobalt (Co)			102.2		%		70-130	24-SEP-20
Copper (Cu)			101.1		%		70-130	24-SEP-20
Iron (Fe)			101.0		%		70-130	24-SEP-20
Lead (Pb)			92.3		%		70-130	24-SEP-20
Lithium (Li)			97.6		%		70-130	24-SEP-20
Magnesium (Mg)			108.3		%		70-130	24-SEP-20
Manganese (Mn)			100.1		%		70-130	24-SEP-20
Molybdenum (Mo)			97.9		%		70-130	24-SEP-20
Nickel (Ni)			104.4		%		70-130	24-SEP-20
Phosphorus (P)			92.4		%		70-130	24-SEP-20
Potassium (K)			107.5		%		70-130	24-SEP-20
Selenium (Se)			0.32		mg/kg		0.11-0.51	24-SEP-20
Silver (Ag)			0.22		mg/kg		0.13-0.33	24-SEP-20
Sodium (Na)			105.9		%		70-130	24-SEP-20
Strontium (Sr)			105.2		%		70-130	24-SEP-20
Thallium (Tl)			0.125		mg/kg		0.077-0.18	24-SEP-20
Tin (Sn)			1.0		mg/kg		0-3.1	24-SEP-20
Titanium (Ti)			121.5		%		70-130	24-SEP-20
Tungsten (W)			0.15		mg/kg		0-0.66	24-SEP-20
Uranium (U)			94.8		%		70-130	24-SEP-20
Vanadium (V)			102.2		%		70-130	24-SEP-20
Zinc (Zn)			104.7		%		70-130	24-SEP-20
Zirconium (Zr)			0.7		mg/kg		0-1.8	24-SEP-20
WG3411243-15 CRM		**TILL-1**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5235087								
WG3411243-15 CRM		**TILL-1**						
Aluminum (Al)			110.0		%		70-130	24-SEP-20
Antimony (Sb)			103.7		%		70-130	24-SEP-20
Arsenic (As)			101.5		%		70-130	24-SEP-20
Barium (Ba)			101.8		%		70-130	24-SEP-20
Beryllium (Be)			103.0		%		70-130	24-SEP-20
Bismuth (Bi)			97.1		%		70-130	24-SEP-20
Boron (B)			3.4		mg/kg		0-8.2	24-SEP-20
Cadmium (Cd)			100.2		%		70-130	24-SEP-20
Calcium (Ca)			107.0		%		70-130	24-SEP-20
Chromium (Cr)			107.9		%		70-130	24-SEP-20
Cobalt (Co)			103.3		%		70-130	24-SEP-20
Copper (Cu)			104.1		%		70-130	24-SEP-20
Iron (Fe)			103.6		%		70-130	24-SEP-20
Lead (Pb)			98.7		%		70-130	24-SEP-20
Lithium (Li)			102.4		%		70-130	24-SEP-20
Magnesium (Mg)			109.3		%		70-130	24-SEP-20
Manganese (Mn)			103.4		%		70-130	24-SEP-20
Molybdenum (Mo)			105.6		%		70-130	24-SEP-20
Nickel (Ni)			101.1		%		70-130	24-SEP-20
Phosphorus (P)			93.2		%		70-130	24-SEP-20
Potassium (K)			111.1		%		70-130	24-SEP-20
Selenium (Se)			0.34		mg/kg		0.11-0.51	24-SEP-20
Silver (Ag)			0.23		mg/kg		0.13-0.33	24-SEP-20
Sodium (Na)			101.9		%		70-130	24-SEP-20
Strontium (Sr)			109.8		%		70-130	24-SEP-20
Thallium (Tl)			0.130		mg/kg		0.077-0.18	24-SEP-20
Tin (Sn)			1.1		mg/kg		0-3.1	24-SEP-20
Titanium (Ti)			124.4		%		70-130	24-SEP-20
Tungsten (W)			0.14		mg/kg		0-0.66	24-SEP-20
Uranium (U)			100.5		%		70-130	24-SEP-20
Vanadium (V)			105.1		%		70-130	24-SEP-20
Zinc (Zn)			106.5		%		70-130	24-SEP-20
Zirconium (Zr)			0.7		mg/kg		0-1.8	24-SEP-20
WG3411243-20 CRM		**TILL-1**						

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5235087								
WG3411243-20 CRM		**TILL-1**						
Aluminum (Al)			110.9		%		70-130	24-SEP-20
Antimony (Sb)			99.8		%		70-130	24-SEP-20
Arsenic (As)			102.1		%		70-130	24-SEP-20
Barium (Ba)			103.9		%		70-130	24-SEP-20
Beryllium (Be)			99.0		%		70-130	24-SEP-20
Bismuth (Bi)			94.1		%		70-130	24-SEP-20
Boron (B)			3.6		mg/kg		0-8.2	24-SEP-20
Cadmium (Cd)			101.2		%		70-130	24-SEP-20
Calcium (Ca)			112.9		%		70-130	24-SEP-20
Chromium (Cr)			110.7		%		70-130	24-SEP-20
Cobalt (Co)			105.6		%		70-130	24-SEP-20
Copper (Cu)			107.4		%		70-130	24-SEP-20
Iron (Fe)			104.8		%		70-130	24-SEP-20
Lead (Pb)			96.7		%		70-130	24-SEP-20
Lithium (Li)			108.8		%		70-130	24-SEP-20
Magnesium (Mg)			113.8		%		70-130	24-SEP-20
Manganese (Mn)			108.5		%		70-130	24-SEP-20
Molybdenum (Mo)			101.2		%		70-130	24-SEP-20
Nickel (Ni)			104.1		%		70-130	24-SEP-20
Phosphorus (P)			96.6		%		70-130	24-SEP-20
Potassium (K)			118.5		%		70-130	24-SEP-20
Selenium (Se)			0.34		mg/kg		0.11-0.51	24-SEP-20
Silver (Ag)			0.22		mg/kg		0.13-0.33	24-SEP-20
Sodium (Na)			112.9		%		70-130	24-SEP-20
Strontium (Sr)			116.8		%		70-130	24-SEP-20
Thallium (Tl)			0.138		mg/kg		0.077-0.18	24-SEP-20
Tin (Sn)			1.1		mg/kg		0-3.1	24-SEP-20
Titanium (Ti)			128.7		%		70-130	24-SEP-20
Tungsten (W)			0.13		mg/kg		0-0.66	24-SEP-20
Uranium (U)			99.1		%		70-130	24-SEP-20
Vanadium (V)			108.3		%		70-130	24-SEP-20
Zinc (Zn)			106.4		%		70-130	24-SEP-20
Zirconium (Zr)			0.7		mg/kg		0-1.8	24-SEP-20
WG3411243-16 DUP		**L2505739-5**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5235087								
WG3411243-16 DUP		**L2505739-5**						
Aluminum (Al)		2010	2250		mg/kg	11	40	24-SEP-20
Antimony (Sb)		0.25	0.25		mg/kg	1.8	30	24-SEP-20
Arsenic (As)		1.61	1.59		mg/kg	1.2	30	24-SEP-20
Barium (Ba)		135	137		mg/kg	1.5	40	24-SEP-20
Beryllium (Be)		0.29	0.28		mg/kg	4.0	30	24-SEP-20
Bismuth (Bi)		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	24-SEP-20
Boron (B)		6.4	6.8		mg/kg	5.2	30	24-SEP-20
Cadmium (Cd)		7.94	8.25		mg/kg	3.9	30	24-SEP-20
Calcium (Ca)		289000	281000		mg/kg	2.5	30	24-SEP-20
Chromium (Cr)		3.18	3.20		mg/kg	0.7	30	24-SEP-20
Cobalt (Co)		244	260		mg/kg	6.3	30	24-SEP-20
Copper (Cu)		4.46	4.55		mg/kg	1.9	30	24-SEP-20
Iron (Fe)		2640	2570		mg/kg	2.7	30	24-SEP-20
Lead (Pb)		1.85	1.72		mg/kg	7.4	40	24-SEP-20
Lithium (Li)		3.2	3.2		mg/kg	1.7	30	24-SEP-20
Magnesium (Mg)		5760	5810		mg/kg	0.9	30	24-SEP-20
Manganese (Mn)		1640	1730		mg/kg	5.2	30	24-SEP-20
Molybdenum (Mo)		0.61	0.58		mg/kg	5.2	40	24-SEP-20
Nickel (Ni)		218	224		mg/kg	3.0	30	24-SEP-20
Phosphorus (P)		166	148		mg/kg	12	30	24-SEP-20
Potassium (K)		590	670		mg/kg	12	40	24-SEP-20
Selenium (Se)		1.56	1.64		mg/kg	5.3	30	24-SEP-20
Silver (Ag)		<0.10	<0.10	RPD-NA	mg/kg	N/A	40	24-SEP-20
Sodium (Na)		361	368		mg/kg	1.9	40	24-SEP-20
Strontium (Sr)		392	377		mg/kg	4.0	40	24-SEP-20
Sulfur (S)		4000	4000		mg/kg	0.0	30	24-SEP-20
Thallium (Tl)		0.191	0.205		mg/kg	6.7	30	24-SEP-20
Tin (Sn)		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	24-SEP-20
Titanium (Ti)		10.1	10.7		mg/kg	6.5	40	24-SEP-20
Tungsten (W)		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	24-SEP-20
Uranium (U)		2.11	2.05		mg/kg	3.0	30	24-SEP-20
Vanadium (V)		6.08	6.58		mg/kg	8.0	30	24-SEP-20
Zinc (Zn)		773	789		mg/kg	2.0	30	24-SEP-20
Zirconium (Zr)		<1.0	<1.0	RPD-NA	mg/kg	N/A	30	24-SEP-20

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5235087								
WG3411243-21 DUP		**L2505739-28**						
Aluminum (Al)		10500	10900		mg/kg	3.9	40	24-SEP-20
Antimony (Sb)		0.67	0.60		mg/kg	11	30	24-SEP-20
Arsenic (As)		8.51	7.73		mg/kg	9.7	30	24-SEP-20
Barium (Ba)		249	233		mg/kg	6.8	40	24-SEP-20
Beryllium (Be)		0.76	0.70		mg/kg	8.4	30	24-SEP-20
Bismuth (Bi)		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	24-SEP-20
Boron (B)		11.2	12.8		mg/kg	14	30	24-SEP-20
Cadmium (Cd)		1.32	1.28		mg/kg	3.2	30	24-SEP-20
Calcium (Ca)		44200	42700		mg/kg	3.4	30	24-SEP-20
Chromium (Cr)		16.7	16.9		mg/kg	1.4	30	24-SEP-20
Cobalt (Co)		13.7	12.8		mg/kg	6.7	30	24-SEP-20
Copper (Cu)		16.1	15.1		mg/kg	6.4	30	24-SEP-20
Iron (Fe)		18000	17100		mg/kg	5.3	30	24-SEP-20
Lead (Pb)		10.3	9.75		mg/kg	5.1	40	24-SEP-20
Lithium (Li)		14.5	14.0		mg/kg	3.3	30	24-SEP-20
Magnesium (Mg)		11000	10400		mg/kg	6.4	30	24-SEP-20
Manganese (Mn)		306	286		mg/kg	6.8	30	24-SEP-20
Molybdenum (Mo)		1.83	1.77		mg/kg	3.4	40	24-SEP-20
Nickel (Ni)		40.7	38.2		mg/kg	6.3	30	24-SEP-20
Phosphorus (P)		1210	1130		mg/kg	6.8	30	24-SEP-20
Potassium (K)		2390	2660		mg/kg	11	40	24-SEP-20
Selenium (Se)		1.27	1.33		mg/kg	4.5	30	24-SEP-20
Silver (Ag)		0.17	0.16		mg/kg	3.4	40	24-SEP-20
Sodium (Na)		103	107		mg/kg	4.5	40	24-SEP-20
Strontium (Sr)		73.6	72.4		mg/kg	1.6	40	24-SEP-20
Sulfur (S)		<1000	<1000	RPD-NA	mg/kg	N/A	30	24-SEP-20
Thallium (Tl)		0.497	0.487		mg/kg	2.1	30	24-SEP-20
Tin (Sn)		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	24-SEP-20
Titanium (Ti)		31.8	26.4		mg/kg	18	40	24-SEP-20
Tungsten (W)		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	24-SEP-20
Uranium (U)		0.785	0.727		mg/kg	7.7	30	24-SEP-20
Vanadium (V)		34.2	35.0		mg/kg	2.4	30	24-SEP-20
Zinc (Zn)		129	121		mg/kg	6.6	30	24-SEP-20
Zirconium (Zr)		1.1	<1.0	RPD-NA	mg/kg	N/A	30	24-SEP-20

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5235087								
WG3411243-14 LCS								
Aluminum (Al)			96.4		%		80-120	24-SEP-20
Antimony (Sb)			105.1		%		80-120	24-SEP-20
Arsenic (As)			95.9		%		80-120	24-SEP-20
Barium (Ba)			97.3		%		80-120	24-SEP-20
Beryllium (Be)			94.3		%		80-120	24-SEP-20
Bismuth (Bi)			94.8		%		80-120	24-SEP-20
Boron (B)			91.8		%		80-120	24-SEP-20
Cadmium (Cd)			95.3		%		80-120	24-SEP-20
Calcium (Ca)			92.6		%		80-120	24-SEP-20
Chromium (Cr)			95.1		%		80-120	24-SEP-20
Cobalt (Co)			94.9		%		80-120	24-SEP-20
Copper (Cu)			94.4		%		80-120	24-SEP-20
Iron (Fe)			110.2		%		80-120	24-SEP-20
Lead (Pb)			101.2		%		80-120	24-SEP-20
Lithium (Li)			96.6		%		80-120	24-SEP-20
Magnesium (Mg)			97.1		%		80-120	24-SEP-20
Manganese (Mn)			95.5		%		80-120	24-SEP-20
Molybdenum (Mo)			100.3		%		80-120	24-SEP-20
Nickel (Ni)			92.3		%		80-120	24-SEP-20
Potassium (K)			92.5		%		80-120	24-SEP-20
Selenium (Se)			96.5		%		80-120	24-SEP-20
Silver (Ag)			94.7		%		80-120	24-SEP-20
Sodium (Na)			94.3		%		80-120	24-SEP-20
Strontium (Sr)			96.0		%		80-120	24-SEP-20
Sulfur (S)			80.4		%		80-120	24-SEP-20
Thallium (Tl)			98.3		%		80-120	24-SEP-20
Tin (Sn)			94.4		%		80-120	24-SEP-20
Titanium (Ti)			92.8		%		80-120	24-SEP-20
Tungsten (W)			94.1		%		80-120	24-SEP-20
Uranium (U)			91.3		%		80-120	24-SEP-20
Vanadium (V)			96.4		%		80-120	24-SEP-20
Zinc (Zn)			95.4		%		80-120	24-SEP-20
Zirconium (Zr)			95.7		%		80-120	24-SEP-20
WG3411243-19 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5235087								
WG3411243-19 LCS								
Aluminum (Al)			100.9		%		80-120	24-SEP-20
Antimony (Sb)			107.6		%		80-120	24-SEP-20
Arsenic (As)			102.6		%		80-120	24-SEP-20
Barium (Ba)			104.6		%		80-120	24-SEP-20
Beryllium (Be)			96.1		%		80-120	24-SEP-20
Bismuth (Bi)			96.6		%		80-120	24-SEP-20
Boron (B)			94.2		%		80-120	24-SEP-20
Cadmium (Cd)			100.3		%		80-120	24-SEP-20
Calcium (Ca)			95.9		%		80-120	24-SEP-20
Chromium (Cr)			102.2		%		80-120	24-SEP-20
Cobalt (Co)			101.6		%		80-120	24-SEP-20
Copper (Cu)			101.1		%		80-120	24-SEP-20
Iron (Fe)			112.2		%		80-120	24-SEP-20
Lead (Pb)			102.3		%		80-120	24-SEP-20
Lithium (Li)			97.3		%		80-120	24-SEP-20
Magnesium (Mg)			107.4		%		80-120	24-SEP-20
Manganese (Mn)			100.7		%		80-120	24-SEP-20
Molybdenum (Mo)			104.3		%		80-120	24-SEP-20
Nickel (Ni)			97.9		%		80-120	24-SEP-20
Potassium (K)			97.7		%		80-120	24-SEP-20
Selenium (Se)			101.0		%		80-120	24-SEP-20
Silver (Ag)			98.0		%		80-120	24-SEP-20
Sodium (Na)			102.9		%		80-120	24-SEP-20
Strontium (Sr)			99.4		%		80-120	24-SEP-20
Sulfur (S)			87.2		%		80-120	24-SEP-20
Thallium (Tl)			98.7		%		80-120	24-SEP-20
Tin (Sn)			101.4		%		80-120	24-SEP-20
Titanium (Ti)			108.4		%		80-120	24-SEP-20
Tungsten (W)			96.0		%		80-120	24-SEP-20
Uranium (U)			90.1		%		80-120	24-SEP-20
Vanadium (V)			103.0		%		80-120	24-SEP-20
Zinc (Zn)			100.2		%		80-120	24-SEP-20
Zirconium (Zr)			98.9		%		80-120	24-SEP-20
WG3411243-9 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5235087								
WG3411243-9 LCS								
Aluminum (Al)			98.1		%		80-120	24-SEP-20
Antimony (Sb)			102.8		%		80-120	24-SEP-20
Arsenic (As)			100.7		%		80-120	24-SEP-20
Barium (Ba)			101.8		%		80-120	24-SEP-20
Beryllium (Be)			92.9		%		80-120	24-SEP-20
Bismuth (Bi)			93.6		%		80-120	24-SEP-20
Boron (B)			94.8		%		80-120	24-SEP-20
Cadmium (Cd)			98.4		%		80-120	24-SEP-20
Calcium (Ca)			94.8		%		80-120	24-SEP-20
Chromium (Cr)			98.1		%		80-120	24-SEP-20
Cobalt (Co)			99.7		%		80-120	24-SEP-20
Copper (Cu)			98.7		%		80-120	24-SEP-20
Iron (Fe)			115.6		%		80-120	24-SEP-20
Lead (Pb)			100.7		%		80-120	24-SEP-20
Lithium (Li)			93.7		%		80-120	24-SEP-20
Magnesium (Mg)			104.6		%		80-120	24-SEP-20
Manganese (Mn)			98.8		%		80-120	24-SEP-20
Molybdenum (Mo)			99.7		%		80-120	24-SEP-20
Nickel (Ni)			101.5		%		80-120	24-SEP-20
Potassium (K)			97.1		%		80-120	24-SEP-20
Selenium (Se)			100.1		%		80-120	24-SEP-20
Silver (Ag)			95.0		%		80-120	24-SEP-20
Sodium (Na)			96.2		%		80-120	24-SEP-20
Strontium (Sr)			101.0		%		80-120	24-SEP-20
Sulfur (S)			91.2		%		80-120	24-SEP-20
Thallium (Tl)			96.1		%		80-120	24-SEP-20
Tin (Sn)			99.0		%		80-120	24-SEP-20
Titanium (Ti)			96.9		%		80-120	24-SEP-20
Tungsten (W)			98.1		%		80-120	24-SEP-20
Uranium (U)			90.3		%		80-120	24-SEP-20
Vanadium (V)			99.6		%		80-120	24-SEP-20
Zinc (Zn)			99.2		%		80-120	24-SEP-20
Zirconium (Zr)			95.1		%		80-120	24-SEP-20
WG3411243-12 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5235087								
WG3411243-12 MB								
Aluminum (Al)			<50		mg/kg		50	24-SEP-20
Antimony (Sb)			<0.10		mg/kg		0.1	24-SEP-20
Arsenic (As)			<0.10		mg/kg		0.1	24-SEP-20
Barium (Ba)			<0.50		mg/kg		0.5	24-SEP-20
Beryllium (Be)			<0.10		mg/kg		0.1	24-SEP-20
Bismuth (Bi)			<0.20		mg/kg		0.2	24-SEP-20
Boron (B)			<5.0		mg/kg		5	24-SEP-20
Cadmium (Cd)			<0.020		mg/kg		0.02	24-SEP-20
Calcium (Ca)			<50		mg/kg		50	24-SEP-20
Chromium (Cr)			<0.50		mg/kg		0.5	24-SEP-20
Cobalt (Co)			<0.10		mg/kg		0.1	24-SEP-20
Copper (Cu)			<0.50		mg/kg		0.5	24-SEP-20
Iron (Fe)			<50		mg/kg		50	24-SEP-20
Lead (Pb)			<0.50		mg/kg		0.5	24-SEP-20
Lithium (Li)			<2.0		mg/kg		2	24-SEP-20
Magnesium (Mg)			<20		mg/kg		20	24-SEP-20
Manganese (Mn)			<1.0		mg/kg		1	24-SEP-20
Molybdenum (Mo)			<0.10		mg/kg		0.1	24-SEP-20
Nickel (Ni)			<0.50		mg/kg		0.5	24-SEP-20
Phosphorus (P)			<50		mg/kg		50	24-SEP-20
Potassium (K)			<100		mg/kg		100	24-SEP-20
Selenium (Se)			<0.20		mg/kg		0.2	24-SEP-20
Silver (Ag)			<0.10		mg/kg		0.1	24-SEP-20
Sodium (Na)			<50		mg/kg		50	24-SEP-20
Strontium (Sr)			<0.50		mg/kg		0.5	24-SEP-20
Sulfur (S)			<1000		mg/kg		1000	24-SEP-20
Thallium (Tl)			<0.050		mg/kg		0.05	24-SEP-20
Tin (Sn)			<2.0		mg/kg		2	24-SEP-20
Titanium (Ti)			<1.0		mg/kg		1	24-SEP-20
Tungsten (W)			<0.50		mg/kg		0.5	24-SEP-20
Uranium (U)			<0.050		mg/kg		0.05	24-SEP-20
Vanadium (V)			<0.20		mg/kg		0.2	24-SEP-20
Zinc (Zn)			<2.0		mg/kg		2	24-SEP-20
Zirconium (Zr)			<1.0		mg/kg		1	24-SEP-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5235087								
WG3411243-17 MB								
Aluminum (Al)			<50		mg/kg		50	24-SEP-20
Antimony (Sb)			<0.10		mg/kg		0.1	24-SEP-20
Arsenic (As)			<0.10		mg/kg		0.1	24-SEP-20
Barium (Ba)			<0.50		mg/kg		0.5	24-SEP-20
Beryllium (Be)			<0.10		mg/kg		0.1	24-SEP-20
Bismuth (Bi)			<0.20		mg/kg		0.2	24-SEP-20
Boron (B)			<5.0		mg/kg		5	24-SEP-20
Cadmium (Cd)			<0.020		mg/kg		0.02	24-SEP-20
Calcium (Ca)			<50		mg/kg		50	24-SEP-20
Chromium (Cr)			<0.50		mg/kg		0.5	24-SEP-20
Cobalt (Co)			<0.10		mg/kg		0.1	24-SEP-20
Copper (Cu)			<0.50		mg/kg		0.5	24-SEP-20
Iron (Fe)			<50		mg/kg		50	24-SEP-20
Lead (Pb)			<0.50		mg/kg		0.5	24-SEP-20
Lithium (Li)			<2.0		mg/kg		2	24-SEP-20
Magnesium (Mg)			<20		mg/kg		20	24-SEP-20
Manganese (Mn)			<1.0		mg/kg		1	24-SEP-20
Molybdenum (Mo)			<0.10		mg/kg		0.1	24-SEP-20
Nickel (Ni)			<0.50		mg/kg		0.5	24-SEP-20
Phosphorus (P)			<50		mg/kg		50	24-SEP-20
Potassium (K)			<100		mg/kg		100	24-SEP-20
Selenium (Se)			<0.20		mg/kg		0.2	24-SEP-20
Silver (Ag)			<0.10		mg/kg		0.1	24-SEP-20
Sodium (Na)			<50		mg/kg		50	24-SEP-20
Strontium (Sr)			<0.50		mg/kg		0.5	24-SEP-20
Sulfur (S)			<1000		mg/kg		1000	24-SEP-20
Thallium (Tl)			<0.050		mg/kg		0.05	24-SEP-20
Tin (Sn)			<2.0		mg/kg		2	24-SEP-20
Titanium (Ti)			<1.0		mg/kg		1	24-SEP-20
Tungsten (W)			<0.50		mg/kg		0.5	24-SEP-20
Uranium (U)			<0.050		mg/kg		0.05	24-SEP-20
Vanadium (V)			<0.20		mg/kg		0.2	24-SEP-20
Zinc (Zn)			<2.0		mg/kg		2	24-SEP-20
Zirconium (Zr)			<1.0		mg/kg		1	24-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5235087								
WG3411243-7 MB								
Aluminum (Al)			<50		mg/kg		50	24-SEP-20
Antimony (Sb)			<0.10		mg/kg		0.1	24-SEP-20
Arsenic (As)			<0.10		mg/kg		0.1	24-SEP-20
Barium (Ba)			<0.50		mg/kg		0.5	24-SEP-20
Beryllium (Be)			<0.10		mg/kg		0.1	24-SEP-20
Bismuth (Bi)			<0.20		mg/kg		0.2	24-SEP-20
Boron (B)			<5.0		mg/kg		5	24-SEP-20
Cadmium (Cd)			<0.020		mg/kg		0.02	24-SEP-20
Calcium (Ca)			<50		mg/kg		50	24-SEP-20
Chromium (Cr)			<0.50		mg/kg		0.5	24-SEP-20
Cobalt (Co)			<0.10		mg/kg		0.1	24-SEP-20
Copper (Cu)			<0.50		mg/kg		0.5	24-SEP-20
Iron (Fe)			<50		mg/kg		50	24-SEP-20
Lead (Pb)			<0.50		mg/kg		0.5	24-SEP-20
Lithium (Li)			<2.0		mg/kg		2	24-SEP-20
Magnesium (Mg)			<20		mg/kg		20	24-SEP-20
Manganese (Mn)			<1.0		mg/kg		1	24-SEP-20
Molybdenum (Mo)			<0.10		mg/kg		0.1	24-SEP-20
Nickel (Ni)			<0.50		mg/kg		0.5	24-SEP-20
Phosphorus (P)			<50		mg/kg		50	24-SEP-20
Potassium (K)			<100		mg/kg		100	24-SEP-20
Selenium (Se)			<0.20		mg/kg		0.2	24-SEP-20
Silver (Ag)			<0.10		mg/kg		0.1	24-SEP-20
Sodium (Na)			<50		mg/kg		50	24-SEP-20
Strontium (Sr)			<0.50		mg/kg		0.5	24-SEP-20
Sulfur (S)			<1000		mg/kg		1000	24-SEP-20
Thallium (Tl)			<0.050		mg/kg		0.05	24-SEP-20
Tin (Sn)			<2.0		mg/kg		2	24-SEP-20
Titanium (Ti)			<1.0		mg/kg		1	24-SEP-20
Tungsten (W)			<0.50		mg/kg		0.5	24-SEP-20
Uranium (U)			<0.050		mg/kg		0.05	24-SEP-20
Vanadium (V)			<0.20		mg/kg		0.2	24-SEP-20
Zinc (Zn)			<2.0		mg/kg		2	24-SEP-20
Zirconium (Zr)			<1.0		mg/kg		1	24-SEP-20

Quality Control Report

Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-CL		**Soil**							
Batch	**R5235395**								
WG3411246-3	**DUP**		**L2505739-1**						
Moisture			90.8	91.5		%	0.8	20	24-SEP-20
WG3411246-2	**LCS**								
Moisture				96.0		%		90-110	24-SEP-20
WG3411246-1	**MB**								
Moisture				<0.25		%		0.25	24-SEP-20
Batch	**R5235396**								
WG3411397-3	**DUP**		**L2505739-21**						
Moisture			78.3	78.8		%	0.6	20	24-SEP-20
WG3411397-2	**LCS**								
Moisture				97.2		%		90-110	24-SEP-20
WG3411397-1	**MB**								
Moisture				<0.25		%		0.25	24-SEP-20
Batch	**R5238042**								
WG3411562-2	**LCS**								
Moisture				98.3		%		90-110	24-SEP-20
WG3411562-1	**MB**								
Moisture				<0.25		%		0.25	24-SEP-20
PAH-TMB-H/A-MS-CL		**Soil**							
Batch	**R5237399**								
WG3412702-9	**DUP**		**L2505739-1**						
Acenaphthene			<0.025	<0.025	RPD-NA	mg/kg	N/A	50	25-SEP-20
Acenaphthylene			<0.025	<0.025	RPD-NA	mg/kg	N/A	50	25-SEP-20
Anthracene			<0.020	<0.020	RPD-NA	mg/kg	N/A	50	25-SEP-20
Acridine			<0.050	<0.050	RPD-NA	mg/kg	N/A	50	25-SEP-20
Benz(a)anthracene			<0.050	<0.050	RPD-NA	mg/kg	N/A	50	25-SEP-20
Benzo(a)pyrene			<0.050	<0.050	RPD-NA	mg/kg	N/A	50	25-SEP-20
Benzo(b&j)fluoranthene			<0.050	<0.050	RPD-NA	mg/kg	N/A	50	25-SEP-20
Benzo(e)pyrene			<0.050	0.050	RPD-NA	mg/kg	N/A	50	25-SEP-20
Benzo(g,h,i)perylene			<0.050	<0.050	RPD-NA	mg/kg	N/A	50	25-SEP-20
Benzo(k)fluoranthene			<0.050	<0.050	RPD-NA	mg/kg	N/A	50	25-SEP-20
Chrysene			0.064	<0.050	RPD-NA	mg/kg	N/A	50	25-SEP-20
Dibenz(a,h)anthracene			<0.025	<0.025	RPD-NA	mg/kg	N/A	50	25-SEP-20
Fluoranthene			<0.050	<0.050	RPD-NA	mg/kg	N/A	50	25-SEP-20
Fluorene			<0.050	<0.050	RPD-NA	mg/kg	N/A	50	25-SEP-20
Indeno(1,2,3-c,d)pyrene			<0.050	<0.050	RPD-NA	mg/kg	N/A	50	25-SEP-20
2-Methylnaphthalene			0.120	0.114		mg/kg	5.4	50	25-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5237399								
WG3412702-9 DUP		**L2505739-1**						
Naphthalene		0.061	0.077		mg/kg	23	50	25-SEP-20
Perylene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	25-SEP-20
Phenanthrene		0.159	0.154		mg/kg	3.7	50	25-SEP-20
Pyrene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	25-SEP-20
1-Methylnaphthalene		0.094	0.096		mg/kg	2.8	50	25-SEP-20
Quinoline		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	25-SEP-20
WG3412702-14 IRM		**ALS PAH RM2**						
Acenaphthene			93.6		%		60-130	25-SEP-20
Acenaphthylene			112.8		%		60-130	25-SEP-20
Anthracene			111.4		%		60-130	25-SEP-20
Acridine			97.0		%		60-130	25-SEP-20
Benz(a)anthracene			91.9		%		60-130	25-SEP-20
Benzo(a)pyrene			82.9		%		60-130	25-SEP-20
Benzo(b&j)fluoranthene			85.3		%		60-130	25-SEP-20
Benzo(e)pyrene			91.5		%		60-130	25-SEP-20
Benzo(g,h,i)perylene			81.8		%		60-130	25-SEP-20
Benzo(k)fluoranthene			78.2		%		60-130	25-SEP-20
Chrysene			89.4		%		60-130	25-SEP-20
Dibenz(a,h)anthracene			79.4		%		60-130	25-SEP-20
Fluoranthene			87.7		%		60-130	25-SEP-20
Fluorene			89.6		%		60-130	25-SEP-20
Indeno(1,2,3-c,d)pyrene			103.7		%		60-130	25-SEP-20
2-Methylnaphthalene			86.0		%		60-130	25-SEP-20
Naphthalene			89.0		%		50-130	25-SEP-20
Perylene			91.2		%		60-130	25-SEP-20
Phenanthrene			90.4		%		60-130	25-SEP-20
Pyrene			89.6		%		60-130	25-SEP-20
1-Methylnaphthalene			83.8		%		60-130	25-SEP-20
WG3412702-3 IRM		**ALS PAH RM2**						
Acenaphthene			88.8		%		60-130	25-SEP-20
Acenaphthylene			112.2		%		60-130	25-SEP-20
Anthracene			112.0		%		60-130	25-SEP-20
Acridine			110.3		%		60-130	25-SEP-20
Benz(a)anthracene			101.3		%		60-130	25-SEP-20
Benzo(a)pyrene			96.5		%		60-130	25-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5237399								
WG3412702-3 IRM		**ALS PAH RM2**						
Benzo(b&j)fluoranthene			98.1		%		60-130	25-SEP-20
Benzo(e)pyrene			101.5		%		60-130	25-SEP-20
Benzo(g,h,i)perylene			88.9		%		60-130	25-SEP-20
Benzo(k)fluoranthene			78.1		%		60-130	25-SEP-20
Chrysene			97.6		%		60-130	25-SEP-20
Dibenz(a,h)anthracene			87.1		%		60-130	25-SEP-20
Fluoranthene			88.8		%		60-130	25-SEP-20
Fluorene			87.0		%		60-130	25-SEP-20
Indeno(1,2,3-c,d)pyrene			112.6		%		60-130	25-SEP-20
2-Methylnaphthalene			83.2		%		60-130	25-SEP-20
Naphthalene			84.3		%		50-130	25-SEP-20
Perylene			95.7		%		60-130	25-SEP-20
Phenanthrene			90.2		%		60-130	25-SEP-20
Pyrene			90.8		%		60-130	25-SEP-20
1-Methylnaphthalene			80.1		%		60-130	25-SEP-20
WG3412702-5 IRM		**ALS PAH RM2**						
Acenaphthene			100.2		%		60-130	25-SEP-20
Acenaphthylene			120.7		%		60-130	25-SEP-20
Anthracene			121.6		%		60-130	25-SEP-20
Acridine			117.0		%		60-130	25-SEP-20
Benz(a)anthracene			110.7		%		60-130	25-SEP-20
Benzo(a)pyrene			103.2		%		60-130	25-SEP-20
Benzo(b&j)fluoranthene			109.9		%		60-130	25-SEP-20
Benzo(e)pyrene			112.2		%		60-130	25-SEP-20
Benzo(g,h,i)perylene			94.3		%		60-130	25-SEP-20
Benzo(k)fluoranthene			87.3		%		60-130	25-SEP-20
Chrysene			106.6		%		60-130	25-SEP-20
Dibenz(a,h)anthracene			93.8		%		60-130	25-SEP-20
Fluoranthene			100.7		%		60-130	25-SEP-20
Fluorene			100.1		%		60-130	25-SEP-20
Indeno(1,2,3-c,d)pyrene			120.8		%		60-130	25-SEP-20
2-Methylnaphthalene			96.0		%		60-130	25-SEP-20
Naphthalene			96.5		%		50-130	25-SEP-20
Perylene			98.7		%		60-130	25-SEP-20

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5237399								
WG3412702-5 IRM		**ALS PAH RM2**						
Phenanthrene			103.4		%		60-130	25-SEP-20
Pyrene			102.0		%		60-130	25-SEP-20
1-Methylnaphthalene			92.8		%		60-130	25-SEP-20
WG3412702-7 IRM		**ALS PAH RM2**						
Acenaphthene			97.3		%		60-130	25-SEP-20
Acenaphthylene			112.3		%		60-130	25-SEP-20
Anthracene			117.3		%		60-130	25-SEP-20
Acridine			102.3		%		60-130	25-SEP-20
Benz(a)anthracene			96.6		%		60-130	25-SEP-20
Benzo(a)pyrene			90.8		%		60-130	25-SEP-20
Benzo(b&j)fluoranthene			92.2		%		60-130	25-SEP-20
Benzo(e)pyrene			96.5		%		60-130	25-SEP-20
Benzo(g,h,i)perylene			86.8		%		60-130	25-SEP-20
Benzo(k)fluoranthene			75.2		%		60-130	25-SEP-20
Chrysene			95.2		%		60-130	25-SEP-20
Dibenz(a,h)anthracene			83.9		%		60-130	25-SEP-20
Fluoranthene			89.6		%		60-130	25-SEP-20
Fluorene			92.9		%		60-130	25-SEP-20
Indeno(1,2,3-c,d)pyrene			105.8		%		60-130	25-SEP-20
2-Methylnaphthalene			90.2		%		60-130	25-SEP-20
Naphthalene			95.7		%		50-130	25-SEP-20
Perylene			91.9		%		60-130	25-SEP-20
Phenanthrene			92.5		%		60-130	25-SEP-20
Pyrene			91.2		%		60-130	25-SEP-20
1-Methylnaphthalene			88.3		%		60-130	25-SEP-20
WG3412702-13 LCS								
Acenaphthene			90.0		%		60-130	25-SEP-20
Acenaphthylene			82.9		%		60-130	25-SEP-20
Anthracene			79.6		%		60-130	25-SEP-20
Acridine			76.9		%		60-130	25-SEP-20
Benz(a)anthracene			85.5		%		60-130	25-SEP-20
Benzo(a)pyrene			74.0		%		60-130	25-SEP-20
Benzo(b&j)fluoranthene			82.6		%		60-130	25-SEP-20
Benzo(e)pyrene			83.5		%		60-130	25-SEP-20
Benzo(g,h,i)perylene			79.1		%		60-130	25-SEP-20

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5237399								
WG3412702-13 LCS								
Benzo(k)fluoranthene			78.2		%		60-130	25-SEP-20
Chrysene			82.3		%		60-130	25-SEP-20
Dibenz(a,h)anthracene			79.2		%		60-130	25-SEP-20
Fluoranthene			85.9		%		60-130	25-SEP-20
Fluorene			84.0		%		60-130	25-SEP-20
Indeno(1,2,3-c,d)pyrene			77.3		%		60-130	25-SEP-20
2-Methylnaphthalene			89.5		%		60-130	25-SEP-20
Naphthalene			92.4		%		50-130	25-SEP-20
Perylene			78.7		%		60-130	25-SEP-20
Phenanthrene			88.6		%		60-130	25-SEP-20
Pyrene			87.4		%		60-130	25-SEP-20
1-Methylnaphthalene			87.2		%		60-130	25-SEP-20
Quinoline			81.4		%		60-130	25-SEP-20
WG3412702-2 LCS								
Acenaphthene			101.2		%		60-130	25-SEP-20
Acenaphthylene			92.1		%		60-130	25-SEP-20
Anthracene			91.0		%		60-130	25-SEP-20
Acridine			91.8		%		60-130	25-SEP-20
Benz(a)anthracene			102.6		%		60-130	25-SEP-20
Benzo(a)pyrene			91.2		%		60-130	25-SEP-20
Benzo(b&j)fluoranthene			103.8		%		60-130	25-SEP-20
Benzo(e)pyrene			100.9		%		60-130	25-SEP-20
Benzo(g,h,i)perylene			88.3		%		60-130	25-SEP-20
Benzo(k)fluoranthene			92.3		%		60-130	25-SEP-20
Chrysene			95.3		%		60-130	25-SEP-20
Dibenz(a,h)anthracene			91.6		%		60-130	25-SEP-20
Fluoranthene			96.4		%		60-130	25-SEP-20
Fluorene			93.8		%		60-130	25-SEP-20
Indeno(1,2,3-c,d)pyrene			96.6		%		60-130	25-SEP-20
2-Methylnaphthalene			99.5		%		60-130	25-SEP-20
Naphthalene			103.4		%		50-130	25-SEP-20
Perylene			92.5		%		60-130	25-SEP-20
Phenanthrene			102.6		%		60-130	25-SEP-20
Pyrene			100.1		%		60-130	25-SEP-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5237399								
WG3412702-2 LCS								
1-Methylnaphthalene			97.6		%		60-130	25-SEP-20
Quinoline			92.6		%		60-130	25-SEP-20
WG3412702-4 LCS								
Acenaphthene			102.6		%		60-130	25-SEP-20
Acenaphthylene			93.8		%		60-130	25-SEP-20
Anthracene			96.1		%		60-130	25-SEP-20
Acridine			95.0		%		60-130	25-SEP-20
Benz(a)anthracene			107.2		%		60-130	25-SEP-20
Benzo(a)pyrene			98.7		%		60-130	25-SEP-20
Benzo(b&j)fluoranthene			106.6		%		60-130	25-SEP-20
Benzo(e)pyrene			104.5		%		60-130	25-SEP-20
Benzo(g,h,i)perylene			89.9		%		60-130	25-SEP-20
Benzo(k)fluoranthene			97.2		%		60-130	25-SEP-20
Chrysene			98.3		%		60-130	25-SEP-20
Dibenz(a,h)anthracene			93.3		%		60-130	25-SEP-20
Fluoranthene			97.4		%		60-130	25-SEP-20
Fluorene			96.4		%		60-130	25-SEP-20
Indeno(1,2,3-c,d)pyrene			100.3		%		60-130	25-SEP-20
2-Methylnaphthalene			99.5		%		60-130	25-SEP-20
Naphthalene			103.8		%		50-130	25-SEP-20
Perylene			98.2		%		60-130	25-SEP-20
Phenanthrene			103.3		%		60-130	25-SEP-20
Pyrene			101.8		%		60-130	25-SEP-20
1-Methylnaphthalene			98.1		%		60-130	25-SEP-20
Quinoline			93.4		%		60-130	25-SEP-20
WG3412702-1 MB								
Acenaphthene			<0.0050		mg/kg		0.005	25-SEP-20
Acenaphthylene			<0.0050		mg/kg		0.005	25-SEP-20
Anthracene			<0.0040		mg/kg		0.004	25-SEP-20
Acridine			<0.010		mg/kg		0.01	25-SEP-20
Benz(a)anthracene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	25-SEP-20

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5237399								
WG3412702-1 MB								
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Chrysene			<0.010		mg/kg		0.01	25-SEP-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	25-SEP-20
Fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Fluorene			<0.010		mg/kg		0.01	25-SEP-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	25-SEP-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	25-SEP-20
Naphthalene			<0.010		mg/kg		0.01	25-SEP-20
Perylene			<0.010		mg/kg		0.01	25-SEP-20
Phenanthrene			<0.010		mg/kg		0.01	25-SEP-20
Pyrene			<0.010		mg/kg		0.01	25-SEP-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	25-SEP-20
Quinoline			<0.050		mg/kg		0.05	25-SEP-20
Surrogate: d8-Naphthalene			92.0		%		50-130	25-SEP-20
Surrogate: d10-Acenaphthene			95.1		%		60-130	25-SEP-20
Surrogate: d10-Phenanthrene			93.9		%		60-130	25-SEP-20
Surrogate: d12-Chrysene			106.2		%		60-130	25-SEP-20
WG3412702-11 MB								
Acenaphthene			<0.0050		mg/kg		0.005	25-SEP-20
Acenaphthylene			<0.0050		mg/kg		0.005	25-SEP-20
Anthracene			<0.0040		mg/kg		0.004	25-SEP-20
Acridine			<0.010		mg/kg		0.01	25-SEP-20
Benz(a)anthracene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Chrysene			<0.010		mg/kg		0.01	25-SEP-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	25-SEP-20
Fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Fluorene			<0.010		mg/kg		0.01	25-SEP-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	25-SEP-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	25-SEP-20

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5237399								
WG3412702-11 MB								
Naphthalene			<0.010		mg/kg		0.01	25-SEP-20
Perylene			<0.010		mg/kg		0.01	25-SEP-20
Phenanthrene			<0.010		mg/kg		0.01	25-SEP-20
Pyrene			<0.010		mg/kg		0.01	25-SEP-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	25-SEP-20
Quinoline			<0.050		mg/kg		0.05	25-SEP-20
Surrogate: d8-Naphthalene			96.3		%		50-130	25-SEP-20
Surrogate: d10-Acenaphthene			95.7		%		60-130	25-SEP-20
Surrogate: d10-Phenanthrene			95.7		%		60-130	25-SEP-20
Surrogate: d12-Chrysene			105.2		%		60-130	25-SEP-20
WG3412702-15 MB								
Acenaphthene			<0.0050		mg/kg		0.005	25-SEP-20
Acenaphthylene			<0.0050		mg/kg		0.005	25-SEP-20
Anthracene			<0.0040		mg/kg		0.004	25-SEP-20
Acridine			<0.010		mg/kg		0.01	25-SEP-20
Benz(a)anthracene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Chrysene			<0.010		mg/kg		0.01	25-SEP-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	25-SEP-20
Fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Fluorene			<0.010		mg/kg		0.01	25-SEP-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	25-SEP-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	25-SEP-20
Naphthalene			<0.010		mg/kg		0.01	25-SEP-20
Perylene			<0.010		mg/kg		0.01	25-SEP-20
Phenanthrene			<0.010		mg/kg		0.01	25-SEP-20
Pyrene			<0.010		mg/kg		0.01	25-SEP-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	25-SEP-20
Quinoline			<0.050		mg/kg		0.05	25-SEP-20
Surrogate: d8-Naphthalene			94.6		%		50-130	25-SEP-20

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5237399								
WG3412702-15 MB								
Surrogate: d10-Acenaphthene			95.8		%		60-130	25-SEP-20
Surrogate: d10-Phenanthrene			95.8		%		60-130	25-SEP-20
Surrogate: d12-Chrysene			107.1		%		60-130	25-SEP-20
WG3412702-8 MB								
Acenaphthene			<0.0050		mg/kg		0.005	25-SEP-20
Acenaphthylene			<0.0050		mg/kg		0.005	25-SEP-20
Anthracene			<0.0040		mg/kg		0.004	25-SEP-20
Acridine			<0.010		mg/kg		0.01	25-SEP-20
Benz(a)anthracene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Chrysene			<0.010		mg/kg		0.01	25-SEP-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	25-SEP-20
Fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Fluorene			<0.010		mg/kg		0.01	25-SEP-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	25-SEP-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	25-SEP-20
Naphthalene			<0.010		mg/kg		0.01	25-SEP-20
Perylene			<0.010		mg/kg		0.01	25-SEP-20
Phenanthrene			<0.010		mg/kg		0.01	25-SEP-20
Pyrene			<0.010		mg/kg		0.01	25-SEP-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	25-SEP-20
Quinoline			<0.050		mg/kg		0.05	25-SEP-20
Surrogate: d8-Naphthalene			97.9		%		50-130	25-SEP-20
Surrogate: d10-Acenaphthene			99.6		%		60-130	25-SEP-20
Surrogate: d10-Phenanthrene			99.8		%		60-130	25-SEP-20
Surrogate: d12-Chrysene			111.7		%		60-130	25-SEP-20
Batch R5238377								
WG3413082-8 DUP		**L2505739-21**						
Acenaphthene		<0.020	<0.020	RPD-NA	mg/kg	N/A	50	26-SEP-20
Acenaphthylene		<0.013	<0.013	RPD-NA	mg/kg	N/A	50	26-SEP-20

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5238377								
WG3413082-8 DUP		**L2505739-21**						
Anthracene		<0.010	<0.010	RPD-NA	mg/kg	N/A	50	26-SEP-20
Acridine		<0.055	<0.055	RPD-NA	mg/kg	N/A	50	26-SEP-20
Benz(a)anthracene		<0.035	<0.035	RPD-NA	mg/kg	N/A	50	26-SEP-20
Benzo(a)pyrene		<0.025	<0.025	RPD-NA	mg/kg	N/A	50	26-SEP-20
Benzo(b&j)fluoranthene		0.048	0.063		mg/kg	27	50	26-SEP-20
Benzo(e)pyrene		0.056	0.080		mg/kg	35	50	26-SEP-20
Benzo(g,h,i)perylene		0.034	0.042		mg/kg	21	50	26-SEP-20
Benzo(k)fluoranthene		<0.025	<0.025	RPD-NA	mg/kg	N/A	50	26-SEP-20
Chrysene		0.081	0.104		mg/kg	25	50	26-SEP-20
Dibenz(a,h)anthracene		<0.020	<0.020	RPD-NA	mg/kg	N/A	50	26-SEP-20
Fluoranthene		<0.035	<0.035	RPD-NA	mg/kg	N/A	50	26-SEP-20
Fluorene		0.037	0.052		mg/kg	33	50	26-SEP-20
Indeno(1,2,3-c,d)pyrene		<0.025	<0.025	RPD-NA	mg/kg	N/A	50	26-SEP-20
2-Methylnaphthalene		0.410	0.530		mg/kg	26	50	26-SEP-20
Naphthalene		0.154	0.198		mg/kg	25	50	26-SEP-20
Perylene		<0.025	<0.025	RPD-NA	mg/kg	N/A	50	26-SEP-20
Phenanthrene		0.242	0.321		mg/kg	28	50	26-SEP-20
Pyrene		0.031	0.050		mg/kg	46	50	26-SEP-20
1-Methylnaphthalene		0.251	0.333		mg/kg	28	50	26-SEP-20
Quinoline		<0.025	<0.025	RPD-NA	mg/kg	N/A	50	26-SEP-20
WG3413082-3 IRM		**ALS PAH RM2**						
Acenaphthene			102.6		%		60-130	26-SEP-20
Acenaphthylene			110.5		%		60-130	26-SEP-20
Anthracene			111.9		%		60-130	26-SEP-20
Acridine			104.0		%		60-130	26-SEP-20
Benz(a)anthracene			99.4		%		60-130	26-SEP-20
Benzo(a)pyrene			95.1		%		60-130	26-SEP-20
Benzo(b&j)fluoranthene			93.6		%		60-130	26-SEP-20
Benzo(e)pyrene			100.5		%		60-130	26-SEP-20
Benzo(g,h,i)perylene			90.7		%		60-130	26-SEP-20
Benzo(k)fluoranthene			82.0		%		60-130	26-SEP-20
Chrysene			98.8		%		60-130	26-SEP-20
Dibenz(a,h)anthracene			92.5		%		60-130	26-SEP-20
Fluoranthene			93.8		%		60-130	26-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5238377								
WG3413082-3 IRM		**ALS PAH RM2**						
Fluorene			97.9		%		60-130	26-SEP-20
Indeno(1,2,3-c,d)pyrene			114.6		%		60-130	26-SEP-20
2-Methylnaphthalene			92.2		%		60-130	26-SEP-20
Naphthalene			97.3		%		50-130	26-SEP-20
Perylene			93.2		%		60-130	26-SEP-20
Phenanthrene			96.5		%		60-130	26-SEP-20
Pyrene			95.9		%		60-130	26-SEP-20
1-Methylnaphthalene			91.3		%		60-130	26-SEP-20
WG3413082-5 IRM		**ALS PAH RM2**						
Acenaphthene			102.8		%		60-130	26-SEP-20
Acenaphthylene			112.1		%		60-130	26-SEP-20
Anthracene			112.4		%		60-130	26-SEP-20
Acridine			101.8		%		60-130	26-SEP-20
Benz(a)anthracene			99.5		%		60-130	26-SEP-20
Benzo(a)pyrene			93.4		%		60-130	26-SEP-20
Benzo(b&j)fluoranthene			93.3		%		60-130	26-SEP-20
Benzo(e)pyrene			99.6		%		60-130	26-SEP-20
Benzo(g,h,i)perylene			88.7		%		60-130	26-SEP-20
Benzo(k)fluoranthene			89.9		%		60-130	26-SEP-20
Chrysene			99.9		%		60-130	26-SEP-20
Dibenz(a,h)anthracene			86.7		%		60-130	26-SEP-20
Fluoranthene			94.7		%		60-130	26-SEP-20
Fluorene			97.0		%		60-130	26-SEP-20
Indeno(1,2,3-c,d)pyrene			108.7		%		60-130	26-SEP-20
2-Methylnaphthalene			94.1		%		60-130	26-SEP-20
Naphthalene			101.2		%		50-130	26-SEP-20
Perylene			89.0		%		60-130	26-SEP-20
Phenanthrene			96.6		%		60-130	26-SEP-20
Pyrene			96.2		%		60-130	26-SEP-20
1-Methylnaphthalene			93.0		%		60-130	26-SEP-20
WG3413082-9 IRM		**ALS PAH RM2**						
Acenaphthene			89.7		%		60-130	26-SEP-20
Acenaphthylene			102.9		%		60-130	26-SEP-20
Anthracene			105.1		%		60-130	26-SEP-20
Acridine			99.5		%		60-130	26-SEP-20

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5238377								
WG3413082-9 IRM		**ALS PAH RM2**						
Benz(a)anthracene			92.7		%		60-130	26-SEP-20
Benzo(a)pyrene			89.1		%		60-130	26-SEP-20
Benzo(b&j)fluoranthene			87.4		%		60-130	26-SEP-20
Benzo(e)pyrene			93.7		%		60-130	26-SEP-20
Benzo(g,h,i)perylene			80.0		%		60-130	26-SEP-20
Benzo(k)fluoranthene			69.2		%		60-130	26-SEP-20
Chrysene			89.3		%		60-130	26-SEP-20
Dibenz(a,h)anthracene			77.6		%		60-130	26-SEP-20
Fluoranthene			84.8		%		60-130	26-SEP-20
Fluorene			86.5		%		60-130	26-SEP-20
Indeno(1,2,3-c,d)pyrene			105.8		%		60-130	26-SEP-20
2-Methylnaphthalene			83.9		%		60-130	26-SEP-20
Naphthalene			84.9		%		50-130	26-SEP-20
Perylene			95.5		%		60-130	26-SEP-20
Phenanthrene			87.9		%		60-130	26-SEP-20
Pyrene			86.7		%		60-130	26-SEP-20
1-Methylnaphthalene			80.2		%		60-130	26-SEP-20
WG3413082-10 LCS								
Acenaphthene			100.3		%		60-130	26-SEP-20
Acenaphthylene			91.6		%		60-130	26-SEP-20
Anthracene			90.2		%		60-130	26-SEP-20
Acridine			87.5		%		60-130	26-SEP-20
Benz(a)anthracene			98.6		%		60-130	26-SEP-20
Benzo(a)pyrene			89.5		%		60-130	26-SEP-20
Benzo(b&j)fluoranthene			97.8		%		60-130	26-SEP-20
Benzo(e)pyrene			96.5		%		60-130	26-SEP-20
Benzo(g,h,i)perylene			87.1		%		60-130	26-SEP-20
Benzo(k)fluoranthene			90.2		%		60-130	26-SEP-20
Chrysene			93.2		%		60-130	26-SEP-20
Dibenz(a,h)anthracene			87.2		%		60-130	26-SEP-20
Fluoranthene			93.7		%		60-130	26-SEP-20
Fluorene			92.4		%		60-130	26-SEP-20
Indeno(1,2,3-c,d)pyrene			100.6		%		60-130	26-SEP-20
2-Methylnaphthalene			97.4		%		60-130	26-SEP-20

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5238377								
WG3413082-10 LCS								
Naphthalene			102.0		%		50-130	26-SEP-20
Perylene			90.5		%		60-130	26-SEP-20
Phenanthrene			99.3		%		60-130	26-SEP-20
Pyrene			97.8		%		60-130	26-SEP-20
1-Methylnaphthalene			95.4		%		60-130	26-SEP-20
Quinoline			90.7		%		60-130	26-SEP-20
WG3413082-4 LCS								
Acenaphthene			105.8		%		60-130	26-SEP-20
Acenaphthylene			102.6		%		60-130	26-SEP-20
Anthracene			102.1		%		60-130	26-SEP-20
Acridine			93.8		%		60-130	26-SEP-20
Benz(a)anthracene			106.1		%		60-130	26-SEP-20
Benzo(a)pyrene			97.2		%		60-130	26-SEP-20
Benzo(b&j)fluoranthene			102.0		%		60-130	26-SEP-20
Benzo(e)pyrene			105.7		%		60-130	26-SEP-20
Benzo(g,h,i)perylene			95.9		%		60-130	26-SEP-20
Benzo(k)fluoranthene			102.2		%		60-130	26-SEP-20
Chrysene			101.8		%		60-130	26-SEP-20
Dibenz(a,h)anthracene			94.7		%		60-130	26-SEP-20
Fluoranthene			102.5		%		60-130	26-SEP-20
Fluorene			100.0		%		60-130	26-SEP-20
Indeno(1,2,3-c,d)pyrene			106.3		%		60-130	26-SEP-20
2-Methylnaphthalene			103.2		%		60-130	26-SEP-20
Naphthalene			111.5		%		50-130	26-SEP-20
Perylene			97.9		%		60-130	26-SEP-20
Phenanthrene			106.7		%		60-130	26-SEP-20
Pyrene			105.6		%		60-130	26-SEP-20
1-Methylnaphthalene			104.4		%		60-130	26-SEP-20
Quinoline			97.6		%		60-130	26-SEP-20
WG3413082-6 LCS								
Acenaphthene			125.1		%		60-130	26-SEP-20
Acenaphthylene			115.0		%		60-130	26-SEP-20
Anthracene			110.9		%		60-130	26-SEP-20
Acridine			109.7		%		60-130	26-SEP-20
Benz(a)anthracene			121.5		%		60-130	26-SEP-20

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5238377								
WG3413082-6 LCS								
Benzo(a)pyrene			110.3		%		60-130	26-SEP-20
Benzo(b&j)fluoranthene			118.8		%		60-130	26-SEP-20
Benzo(e)pyrene			119.7		%		60-130	26-SEP-20
Benzo(g,h,i)perylene			108.8		%		60-130	26-SEP-20
Benzo(k)fluoranthene			113.1		%		60-130	26-SEP-20
Chrysene			116.3		%		60-130	26-SEP-20
Dibenz(a,h)anthracene			108.9		%		60-130	26-SEP-20
Fluoranthene			117.7		%		60-130	26-SEP-20
Fluorene			115.1		%		60-130	26-SEP-20
Indeno(1,2,3-c,d)pyrene			114.3		%		60-130	26-SEP-20
2-Methylnaphthalene			120.5		%		60-130	26-SEP-20
Naphthalene			122.7		%		50-130	26-SEP-20
Perylene			114.6		%		60-130	26-SEP-20
Phenanthrene			123.8		%		60-130	26-SEP-20
Pyrene			121.6		%		60-130	26-SEP-20
1-Methylnaphthalene			119.7		%		60-130	26-SEP-20
Quinoline			113.2		%		60-130	26-SEP-20
WG3413082-1 MB								
Acenaphthene			<0.0050		mg/kg		0.005	25-SEP-20
Acenaphthylene			<0.0050		mg/kg		0.005	25-SEP-20
Anthracene			<0.0040		mg/kg		0.004	25-SEP-20
Acridine			<0.010		mg/kg		0.01	25-SEP-20
Benz(a)anthracene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	25-SEP-20
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Chrysene			<0.010		mg/kg		0.01	25-SEP-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	25-SEP-20
Fluoranthene			<0.010		mg/kg		0.01	25-SEP-20
Fluorene			<0.010		mg/kg		0.01	25-SEP-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	25-SEP-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	25-SEP-20

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5238377								
WG3413082-1 MB								
Naphthalene			<0.010		mg/kg		0.01	25-SEP-20
Perylene			<0.010		mg/kg		0.01	25-SEP-20
Phenanthrene			<0.010		mg/kg		0.01	25-SEP-20
Pyrene			<0.010		mg/kg		0.01	25-SEP-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	25-SEP-20
Quinoline			<0.050		mg/kg		0.05	25-SEP-20
Surrogate: d8-Naphthalene			98.9		%		50-130	25-SEP-20
Surrogate: d10-Acenaphthene			101.0		%		60-130	25-SEP-20
Surrogate: d10-Phenanthrene			99.0		%		60-130	25-SEP-20
Surrogate: d12-Chrysene			106.6		%		60-130	25-SEP-20
WG3413082-7 MB								
Acenaphthene			<0.0050		mg/kg		0.005	26-SEP-20
Acenaphthylene			<0.0050		mg/kg		0.005	26-SEP-20
Anthracene			<0.0040		mg/kg		0.004	26-SEP-20
Acridine			<0.010		mg/kg		0.01	26-SEP-20
Benz(a)anthracene			<0.010		mg/kg		0.01	26-SEP-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	26-SEP-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	26-SEP-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	26-SEP-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	26-SEP-20
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	26-SEP-20
Chrysene			<0.010		mg/kg		0.01	26-SEP-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	26-SEP-20
Fluoranthene			<0.010		mg/kg		0.01	26-SEP-20
Fluorene			<0.010		mg/kg		0.01	26-SEP-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	26-SEP-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	26-SEP-20
Naphthalene			<0.010		mg/kg		0.01	26-SEP-20
Perylene			<0.010		mg/kg		0.01	26-SEP-20
Phenanthrene			<0.010		mg/kg		0.01	26-SEP-20
Pyrene			<0.010		mg/kg		0.01	26-SEP-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	26-SEP-20
Quinoline			<0.050		mg/kg		0.05	26-SEP-20
Surrogate: d8-Naphthalene			104.4		%		50-130	26-SEP-20

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5238377								
WG3413082-7 MB								
Surrogate: d10-Acenaphthene			108.2		%		60-130	26-SEP-20
Surrogate: d10-Phenanthrene			101.6		%		60-130	26-SEP-20
Surrogate: d12-Chrysene			110.0		%		60-130	26-SEP-20
PH-1:2-CL	**Soil**							
Batch R5238676								
WG3412993-3 DUP		**L2505739-10**						
pH (1:2 soil:water)		8.00	7.98	J	pH	0.02	0.2	26-SEP-20
WG3412993-6 DUP		**L2505739-28**						
pH (1:2 soil:water)		8.09	8.05	J	pH	0.04	0.2	26-SEP-20
WG3412993-2 IRM		**SAL-STD10**						
pH (1:2 soil:water)			7.70		pH		7.4-8	26-SEP-20
WG3412993-5 IRM		**SAL-STD10**						
pH (1:2 soil:water)			7.72		pH		7.4-8	26-SEP-20
WG3412993-8 IRM		**SAL-STD10**						
pH (1:2 soil:water)			7.70		pH		7.4-8	26-SEP-20
WG3412993-1 LCS								
pH (1:2 soil:water)			7.02		pH		6.8-7.2	26-SEP-20
WG3412993-4 LCS								
pH (1:2 soil:water)			7.01		pH		6.8-7.2	26-SEP-20
WG3412993-7 LCS								
pH (1:2 soil:water)			7.01		pH		6.8-7.2	26-SEP-20
PSA-PIPET-DETAIL-SK	**Soil**							
Batch R5241412								
WG3412285-1 DUP		**L2505739-7**						
% Gravel (>2mm)		1.2	1.2	J	%	0.0	5	28-SEP-20
% Sand (2.00mm - 1.00mm)		2.5	2.9	J	%	0.4	5	28-SEP-20
% Sand (1.00mm - 0.50mm)		4.4	4.4	J	%	0.0	5	28-SEP-20
% Sand (0.50mm - 0.25mm)		10.8	11.5	J	%	0.7	5	28-SEP-20
% Sand (0.25mm - 0.125mm)		21.0	21.3	J	%	0.4	5	28-SEP-20
% Sand (0.125mm - 0.063mm)		18.0	17.4	J	%	0.6	5	28-SEP-20
% Silt (0.063mm - 0.0312mm)		17.1	16.6	J	%	0.6	5	28-SEP-20
% Silt (0.0312mm - 0.004mm)		20.5	20.2	J	%	0.2	5	28-SEP-20
% Clay (<4um)		4.5	4.5	J	%	0.0	5	28-SEP-20
WG3412285-2 IRM		**2017-PSA**						
% Sand (2.00mm - 1.00mm)			2.7		%		0-7.6	28-SEP-20
% Sand (1.00mm - 0.50mm)			4.0		%		0-8.9	28-SEP-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PSA-PIPET-DETAIL-SK	**Soil**							
Batch R5241412								
WG3412285-2 IRM		**2017-PSA**						
% Sand (0.50mm - 0.25mm)			10.3		%		5.3-15.3	28-SEP-20
% Sand (0.25mm - 0.125mm)			14.9		%		10-20	28-SEP-20
% Sand (0.125mm - 0.063mm)			12.7		%		7.3-17.3	28-SEP-20
% Silt (0.063mm - 0.0312mm)			14.8		%		9.9-19.9	28-SEP-20
% Silt (0.0312mm - 0.004mm)			22.4		%		17.6-27.6	28-SEP-20
% Clay (<4um)			18.2		%		13.4-23.4	28-SEP-20
Batch R5241854								
WG3412289-1 DUP		**L2505739-26**						
% Gravel (>2mm)		<1.0	<1.0	RPD-NA	%	N/A	5	28-SEP-20
% Sand (2.00mm - 1.00mm)		1.7	1.8	J	%	0.1	5	28-SEP-20
% Sand (1.00mm - 0.50mm)		6.7	6.5	J	%	0.2	5	28-SEP-20
% Sand (0.50mm - 0.25mm)		8.5	9.8	J	%	1.2	5	28-SEP-20
% Sand (0.25mm - 0.125mm)		9.0	9.0	J	%	0.0	5	28-SEP-20
% Sand (0.125mm - 0.063mm)		8.7	8.6	J	%	0.1	5	28-SEP-20
% Silt (0.063mm - 0.0312mm)		27.8	27.4	J	%	0.5	5	28-SEP-20
% Silt (0.0312mm - 0.004mm)		31.5	30.8	J	%	0.7	5	28-SEP-20
% Clay (<4um)		5.3	5.5	J	%	0.1	5	28-SEP-20
WG3412289-2 IRM		**2017-PSA**						
% Sand (2.00mm - 1.00mm)			2.5		%		0-7.6	28-SEP-20
% Sand (1.00mm - 0.50mm)			4.0		%		0-8.9	28-SEP-20
% Sand (0.50mm - 0.25mm)			10.1		%		5.3-15.3	28-SEP-20
% Sand (0.25mm - 0.125mm)			15.5		%		10-20	28-SEP-20
% Sand (0.125mm - 0.063mm)			12.5		%		7.3-17.3	28-SEP-20
% Silt (0.063mm - 0.0312mm)			14.6		%		9.9-19.9	28-SEP-20
% Silt (0.0312mm - 0.004mm)			22.6		%		17.6-27.6	28-SEP-20
% Clay (<4um)			18.1		%		13.4-23.4	28-SEP-20
Batch R5242117								
WG3412291-2 IRM		**2017-PSA**						
% Sand (2.00mm - 1.00mm)			2.5		%		0-7.6	29-SEP-20
% Sand (1.00mm - 0.50mm)			3.8		%		0-8.9	29-SEP-20
% Sand (0.50mm - 0.25mm)			9.9		%		5.3-15.3	29-SEP-20
% Sand (0.25mm - 0.125mm)			14.9		%		10-20	29-SEP-20
% Sand (0.125mm - 0.063mm)			13.1		%		7.3-17.3	29-SEP-20
% Silt (0.063mm - 0.0312mm)			14.6		%		9.9-19.9	29-SEP-20
% Silt (0.0312mm - 0.004mm)			22.4		%		17.6-27.6	29-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PSA-PIPET-DETAIL-SK	**Soil**							
Batch R5242117								
WG3412291-2 IRM		**2017-PSA**						
% Clay (<4um)			18.7		%		13.4-23.4	29-SEP-20

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

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:	CMO LAEMP Sept 2020	TURNAROUND TIME:	

PROJECT/CLIENT INFO				LABORATORY			
Facility Name	REP			Lab Name	ALS Calgary		
Project Manager	Cait Good			Lab Contact	Lyudmyla Shvets		
Email	cait.good@teck.com			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
cait.good@teck.com	x	x	x
teckcoal@equisonline.com			x
jings@minnow.ca	x	x	x
carlie.meyer@teck.com	x	x	x
sweech@minnow.ca	x	x	x

PO number: 689999

SAMPLE DETAILS

L2505739-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
PRESERVED									NONE	NONE	NONE	NONE	NONE
1	RG_AGCK_SE-1_2020-09-10_1622	RG_AGCK	SE	No	10-Sep-20	16:22	G	2	X	X	X	X	X
2	RG_RIVER_SE-5_2020-09-13_0946	RG_RIVER	SE	No	13-Sep-20	9:46	G	2	X	X	X	X	X
3	RG_RIVER_SE-2_2020-09-12_1137	RG_RIVER	SE	No	12-Sep-20	11:37	G	2	X	X	X	X	X
4	RG_RIVER_SE-1_2020-09-11_1016	RG_RIVER	SE	No	11-Sep-20	10:16	G	2	X	X	X	X	X
5	RG_CORCK_SE-1_2020-09-12_1614	RG_CORCK	SE	No	12-Sep-20	16:14	G	2	X	X	X	X	X
6	RG_CORCK_SE-2_2020-09-12_1657	RG_CORCK	SE	No	12-Sep-20	16:57	G	2	X	X	X	X	X
7	RG_CORCK_SE-3_2020-09-12_1704	RG_CORCK	SE	No	12-Sep-20	17:04	G	2	X	X	X	X	X
8	RG_CORCK_SE-4_2020-09-13_0936	RG_CORCK	SE	No	13-Sep-20	9:36	G	2	X	X	X	X	X
9	RG_CORCK_SE-5_2020-09-13_0946	RG_CORCK	SE	No	13-Sep-20	9:46	G	2	X	X	X	X	X
10	RG_MI25_SE-1_2020-09-11_1016	RG_MI25	SE	No	11-Sep-20	10:16	G	2	X	X	X	X	X
11	RG_MI25_SE-2_2020-09-11_1033	RG_MI25	SE	No	11-Sep-20	10:33	G	2	X	X	X	X	X
12	RG_MI25_SE-3_2020-09-11_1455	RG_MI25	SE	No	11-Sep-20	14:55	G	2	X	X	X	X	X
13	RG_MIUCO_SE-1_2020-09-12_1026	RG_MIUCO	SE	No	12-Sep-20	10:26	G	2	X	X	X	X	X
14	RG_MIUCO_SE-2_2020-09-12_1137	RG_MIUCO	SE	No	12-Sep-20	11:37	G	2	X	X	X	X	X
15	RG_MIUCO_SE-3_2020-09-12_1403	RG_MIUCO	SE	No	12-Sep-20	14:03	G	2	X	X	X	X	X
16	RG_MIUCO_SE-4_2020-09-12_1348	RG_MIUCO	SE	No	12-Sep-20	13:48	G	2	X	X	X	X	X
17	RG_MIUCO_SE-5_2020-09-12_1325	RG_MIUCO	SE	No	12-Sep-20	13:25	G	2	X	X	X	X	X
18	RG_MIDCO_SE-1_2020-09-15_0801	RG_MIDCO	SE	No	15-Sep-20	8:01	G	2	X	X	X	X	X
19	RG_MIDCO_SE-2_2020-09-15_0805	RG_MIDCO	SE	No	15-Sep-20	8:05	G	2	X	X	X	X	X
20	RG_MIDCO_SE-3_2020-09-15_0825	RG_MIDCO	SE	No	15-Sep-20	8:25	G	2	X	X	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	
	Jennifer Ings	September 18, 2020	DK	9/19 0830
				7°C

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 18, 2020
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

Page 2 of 2

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COC ID:	CMO LAEMP Sept 2020	TURNAROUND TIME:	

PROJECT/CLIENT INFO | **LABORATORY**

Facility Name	REP			Lab Name	ALS Calgary		
Project Manager	Cait Good			Lab Contact	Lyudmyla Shvets		
Email	cait.good@teck.com			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
cait.good@teck.com	x	x	x
teckcoal@equisonline.com			x
~~jings@minnow.ca~~	x	x	x
carlie.meyer@teck.com	x	x	x
sweech@minnow.ca	x	x	x

PO number: 689999

SAMPLE DETAILS | **ANALYSIS REQUESTED** | Filtered - F: Field, L: Lab, FL: Field & Lab, N: None

L2505739-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
								Filt.	N	N	N	N	N
								Preserv.	NONE	NONE	NONE	NONE	NONE
21	RG_MIDCO_SE-4_2020-09-15_0840	RG_MIDCO	SE	No	15-Sep-20	8:40	G	2	X	X	X	X	X
22	RG_MIDCO_SE-5_2020-09-15_1118	RG_MIDCO	SE	No	15-Sep-20	11:18	G	2	X	X	X	X	X
23	RG_RIVER_SE-2_2020-09-15_0805	RG_RIVER	SE	No	15-Sep-20	8:05	G	2	X	X	X	X	X
24	RG_RIVER_SE-5_2020-09-15_1118	RG_RIVER	SE	No	15-Sep-20	11:18	G	2	X	X	X	X	X
25	RG_MIDAG_SE-1_2020-09-15_1714	RG_MIDAG	SE	No	15-Sep-20	17:14	G	2	X	X	X	X	X
26	RG_MIDAG_SE-2_2020-09-15_1723	RG_MIDAG	SE	No	15-Sep-20	17:23	G	2	X	X	X	X	X
27	RG_MIULE_SE-1_2020-09-16_1145	RG_MIULE	SE	No	16-Sep-20	11:45	G	2	X	X	X	X	X
28	RG_MIULE_SE-2_2020-09-16_1205	RG_MIULE	SE	No	16-Sep-20	12:05	G	2	X	X	X	X	X
29	RG_MIULE_SE-3_2020-09-16_1457	RG_MIULE	SE	No	16-Sep-20	14:57	G	2	X	X	X	X	X
30	RG_MIDAG_SE-3_2020-09-16_0805	RG_MIDAG	SE	No	16-Sep-20	8:05	G	2	X	X	X	X	X
31	RG_MIDAG_SE-4_2020-09-16_0922	RG_MIDAG	SE	No	16-Sep-20	9:22	G	2	X	X	X	X	X
32	RG_MIDAG_SE-5_2020-09-16_0932	RG_MIDAG	SE	No	16-Sep-20	9:32	G	2	X	X	X	X	X
33	RG_RIVER_SE-2_2020-09-16_1208	RG_RIVER	SE	No	16-Sep-20	12:08	G	2	X	X	X	X	X
34	RG_LE1_SE-1_2020-09-17_1420	RG_LE1	SE	No	17-Sep-20	14:20	G	2	X	X	X	X	X
35	RG_LE1_SE-2_2020-09-17_1540	RG_LE1	SE	No	17-Sep-20	15:40	G	2	X	X	X	X	X
36	RG_LE1_SE-3_2020-09-17_1550	RG_LE1	SE	No	17-Sep-20	15:50	G	2	X	X	X	X	X
37	RG_MIULE_SE-4_2020-09-17_0815	RG_MIULE	SE	No	9/17/2020	8:15	G	2	X	X	X	X	X
38	RG_MIULE_SE-5_2020-09-17_0840	RG_MIULE	SE	No	9/17/2020	8:40	G	2	X	X	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
RG_MIDAG_S2_SE-_2020	Jennifer Ings	September 18, 2020	DK	9/19 0830

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 18, 2020
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 25-SEP-20
Report Date: 09-OCT-20 10:41 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2508802

Project P.O. #: NOT SUBMITTED
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: CMO Supplem
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

		L2508802-1	L2508802-2	L2508802-3	L2508802-4	L2508802-5
	Sample ID	L2508802-1	L2508802-2	L2508802-3	L2508802-4	L2508802-5
	Description	SE	SE	SE	SE	SE
	Sampled Date	18-SEP-20	18-SEP-20	18-SEP-20	18-SEP-20	18-SEP-20
	Sampled Time	08:50	09:15	09:35	10:40	10:20
	Client ID	RG_MIDAG-S1_SE-1_2020-09-18_0850	RG_MIDAG-S1_SE-2_2020-09-18_0915	RG_MIDAG-S1_SE-3_2020-09-18_0935	RG_MIDAG-S1_SE-4_2020-09-18_1040	RG_MIDAG-S1_SE-5_2020-09-18_1020
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	64.6	66.9	65.9	65.9	52.1
	pH (1:2 soil:water) (pH)	7.32	7.23	7.39	7.45	7.65
Particle Size	% Gravel (>2mm) (%)	2.3	<1.0	<1.0	1.1	<1.0
	% Sand (2.00mm - 1.00mm) (%)	4.0	2.1	2.4	3.3	<1.0
	% Sand (1.00mm - 0.50mm) (%)	4.9	5.5	6.0	6.9	<1.0
	% Sand (0.50mm - 0.25mm) (%)	11.8	16.7	9.6	12.6	4.6
	% Sand (0.25mm - 0.125mm) (%)	12.1	14.6	13.1	13.8	15.4
	% Sand (0.125mm - 0.063mm) (%)	11.5	9.7	13.9	12.0	18.8
	% Silt (0.063mm - 0.0312mm) (%)	23.1	21.4	22.5	21.8	25.8
	% Silt (0.0312mm - 0.004mm) (%)	26.3	25.4	27.0	24.7	29.3
	% Clay (<4um) (%)	4.1	4.4	5.1	3.7	4.8
	Texture	Silt loam	Sandy loam	Sandy loam	Sandy loam	Silt loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	8.73	8.44	8.87	8.22	4.95
Metals	Aluminum (Al) (mg/kg)	9780	12300	12600	13200	11900
	Antimony (Sb) (mg/kg)	0.51	0.41	0.37	0.29	0.35
	Arsenic (As) (mg/kg)	7.96	8.19	7.77	8.36	8.47
	Barium (Ba) (mg/kg)	115	142	151	131	149
	Beryllium (Be) (mg/kg)	0.79	0.87	0.89	0.86	0.76
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	12.8	16.8	14.7	13.9	13.8
	Cadmium (Cd) (mg/kg)	1.23	1.34	1.21	1.29	0.889
	Calcium (Ca) (mg/kg)	54300	55900	37100	52400	45300
	Chromium (Cr) (mg/kg)	17.0	18.1	18.5	19.9	17.5
	Cobalt (Co) (mg/kg)	45.7	41.4	32.9	34.5	12.3
	Copper (Cu) (mg/kg)	16.5	15.7	16.5	16.8	13.7
	Iron (Fe) (mg/kg)	14400	15700	15500	15800	15400
	Lead (Pb) (mg/kg)	9.55	9.49	9.76	9.69	8.89
	Lithium (Li) (mg/kg)	13.4	16.4	16.1	15.8	14.6
	Magnesium (Mg) (mg/kg)	12100	11000	10400	12900	12200
	Manganese (Mn) (mg/kg)	483	694	496	693	867
	Mercury (Hg) (mg/kg)	0.0473	0.0452	0.0475	0.0473	0.0366
	Molybdenum (Mo) (mg/kg)	1.56	1.66	1.54	1.60	1.72
	Nickel (Ni) (mg/kg)	111	83.3	76.0	88.7	33.2
	Phosphorus (P) (mg/kg)	1170	1270	1110	1270	1170
	Potassium (K) (mg/kg)	2090	2810	2830	3010	2820
	Selenium (Se) (mg/kg)	2.12	2.26	2.03	2.13	1.72
	Silver (Ag) (mg/kg)	0.19	0.16	0.17	0.16	0.12

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2508802-6	L2508802-7	L2508802-8	L2508802-9	L2508802-10
	Description	SE	SE	SE	SE	SE
	Sampled Date	18-SEP-20	18-SEP-20	18-SEP-20	18-SEP-20	18-SEP-20
	Sampled Time	14:08	14:35	14:50	14:58	15:10
	Client ID	CM_MC2_SE-1_2020-09-18_1408	CM_MC2_SE-2_2020-09-18_1435	CM_MC2_SE-3_2020-09-18_1450	CM_MC2_SE-4_2020-09-18_1458	CM_MC2_SE-5_2020-09-18_1510
SOIL						
Physical Tests	Moisture (%)	76.1	73.4	64.4	75.3	72.4
	pH (1:2 soil:water) (pH)	6.96	7.05	7.09	7.04	7.02
Particle Size	% Gravel (>2mm) (%)	2.1	<1.0	1.2	1.1	<1.0
	% Sand (2.00mm - 1.00mm) (%)	1.9	5.8	1.6	3.5	<1.0
	% Sand (1.00mm - 0.50mm) (%)	6.8	8.7	3.8	6.2	2.3
	% Sand (0.50mm - 0.25mm) (%)	12.1	11.4	18.8	7.1	8.5
	% Sand (0.25mm - 0.125mm) (%)	13.5	11.7	20.3	11.7	13.6
	% Sand (0.125mm - 0.063mm) (%)	10.1	10.7	10.5	10.6	13.7
	% Silt (0.063mm - 0.0312mm) (%)	23.7	22.8	19.6	27.5	28.3
	% Silt (0.0312mm - 0.004mm) (%)	26.2	25.1	21.3	29.0	29.3
	% Clay (<4um) (%)	3.5	3.1	3.0	3.3	3.4
	Texture	Silt loam	Sandy loam	Sandy loam	Silt loam	Silt loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	4.6	3.9	4.0	4.4	4.3
Metals	Aluminum (Al) (mg/kg)	5110	7470	9360	6270	6800
	Antimony (Sb) (mg/kg)	0.18	0.24	0.30	0.20	0.19
	Arsenic (As) (mg/kg)	2.62	3.77	5.14	3.13	3.03
	Barium (Ba) (mg/kg)	150	163	156	153	153
	Beryllium (Be) (mg/kg)	0.30	0.46	0.59	0.39	0.38
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	10.6	12.8	13.1	11.9	12.7
	Cadmium (Cd) (mg/kg)	1.33	1.45	1.34	1.42	1.54
	Calcium (Ca) (mg/kg)	210000	202000	140000	204000	209000
	Chromium (Cr) (mg/kg)	7.15	9.70	12.4	8.09	9.33
	Cobalt (Co) (mg/kg)	82.3	86.4	70.8	94.0	88.8
	Copper (Cu) (mg/kg)	5.64	8.04	10.6	7.20	6.77
	Iron (Fe) (mg/kg)	6240	9270	12900	8400	7440
	Lead (Pb) (mg/kg)	3.58	4.82	7.17	4.24	3.93
	Lithium (Li) (mg/kg)	6.4	9.9	12.7	8.6	8.2
	Magnesium (Mg) (mg/kg)	6150	7150	6870	6450	6710
	Manganese (Mn) (mg/kg)	581	595	603	752	595
	Mercury (Hg) (mg/kg)	0.0116	0.0122	0.0174	0.0142	0.0145
	Molybdenum (Mo) (mg/kg)	0.68	0.93	1.41	0.79	0.84
	Nickel (Ni) (mg/kg)	123	133	106	136	130
	Phosphorus (P) (mg/kg)	585	727	978	570	633
	Potassium (K) (mg/kg)	1520	2050	2350	1720	1970
	Selenium (Se) (mg/kg)	1.81	2.15	1.64	2.11	2.29
	Silver (Ag) (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2508802-1	L2508802-2	L2508802-3	L2508802-4	L2508802-5
	Description	SE	SE	SE	SE	SE
	Sampled Date	18-SEP-20	18-SEP-20	18-SEP-20	18-SEP-20	18-SEP-20
	Sampled Time	08:50	09:15	09:35	10:40	10:20
	Client ID	RG_MIDAG-S1_SE-1_2020-09-18_0850	RG_MIDAG-S1_SE-2_2020-09-18_0915	RG_MIDAG-S1_SE-3_2020-09-18_0935	RG_MIDAG-S1_SE-4_2020-09-18_1040	RG_MIDAG-S1_SE-5_2020-09-18_1020
SOIL						
Metals	Sodium (Na) (mg/kg)	196	165	159	188	152
	Strontium (Sr) (mg/kg)	87.8	85.9	69.5	87.0	70.0
	Sulfur (S) (mg/kg)	1100	<1000	<1000	<1000	<1000
	Thallium (Tl) (mg/kg)	0.556	0.596	0.526	0.560	0.453
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	26.5	16.9	14.1	12.3	15.4
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	0.979	1.12	1.00	0.982	0.901
	Vanadium (V) (mg/kg)	28.0	30.8	31.6	33.3	31.0
	Zinc (Zn) (mg/kg)	129	133	127	140	106
	Zirconium (Zr) (mg/kg)	1.1	<1.0	<1.0	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.030 DLCI	<0.020 DLCI	<0.020 DLCI	<0.020 DLCI	<0.020 DLCI
	Acenaphthylene (mg/kg)	<0.0070 DLHM	<0.0070 DLHM	<0.0070 DLHM	<0.0050	<0.0050
	Acridine (mg/kg)	<0.014 DLHM	<0.014 DLHM	<0.040 DLCI	<0.020 DLCI	<0.010
	Anthracene (mg/kg)	0.0094 DLHM	<0.0056 DLHM	<0.0056 DLHM	<0.0040	<0.0040
	Benz(a)anthracene (mg/kg)	0.030 DLHM	0.030 DLHM	<0.050 DLCI	0.019	0.017
	Benzo(a)pyrene (mg/kg)	0.016 DLHM	0.015 DLHM	0.018 DLHM	0.011	<0.010
	Benzo(b&j)fluoranthene (mg/kg)	0.134 DLHM	0.088 DLHM	0.113 DLHM	0.080	0.070
	Benzo(b+j+k)fluoranthene (mg/kg)	0.134	0.104	0.128	0.080	0.070
	Benzo(e)pyrene (mg/kg)	0.122 DLHM	0.087 DLHM	0.111 DLHM	0.085	0.077
	Benzo(g,h,i)perylene (mg/kg)	0.042 DLHM	0.031 DLHM	0.039 DLHM	0.029	0.026
	Benzo(k)fluoranthene (mg/kg)	<0.014 DLHM	0.016 DLHM	0.015 DLHM	<0.010	<0.010
	Chrysene (mg/kg)	<0.20 DLCI	0.153 DLHM	<0.19 DLCI	<0.14 DLCI	0.119
	Dibenz(a,h)anthracene (mg/kg)	0.0116 DLHM	0.0087 DLHM	0.0164 DLHM	0.0096	0.0080
	Fluoranthene (mg/kg)	0.057 DLHM	0.043 DLHM	0.049 DLHM	0.033	0.029
	Fluorene (mg/kg)	0.049 DLHM	0.039 DLHM	0.031 DLHM	0.032	0.027
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.014 DLHM	<0.014 DLHM	0.020 DLHM	0.011	<0.010
	1-Methylnaphthalene (mg/kg)	0.405 DLHM	0.278 DLHM	0.346 DLHM	0.314	0.230
	2-Methylnaphthalene (mg/kg)	0.574 DLHM	0.424 DLHM	0.506 DLHM	0.489	0.341
	Naphthalene (mg/kg)	0.240 DLHM	0.193 DLHM	0.245 DLHM	0.222	0.152
	Perylene (mg/kg)	0.017 DLHM	0.015 DLHM	0.015 DLHM	0.014	0.013
	Phenanthrene (mg/kg)	0.553 DLHM	0.352 DLHM	0.477 DLHM	0.353	0.310
	Pyrene (mg/kg)	0.069 DLHM	<0.060 DLCI	0.063 DLHM	0.042	0.037
	Quinoline (mg/kg)	<0.014 DLHM	<0.014 DLHM	<0.014 DLHM	<0.050	<0.050
	Surrogate: d10-Acenaphthene (%)	95.8	91.0	95.0	96.8	93.6
	Surrogate: d12-Chrysene (%)	104.2	99.2	104.8	110.6	100.4

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		L2508802-6	L2508802-7	L2508802-8	L2508802-9	L2508802-10
	Sample ID	L2508802-6	L2508802-7	L2508802-8	L2508802-9	L2508802-10
	Description	SE	SE	SE	SE	SE
	Sampled Date	18-SEP-20	18-SEP-20	18-SEP-20	18-SEP-20	18-SEP-20
	Sampled Time	14:08	14:35	14:50	14:58	15:10
	Client ID	CM_MC2_SE-1_2020-09-18_1408	CM_MC2_SE-2_2020-09-18_1435	CM_MC2_SE-3_2020-09-18_1450	CM_MC2_SE-4_2020-09-18_1458	CM_MC2_SE-5_2020-09-18_1510
Grouping	**Analyte**					
SOIL						
Metals	Sodium (Na) (mg/kg)	380	370	285	360	329
	Strontium (Sr) (mg/kg)	336	291	213	286	285
	Sulfur (S) (mg/kg)	3800	3600	2600	3700	3800
	Thallium (Tl) (mg/kg)	0.154	0.207	0.270	0.190	0.188
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	16.2	17.0	19.1	15.3	15.2
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	1.47	1.21	1.14	1.12	1.20
	Vanadium (V) (mg/kg)	12.4	16.8	21.9	13.5	15.6
	Zinc (Zn) (mg/kg)	113	132	129	128	133
	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 0.0069	DLHM <0.010	DLHM <0.0080
	Acenaphthylene (mg/kg)	DLHM <0.010	DLHM <0.010	DLHM <0.0065	DLHM <0.010	DLHM <0.0080
	Acridine (mg/kg)	DLHM <0.020	DLHM <0.020	DLHM <0.013	DLHM <0.020	DLHM <0.016
	Anthracene (mg/kg)	DLHM <0.0080	DLHM 0.0081	DLHM <0.0052	DLHM <0.0080	DLHM 0.0074
	Benz(a)anthracene (mg/kg)	DLHM <0.020	DLHM <0.020	DLHM <0.013	DLHM <0.020	DLHM <0.016
	Benzo(a)pyrene (mg/kg)	DLHM <0.020	DLHM <0.020	DLHM <0.013	DLHM <0.020	DLHM <0.016
	Benzo(b&j)fluoranthene (mg/kg)	DLHM 0.037	DLHM 0.035	DLHM 0.038	DLHM 0.028	DLHM 0.029
	Benzo(b+j+k)fluoranthene (mg/kg)	0.037	0.035	0.038	<0.028	0.029
	Benzo(e)pyrene (mg/kg)	DLHM 0.048	DLHM <0.020	DLHM 0.045	DLHM 0.040	DLHM <0.016
	Benzo(g,h,i)perylene (mg/kg)	DLHM 0.020	DLHM <0.020	DLHM 0.016	DLHM <0.020	DLHM 0.017
	Benzo(k)fluoranthene (mg/kg)	DLHM <0.020	DLHM <0.020	DLHM <0.013	DLHM <0.020	DLHM <0.016
	Chrysene (mg/kg)	DLHM 0.060	DLHM 0.063	DLCI <0.070	DLHM 0.054	DLCI <0.060
	Dibenz(a,h)anthracene (mg/kg)	DLHM <0.010	DLHM <0.010	DLHM <0.0065	DLHM <0.010	DLHM <0.0080
	Fluoranthene (mg/kg)	DLHM <0.020	DLHM <0.020	DLHM <0.013	DLHM <0.020	DLHM <0.016
	Fluorene (mg/kg)	DLHM 0.027	DLCI <0.030	DLHM 0.023	DLHM 0.033	DLHM 0.020
	Indeno(1,2,3-c,d)pyrene (mg/kg)	DLHM <0.020	DLHM <0.020	DLHM <0.013	DLHM <0.020	DLHM <0.016
	1-Methylnaphthalene (mg/kg)	DLHM 0.173	DLHM 0.150	DLHM 0.177	DLHM 0.171	DLHM 0.171
	2-Methylnaphthalene (mg/kg)	DLHM 0.277	DLHM 0.253	DLHM 0.287	DLHM 0.285	DLHM 0.277
	Naphthalene (mg/kg)	DLHM 0.104	DLHM 0.098	DLHM 0.141	DLHM 0.112	DLHM 0.109
	Perylene (mg/kg)	DLHM <0.020	DLHM <0.020	DLHM <0.013	DLHM <0.020	DLHM <0.016
	Phenanthrene (mg/kg)	DLHM 0.160	DLHM 0.151	DLHM 0.182	DLHM 0.158	DLHM 0.158
	Pyrene (mg/kg)	DLHM 0.023	DLHM <0.020	DLHM 0.022	DLHM <0.020	DLHM 0.021
	Quinoline (mg/kg)	DLHM <0.020	DLHM <0.020	DLHM <0.013	DLHM <0.020	DLHM <0.016
	Surrogate: d10-Acenaphthene (%)	102.3	97.6	94.1	93.6	98.6
	Surrogate: d12-Chrysene (%)	117.3	109.9	107.4	104.5	114.3

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508802-1	L2508802-2	L2508802-3	L2508802-4	L2508802-5
	Description	SE	SE	SE	SE	SE
	Sampled Date	18-SEP-20	18-SEP-20	18-SEP-20	18-SEP-20	18-SEP-20
	Sampled Time	08:50	09:15	09:35	10:40	10:20
	Client ID	RG_MIDAG-S1_SE-1_2020-09-18_0850	RG_MIDAG-S1_SE-2_2020-09-18_0915	RG_MIDAG-S1_SE-3_2020-09-18_0935	RG_MIDAG-S1_SE-4_2020-09-18_1040	RG_MIDAG-S1_SE-5_2020-09-18_1020
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d8-Naphthalene (%)	96.3	93.7	96.8	100.7	93.7
	Surrogate: d10-Phenanthrene (%)	96.6	94.2	96.6	101.6	96.8
	IACR:Coarse	<0.050	<0.050	<0.050	<0.050	<0.050
	IACR:Fine	0.068	0.067	0.074	<0.050	<0.050
	B(a)P Total Potency Equivalent (mg/kg)	0.046	0.040	0.053	0.033	0.024
	IACR (CCME)	1.12	0.90	1.05	0.70	0.63

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508802-6	L2508802-7	L2508802-8	L2508802-9	L2508802-10
	Description	SE	SE	SE	SE	SE
	Sampled Date	18-SEP-20	18-SEP-20	18-SEP-20	18-SEP-20	18-SEP-20
	Sampled Time	14:08	14:35	14:50	14:58	15:10
	Client ID	CM_MC2_SE-1_2020-09-18_1408	CM_MC2_SE-2_2020-09-18_1435	CM_MC2_SE-3_2020-09-18_1450	CM_MC2_SE-4_2020-09-18_1458	CM_MC2_SE-5_2020-09-18_1510
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d8-Naphthalene (%)	100.1	95.9	90.4	92.3	98.1
	Surrogate: d10-Phenanthrene (%)	105.6	100.4	93.4	92.9	97.7
	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)	0.023	0.022	<0.020	0.021	<0.020
	IACR (CCME)	0.41	0.40	0.35	0.34	0.31

* 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

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:

CMO Supplem

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TIC-PCT-SK	**Soil**							
Batch R5251839								
WG3414810-1 DUP		**L2508802-10**						
Inorganic Carbon		6.74	6.92		%	2.8	20	08-OCT-20
WG3414810-4 IRM		**08-109_SOIL**						
Inorganic Carbon			95.7		%		80-120	08-OCT-20
WG3414810-2 LCS		**0.5**						
Inorganic Carbon			99.2		%		90-110	08-OCT-20
WG3414810-3 MB								
Inorganic Carbon			<0.050		%		0.05	08-OCT-20
C-TOT-LECO-SK	**Soil**							
Batch R5251117								
WG3414875-2 IRM		**08-109_SOIL**						
Total Carbon by Combustion			95.3		%		80-120	06-OCT-20
WG3414875-4 LCS		**SULFADIAZINE**						
Total Carbon by Combustion			97.0		%		90-110	06-OCT-20
WG3414875-3 MB								
Total Carbon by Combustion			<0.05		%		0.05	06-OCT-20
MET-200.2-CCMS-CL	**Soil**							
Batch R5243567								
WG3416136-9 CRM		**TILL-1**						
Aluminum (Al)			117.8		%		70-130	01-OCT-20
Antimony (Sb)			110.6		%		70-130	01-OCT-20
Arsenic (As)			111.7		%		70-130	01-OCT-20
Barium (Ba)			105.0		%		70-130	01-OCT-20
Beryllium (Be)			108.4		%		70-130	01-OCT-20
Bismuth (Bi)			99.5		%		70-130	01-OCT-20
Boron (B)			4.9		mg/kg		0-8.2	01-OCT-20
Cadmium (Cd)			108.7		%		70-130	01-OCT-20
Calcium (Ca)			123.2		%		70-130	01-OCT-20
Chromium (Cr)			119.7		%		70-130	01-OCT-20
Cobalt (Co)			114.1		%		70-130	01-OCT-20
Copper (Cu)			110.0		%		70-130	01-OCT-20
Iron (Fe)			113.6		%		70-130	01-OCT-20
Lead (Pb)			102.4		%		70-130	01-OCT-20
Lithium (Li)			111.0		%		70-130	01-OCT-20
Magnesium (Mg)			118.6		%		70-130	01-OCT-20
Manganese (Mn)			111.7		%		70-130	01-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5243567								
WG3416136-9 CRM		**TILL-1**						
Molybdenum (Mo)			109.7		%		70-130	01-OCT-20
Nickel (Ni)			112.3		%		70-130	01-OCT-20
Phosphorus (P)			107.7		%		70-130	01-OCT-20
Potassium (K)			123.7		%		70-130	01-OCT-20
Selenium (Se)			0.36		mg/kg		0.11-0.51	01-OCT-20
Silver (Ag)			0.24		mg/kg		0.13-0.33	01-OCT-20
Sodium (Na)			118.3		%		70-130	01-OCT-20
Strontium (Sr)			123.8		%		70-130	01-OCT-20
Thallium (Tl)			0.139		mg/kg		0.077-0.18	01-OCT-20
Tin (Sn)			1.2		mg/kg		0-3.1	01-OCT-20
Titanium (Ti)			126.9		%		70-130	01-OCT-20
Tungsten (W)			0.16		mg/kg		0-0.66	01-OCT-20
Uranium (U)			118.9		%		70-130	01-OCT-20
Vanadium (V)			117.0		%		70-130	01-OCT-20
Zinc (Zn)			113.5		%		70-130	01-OCT-20
Zirconium (Zr)			0.8		mg/kg		0-1.8	01-OCT-20
WG3416136-8 LCS								
Aluminum (Al)			99.99		%		80-120	01-OCT-20
Antimony (Sb)			104.1		%		80-120	01-OCT-20
Arsenic (As)			104.1		%		80-120	01-OCT-20
Barium (Ba)			98.6		%		80-120	01-OCT-20
Beryllium (Be)			95.7		%		80-120	01-OCT-20
Bismuth (Bi)			92.8		%		80-120	01-OCT-20
Boron (B)			92.7		%		80-120	01-OCT-20
Cadmium (Cd)			100.6		%		80-120	01-OCT-20
Calcium (Ca)			94.1		%		80-120	01-OCT-20
Chromium (Cr)			102.2		%		80-120	01-OCT-20
Cobalt (Co)			101.2		%		80-120	01-OCT-20
Copper (Cu)			99.0		%		80-120	01-OCT-20
Iron (Fe)			100.3		%		80-120	01-OCT-20
Lead (Pb)			100.9		%		80-120	01-OCT-20
Lithium (Li)			95.9		%		80-120	01-OCT-20
Magnesium (Mg)			106.4		%		80-120	01-OCT-20
Manganese (Mn)			100.4		%		80-120	01-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5243567								
WG3416136-8 LCS								
Molybdenum (Mo)			100.6		%		80-120	01-OCT-20
Nickel (Ni)			100.5		%		80-120	01-OCT-20
Potassium (K)			98.0		%		80-120	01-OCT-20
Selenium (Se)			103.8		%		80-120	01-OCT-20
Silver (Ag)			97.4		%		80-120	01-OCT-20
Sodium (Na)			101.4		%		80-120	01-OCT-20
Strontium (Sr)			99.8		%		80-120	01-OCT-20
Sulfur (S)			100.8		%		80-120	01-OCT-20
Thallium (Tl)			95.4		%		80-120	01-OCT-20
Tin (Sn)			99.8		%		80-120	01-OCT-20
Titanium (Ti)			98.3		%		80-120	01-OCT-20
Tungsten (W)			96.5		%		80-120	01-OCT-20
Uranium (U)			97.5		%		80-120	01-OCT-20
Vanadium (V)			102.7		%		80-120	01-OCT-20
Zinc (Zn)			99.2		%		80-120	01-OCT-20
Zirconium (Zr)			96.3		%		80-120	01-OCT-20
WG3416136-6 MB								
Aluminum (Al)			<50		mg/kg		50	01-OCT-20
Antimony (Sb)			<0.10		mg/kg		0.1	01-OCT-20
Arsenic (As)			<0.10		mg/kg		0.1	01-OCT-20
Barium (Ba)			<0.50		mg/kg		0.5	01-OCT-20
Beryllium (Be)			<0.10		mg/kg		0.1	01-OCT-20
Bismuth (Bi)			<0.20		mg/kg		0.2	01-OCT-20
Boron (B)			<5.0		mg/kg		5	01-OCT-20
Cadmium (Cd)			<0.020		mg/kg		0.02	01-OCT-20
Calcium (Ca)			<50		mg/kg		50	01-OCT-20
Chromium (Cr)			<0.50		mg/kg		0.5	01-OCT-20
Cobalt (Co)			<0.10		mg/kg		0.1	01-OCT-20
Copper (Cu)			<0.50		mg/kg		0.5	01-OCT-20
Iron (Fe)			<50		mg/kg		50	01-OCT-20
Lead (Pb)			<0.50		mg/kg		0.5	01-OCT-20
Lithium (Li)			<2.0		mg/kg		2	01-OCT-20
Magnesium (Mg)			<20		mg/kg		20	01-OCT-20
Manganese (Mn)			<1.0		mg/kg		1	01-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5243567								
WG3416136-6 MB								
Molybdenum (Mo)			<0.10		mg/kg		0.1	01-OCT-20
Nickel (Ni)			<0.50		mg/kg		0.5	01-OCT-20
Phosphorus (P)			<50		mg/kg		50	01-OCT-20
Potassium (K)			<100		mg/kg		100	01-OCT-20
Selenium (Se)			<0.20		mg/kg		0.2	01-OCT-20
Silver (Ag)			<0.10		mg/kg		0.1	01-OCT-20
Sodium (Na)			<50		mg/kg		50	01-OCT-20
Strontium (Sr)			<0.50		mg/kg		0.5	01-OCT-20
Sulfur (S)			<1000		mg/kg		1000	01-OCT-20
Thallium (Tl)			<0.050		mg/kg		0.05	01-OCT-20
Tin (Sn)			<2.0		mg/kg		2	01-OCT-20
Titanium (Ti)			<1.0		mg/kg		1	01-OCT-20
Tungsten (W)			<0.50		mg/kg		0.5	01-OCT-20
Uranium (U)			<0.050		mg/kg		0.05	01-OCT-20
Vanadium (V)			<0.20		mg/kg		0.2	01-OCT-20
Zinc (Zn)			<2.0		mg/kg		2	01-OCT-20
Zirconium (Zr)			<1.0		mg/kg		1	01-OCT-20
MOISTURE-CL	**Soil**							
Batch R5243805								
WG3416318-2 LCS								
Moisture			100.6		%		90-110	01-OCT-20
WG3416318-1 MB								
Moisture			<0.25		%		0.25	01-OCT-20
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245163								
WG3418493-14 IRM		**ALS PAH RM2**						
Acenaphthene			99.4		%		60-130	05-OCT-20
Acenaphthylene			119.8		%		60-130	05-OCT-20
Anthracene			120.2		%		60-130	05-OCT-20
Acridine			104.2		%		60-130	05-OCT-20
Benz(a)anthracene			102.0		%		60-130	05-OCT-20
Benzo(a)pyrene			96.7		%		60-130	05-OCT-20
Benzo(b&j)fluoranthene			94.7		%		60-130	05-OCT-20
Benzo(e)pyrene			105.1		%		60-130	05-OCT-20
Benzo(g,h,i)perylene			97.5		%		60-130	05-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245163								
WG3418493-14 IRM		**ALS PAH RM2**						
Benzo(k)fluoranthene			90.8		%		60-130	05-OCT-20
Chrysene			101.2		%		60-130	05-OCT-20
Dibenz(a,h)anthracene			94.1		%		60-130	05-OCT-20
Fluoranthene			96.0		%		60-130	05-OCT-20
Fluorene			97.9		%		60-130	05-OCT-20
Indeno(1,2,3-c,d)pyrene			128.4		%		60-130	05-OCT-20
2-Methylnaphthalene			96.0		%		60-130	05-OCT-20
Naphthalene			102.0		%		50-130	05-OCT-20
Perylene			111.7		%		60-130	05-OCT-20
Phenanthrene			99.2		%		60-130	05-OCT-20
Pyrene			100.0		%		60-130	05-OCT-20
1-Methylnaphthalene			95.2		%		60-130	05-OCT-20
WG3418493-17 IRM		**ALS PAH RM2**						
Acenaphthene			105.0		%		60-130	06-OCT-20
Acenaphthylene			125.6		%		60-130	06-OCT-20
Anthracene			127.5		%		60-130	06-OCT-20
Acridine			114.8		%		60-130	06-OCT-20
Benz(a)anthracene			106.7		%		60-130	06-OCT-20
Benzo(a)pyrene			93.0		%		60-130	06-OCT-20
Benzo(b&j)fluoranthene			95.0		%		60-130	06-OCT-20
Benzo(e)pyrene			100.4		%		60-130	06-OCT-20
Benzo(g,h,i)perylene			94.4		%		60-130	06-OCT-20
Benzo(k)fluoranthene			89.3		%		60-130	06-OCT-20
Chrysene			105.0		%		60-130	06-OCT-20
Dibenz(a,h)anthracene			98.1		%		60-130	06-OCT-20
Fluoranthene			98.2		%		60-130	06-OCT-20
Fluorene			101.5		%		60-130	06-OCT-20
Indeno(1,2,3-c,d)pyrene			111.9		%		60-130	06-OCT-20
2-Methylnaphthalene			97.4		%		60-130	06-OCT-20
Naphthalene			99.6		%		50-130	06-OCT-20
Perylene			96.2		%		60-130	06-OCT-20
Phenanthrene			102.1		%		60-130	06-OCT-20
Pyrene			101.7		%		60-130	06-OCT-20
1-Methylnaphthalene			94.3		%		60-130	06-OCT-20
WG3418493-3 IRM		**ALS PAH RM2**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245163								
WG3418493-3 IRM		**ALS PAH RM2**						
Acenaphthene			106.5		%		60-130	04-OCT-20
Acenaphthylene			128.6		%		60-130	04-OCT-20
Anthracene			122.3		%		60-130	04-OCT-20
Acridine			123.8		%		60-130	04-OCT-20
Benz(a)anthracene			110.1		%		60-130	04-OCT-20
Benzo(a)pyrene			107.5		%		60-130	04-OCT-20
Benzo(b&j)fluoranthene			100.1		%		60-130	04-OCT-20
Benzo(e)pyrene			110.1		%		60-130	04-OCT-20
Benzo(g,h,i)perylene			104.5		%		60-130	04-OCT-20
Benzo(k)fluoranthene			97.3		%		60-130	04-OCT-20
Chrysene			107.0		%		60-130	04-OCT-20
Dibenz(a,h)anthracene			106.5		%		60-130	04-OCT-20
Fluoranthene			102.1		%		60-130	04-OCT-20
Fluorene			102.0		%		60-130	04-OCT-20
Indeno(1,2,3-c,d)pyrene			130.0		%		60-130	04-OCT-20
2-Methylnaphthalene			100.6		%		60-130	04-OCT-20
Naphthalene			104.0		%		50-130	04-OCT-20
Perylene			102.7		%		60-130	04-OCT-20
Phenanthrene			104.3		%		60-130	04-OCT-20
Pyrene			105.4		%		60-130	04-OCT-20
1-Methylnaphthalene			98.8		%		60-130	04-OCT-20
WG3418493-7 IRM		**ALS PAH RM2**						
Acenaphthene			97.4		%		60-130	05-OCT-20
Acenaphthylene			116.7		%		60-130	05-OCT-20
Anthracene			123.5		%		60-130	05-OCT-20
Acridine			120.9		%		60-130	05-OCT-20
Benz(a)anthracene			106.3		%		60-130	05-OCT-20
Benzo(a)pyrene			103.2		%		60-130	05-OCT-20
Benzo(b&j)fluoranthene			94.6		%		60-130	05-OCT-20
Benzo(e)pyrene			104.7		%		60-130	05-OCT-20
Benzo(g,h,i)perylene			91.1		%		60-130	05-OCT-20
Benzo(k)fluoranthene			89.3		%		60-130	05-OCT-20
Chrysene			103.8		%		60-130	05-OCT-20
Dibenz(a,h)anthracene			90.6		%		60-130	05-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245163								
WG3418493-7 IRM		**ALS PAH RM2**						
Fluoranthene			94.4		%		60-130	05-OCT-20
Fluorene			95.2		%		60-130	05-OCT-20
Indeno(1,2,3-c,d)pyrene			122.3		%		60-130	05-OCT-20
2-Methylnaphthalene			90.4		%		60-130	05-OCT-20
Naphthalene			92.1		%		50-130	05-OCT-20
Perylene			99.6		%		60-130	05-OCT-20
Phenanthrene			99.9		%		60-130	05-OCT-20
Pyrene			98.6		%		60-130	05-OCT-20
1-Methylnaphthalene			87.3		%		60-130	05-OCT-20
WG3418493-13 LCS								
Acenaphthene			84.9		%		60-130	05-OCT-20
Acenaphthylene			77.5		%		60-130	05-OCT-20
Anthracene			76.6		%		60-130	05-OCT-20
Acridine			76.0		%		60-130	05-OCT-20
Benz(a)anthracene			81.3		%		60-130	05-OCT-20
Benzo(a)pyrene			78.9		%		60-130	05-OCT-20
Benzo(b&j)fluoranthene			73.8		%		60-130	05-OCT-20
Benzo(e)pyrene			76.6		%		60-130	05-OCT-20
Benzo(g,h,i)perylene			76.7		%		60-130	05-OCT-20
Benzo(k)fluoranthene			78.9		%		60-130	05-OCT-20
Chrysene			80.1		%		60-130	05-OCT-20
Dibenz(a,h)anthracene			89.9		%		60-130	05-OCT-20
Fluoranthene			81.0		%		60-130	05-OCT-20
Fluorene			78.8		%		60-130	05-OCT-20
Indeno(1,2,3-c,d)pyrene			85.0		%		60-130	05-OCT-20
2-Methylnaphthalene			81.3		%		60-130	05-OCT-20
Naphthalene			85.2		%		50-130	05-OCT-20
Perylene			76.7		%		60-130	05-OCT-20
Phenanthrene			83.0		%		60-130	05-OCT-20
Pyrene			84.8		%		60-130	05-OCT-20
1-Methylnaphthalene			82.1		%		60-130	05-OCT-20
Quinoline			75.9		%		60-130	05-OCT-20
WG3418493-16 LCS								
Acenaphthene			95.8		%		60-130	06-OCT-20
Acenaphthylene			86.3		%		60-130	06-OCT-20

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245163								
WG3418493-16 LCS								
Anthracene			85.0		%		60-130	06-OCT-20
Acridine			84.8		%		60-130	06-OCT-20
Benz(a)anthracene			95.2		%		60-130	06-OCT-20
Benzo(a)pyrene			79.9		%		60-130	06-OCT-20
Benzo(b&j)fluoranthene			83.7		%		60-130	06-OCT-20
Benzo(e)pyrene			89.2		%		60-130	06-OCT-20
Benzo(g,h,i)perylene			83.7		%		60-130	06-OCT-20
Benzo(k)fluoranthene			89.3		%		60-130	06-OCT-20
Chrysene			91.7		%		60-130	06-OCT-20
Dibenz(a,h)anthracene			85.0		%		60-130	06-OCT-20
Fluoranthene			89.5		%		60-130	06-OCT-20
Fluorene			86.8		%		60-130	06-OCT-20
Indeno(1,2,3-c,d)pyrene			84.7		%		60-130	06-OCT-20
2-Methylnaphthalene			92.4		%		60-130	06-OCT-20
Naphthalene			97.9		%		50-130	06-OCT-20
Perylene			84.7		%		60-130	06-OCT-20
Phenanthrene			92.8		%		60-130	06-OCT-20
Pyrene			96.1		%		60-130	06-OCT-20
1-Methylnaphthalene			92.4		%		60-130	06-OCT-20
Quinoline			87.9		%		60-130	06-OCT-20
WG3418493-2 LCS								
Acenaphthene			103.5		%		60-130	04-OCT-20
Acenaphthylene			94.2		%		60-130	04-OCT-20
Anthracene			90.0		%		60-130	04-OCT-20
Acridine			88.5		%		60-130	04-OCT-20
Benz(a)anthracene			96.4		%		60-130	04-OCT-20
Benzo(a)pyrene			99.7		%		60-130	04-OCT-20
Benzo(b&j)fluoranthene			90.7		%		60-130	04-OCT-20
Benzo(e)pyrene			96.5		%		60-130	04-OCT-20
Benzo(g,h,i)perylene			92.0		%		60-130	04-OCT-20
Benzo(k)fluoranthene			91.1		%		60-130	04-OCT-20
Chrysene			95.5		%		60-130	04-OCT-20
Dibenz(a,h)anthracene			91.3		%		60-130	04-OCT-20
Fluoranthene			95.9		%		60-130	04-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245163								
WG3418493-2 LCS								
Fluorene			94.1		%		60-130	04-OCT-20
Indeno(1,2,3-c,d)pyrene			99.9		%		60-130	04-OCT-20
2-Methylnaphthalene			101.8		%		60-130	04-OCT-20
Naphthalene			106.2		%		50-130	04-OCT-20
Perylene			91.2		%		60-130	04-OCT-20
Phenanthrene			99.5		%		60-130	04-OCT-20
Pyrene			100.2		%		60-130	04-OCT-20
1-Methylnaphthalene			100.4		%		60-130	04-OCT-20
Quinoline			95.6		%		60-130	04-OCT-20
WG3418493-6 LCS								
Acenaphthene			95.8		%		60-130	05-OCT-20
Acenaphthylene			85.9		%		60-130	05-OCT-20
Anthracene			87.1		%		60-130	05-OCT-20
Acridine			86.0		%		60-130	05-OCT-20
Benz(a)anthracene			94.2		%		60-130	05-OCT-20
Benzo(a)pyrene			98.5		%		60-130	05-OCT-20
Benzo(b&j)fluoranthene			88.5		%		60-130	05-OCT-20
Benzo(e)pyrene			91.3		%		60-130	05-OCT-20
Benzo(g,h,i)perylene			83.3		%		60-130	05-OCT-20
Benzo(k)fluoranthene			87.9		%		60-130	05-OCT-20
Chrysene			87.6		%		60-130	05-OCT-20
Dibenz(a,h)anthracene			83.7		%		60-130	05-OCT-20
Fluoranthene			88.9		%		60-130	05-OCT-20
Fluorene			87.3		%		60-130	05-OCT-20
Indeno(1,2,3-c,d)pyrene			71.0		%		60-130	05-OCT-20
2-Methylnaphthalene			91.3		%		60-130	05-OCT-20
Naphthalene			96.9		%		50-130	05-OCT-20
Perylene			97.6		%		60-130	05-OCT-20
Phenanthrene			93.6		%		60-130	05-OCT-20
Pyrene			92.6		%		60-130	05-OCT-20
1-Methylnaphthalene			90.7		%		60-130	05-OCT-20
Quinoline			85.0		%		60-130	05-OCT-20
WG3418493-1 MB								
Acenaphthene			<0.0050		mg/kg		0.005	04-OCT-20
Acenaphthylene			<0.0050		mg/kg		0.005	04-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245163								
WG3418493-1 MB								
Anthracene			<0.0040		mg/kg		0.004	04-OCT-20
Acridine			<0.010		mg/kg		0.01	04-OCT-20
Benz(a)anthracene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	04-OCT-20
Chrysene			<0.010		mg/kg		0.01	04-OCT-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	04-OCT-20
Fluoranthene			<0.010		mg/kg		0.01	04-OCT-20
Fluorene			<0.010		mg/kg		0.01	04-OCT-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	04-OCT-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	04-OCT-20
Naphthalene			<0.010		mg/kg		0.01	04-OCT-20
Perylene			<0.010		mg/kg		0.01	04-OCT-20
Phenanthrene			<0.010		mg/kg		0.01	04-OCT-20
Pyrene			<0.010		mg/kg		0.01	04-OCT-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	04-OCT-20
Quinoline			<0.050		mg/kg		0.05	04-OCT-20
Surrogate: d8-Naphthalene			91.4		%		50-130	04-OCT-20
Surrogate: d10-Acenaphthene			92.4		%		60-130	04-OCT-20
Surrogate: d10-Phenanthrene			90.1		%		60-130	04-OCT-20
Surrogate: d12-Chrysene			99.0		%		60-130	04-OCT-20
WG3418493-12 MB								
Acenaphthene			<0.0050		mg/kg		0.005	05-OCT-20
Acenaphthylene			<0.0050		mg/kg		0.005	05-OCT-20
Anthracene			<0.0040		mg/kg		0.004	05-OCT-20
Acridine			<0.010		mg/kg		0.01	05-OCT-20
Benz(a)anthracene			<0.010		mg/kg		0.01	05-OCT-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	05-OCT-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	05-OCT-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	05-OCT-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	05-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245163								
WG3418493-12 MB								
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	05-OCT-20
Chrysene			<0.010		mg/kg		0.01	05-OCT-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	05-OCT-20
Fluoranthene			<0.010		mg/kg		0.01	05-OCT-20
Fluorene			<0.010		mg/kg		0.01	05-OCT-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	05-OCT-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	05-OCT-20
Naphthalene			<0.010		mg/kg		0.01	05-OCT-20
Perylene			<0.010		mg/kg		0.01	05-OCT-20
Phenanthrene			<0.010		mg/kg		0.01	05-OCT-20
Pyrene			<0.010		mg/kg		0.01	05-OCT-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	05-OCT-20
Quinoline			<0.050		mg/kg		0.05	05-OCT-20
Surrogate: d8-Naphthalene			86.3		%		50-130	05-OCT-20
Surrogate: d10-Acenaphthene			86.0		%		60-130	05-OCT-20
Surrogate: d10-Phenanthrene			85.4		%		60-130	05-OCT-20
Surrogate: d12-Chrysene			96.1		%		60-130	05-OCT-20
WG3418493-5 MB								
Acenaphthene			<0.0050		mg/kg		0.005	04-OCT-20
Acenaphthylene			<0.0050		mg/kg		0.005	04-OCT-20
Anthracene			<0.0040		mg/kg		0.004	04-OCT-20
Acridine			<0.010		mg/kg		0.01	04-OCT-20
Benz(a)anthracene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	04-OCT-20
Chrysene			<0.010		mg/kg		0.01	04-OCT-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	04-OCT-20
Fluoranthene			<0.010		mg/kg		0.01	04-OCT-20
Fluorene			<0.010		mg/kg		0.01	04-OCT-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	04-OCT-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	04-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245163								
WG3418493-5 MB								
Naphthalene			<0.010		mg/kg		0.01	04-OCT-20
Perylene			<0.010		mg/kg		0.01	04-OCT-20
Phenanthrene			<0.010		mg/kg		0.01	04-OCT-20
Pyrene			<0.010		mg/kg		0.01	04-OCT-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	04-OCT-20
Quinoline			<0.050		mg/kg		0.05	04-OCT-20
Surrogate: d8-Naphthalene			94.6		%		50-130	04-OCT-20
Surrogate: d10-Acenaphthene			99.0		%		60-130	04-OCT-20
Surrogate: d10-Phenanthrene			97.8		%		60-130	04-OCT-20
Surrogate: d12-Chrysene			98.8		%		60-130	04-OCT-20
WG3418493-9 MB								
Acenaphthene			<0.0050		mg/kg		0.005	05-OCT-20
Acenaphthylene			<0.0050		mg/kg		0.005	05-OCT-20
Anthracene			<0.0040		mg/kg		0.004	05-OCT-20
Acridine			<0.010		mg/kg		0.01	05-OCT-20
Benz(a)anthracene			<0.010		mg/kg		0.01	05-OCT-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	05-OCT-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	05-OCT-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	05-OCT-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	05-OCT-20
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	05-OCT-20
Chrysene			<0.010		mg/kg		0.01	05-OCT-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	05-OCT-20
Fluoranthene			<0.010		mg/kg		0.01	05-OCT-20
Fluorene			<0.010		mg/kg		0.01	05-OCT-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	05-OCT-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	05-OCT-20
Naphthalene			<0.010		mg/kg		0.01	05-OCT-20
Perylene			<0.010		mg/kg		0.01	05-OCT-20
Phenanthrene			<0.010		mg/kg		0.01	05-OCT-20
Pyrene			<0.010		mg/kg		0.01	05-OCT-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	05-OCT-20
Quinoline			<0.050		mg/kg		0.05	05-OCT-20
Surrogate: d8-Naphthalene			87.6		%		50-130	05-OCT-20

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245163								
WG3418493-9 MB								
Surrogate: d10-Acenaphthene			89.5		%		60-130	05-OCT-20
Surrogate: d10-Phenanthrene			89.4		%		60-130	05-OCT-20
Surrogate: d12-Chrysene			96.4		%		60-130	05-OCT-20
PH-1:2-CL	**Soil**							
Batch R5245103								
WG3417923-2 DUP		**L2508802-10**						
pH (1:2 soil:water)		7.02	7.04	J	pH	0.02	0.2	02-OCT-20
WG3417923-3 IRM		**SAL-STD10**						
pH (1:2 soil:water)			7.80		pH		7.4-8	02-OCT-20
WG3417923-1 LCS								
pH (1:2 soil:water)			7.02		pH		6.8-7.2	02-OCT-20
PSA-PIPET-DETAIL-SK	**Soil**							
Batch R5251857								
WG3419172-1 DUP		**L2508802-4**						
% Gravel (>2mm)		1.1	1.1	J	%	0.0	5	07-OCT-20
% Sand (2.00mm - 1.00mm)		3.3	4.9	J	%	1.6	5	07-OCT-20
% Sand (1.00mm - 0.50mm)		6.9	6.3	J	%	0.6	5	07-OCT-20
% Sand (0.50mm - 0.25mm)		12.6	12.5	J	%	0.2	5	07-OCT-20
% Sand (0.25mm - 0.125mm)		13.8	12.9	J	%	0.9	5	07-OCT-20
% Sand (0.125mm - 0.063mm)		12.0	11.2	J	%	0.9	5	07-OCT-20
% Silt (0.063mm - 0.0312mm)		21.8	20.8	J	%	1.0	5	07-OCT-20
% Silt (0.0312mm - 0.004mm)		24.7	25.5	J	%	0.8	5	07-OCT-20
% Clay (<4um)		3.7	4.9	J	%	1.2	5	07-OCT-20
WG3419172-2 IRM		**2017-PSA**						
% Sand (2.00mm - 1.00mm)			2.9		%		0-7.6	07-OCT-20
% Sand (1.00mm - 0.50mm)			3.7		%		0-8.9	07-OCT-20
% Sand (0.50mm - 0.25mm)			10.1		%		5.3-15.3	07-OCT-20
% Sand (0.25mm - 0.125mm)			14.7		%		10-20	07-OCT-20
% Sand (0.125mm - 0.063mm)			12.7		%		7.3-17.3	07-OCT-20
% Silt (0.063mm - 0.0312mm)			14.6		%		9.9-19.9	07-OCT-20
% Silt (0.0312mm - 0.004mm)			23.2		%		17.6-27.6	07-OCT-20
% Clay (<4um)			18.0		%		13.4-23.4	07-OCT-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID:	**CMO Supplemntal Sampling Sept 2020**	**TURNAROUND TIME:**	

PROJECT/CLIENT INFO

Facility Name	REP		
Project Manager	Cait Good		
Email	cait.good@teck.com		
Address	421 Pine Avenue		
City	Sparwood	Province	BC
Postal Code	V0B 2G0	Country	Canada
Phone Number	250-425-8202		

LABORATORY

Lab Name	ALS Calgary		
Lab Contact	Lyudmyla Shvets		
Email	lyudmyla.shvets@alsglobal.com		
Address	2559 29 Street NE		
City	Calgary	Province	AB
Postal Code	T1Y 7B5	Country	Canada
Phone Number	1 403 407 1794		

	Excel	PDF	EDD
cait.good@teck.com	x	x	x
teckcoal@equisonline.com			x
Jings@minnow.ca	x	x	x
carlie.meyer@teck.com	x	x	x
sweech@minnow.ca	x	x	x

Please Invoice Minnow

SAMPLE DETAILS

L2508802-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_MIDAG-S1_SE-1_2020-09-18_0850	RG_MIDAG-S1	SE	No	18-Sep-20	8:50	G	2	X	X	X	X	X
2	RG_MIDAG-S1_SE-2_2020-09-18_0915	RG_MIDAG-S1	SE	No	18-Sep-20	9:15	G	2	X	X	X	X	X
3	RG_MIDAG-S1_SE-3_2020-09-18_0935	RG_MIDAG-S1	SE	No	18-Sep-20	9:35	G	2	X	X	X	X	X
4	RG_MIDAG-S1_SE-4_2020-09-18_1040	RG_MIDAG-S1	SE	No	18-Sep-20	10:40	G	2	X	X	X	X	X
5	RG_MIDAG-S1_SE-5_2020-09-18_1020	RG_MIDAG-S1	SE	No	18-Sep-20	10:20	G	2	X	X	X	X	X
6	CM_MC2_SE-1_2020-09-18_1408	CM_MC2	SE	No	18-Sep-20	14:08	G	2	X	X	X	X	X
7	CM_MC2_SE-2_2020-09-18_1435	CM_MC2	SE	No	18-Sep-20	14:35	G	2	X	X	X	X	X
8	CM_MC2_SE-3_2020-09-18_1450	CM_MC2	SE	No	18-Sep-20	14:50	G	2	X	X	X	X	X
9	CM_MC2_SE-4_2020-09-18_1458	CM_MC2	SE	No	18-Sep-20	14:58	G	2	X	X	X	X	X
10	CM_MC2_SE-5_2020-09-18_1510	CM_MC2	SE	No	18-Sep-20	15:10	G	2	X	X	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Jennifer Ings	September 23, 2020		9/25 920

10°

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 23, 2020**

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 28-SEP-20
Report Date: 09-OCT-20 12:47 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2508964
Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers:
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508964-1	L2508964-2	L2508964-3	L2508964-4	L2508964-5
	Description	SE	SE	SE	SE	SE
	Sampled Date	19-SEP-20	19-SEP-20	19-SEP-20	19-SEP-20	17-SEP-20
	Sampled Time	11:25	11:40	11:55	12:15	17:00
	Client ID	RG_MI5_SE-1_2020-09-19_1125	RG_MI5_SE-3_2020-09-19_1140	RG_MI5_SE-4_2020-09-19_1155	RG_MI5_SE-5_2020-09-19_1215	RG_MI5_SE-2_2020-09-17_1700
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	81.7	63.9	85.8	86.3	67.4
	pH (1:9) (pH)	6.85	7.18	6.88	6.75	7.29
Particle Size	% Gravel (>2mm) (%)	1.1	3.6	3.2 PSAL	<1.0	2.1
	% Sand (2.00mm - 1.00mm) (%)	3.8	<1.0	1.2 PSAL	1.5	<1.0
	% Sand (1.00mm - 0.50mm) (%)	22.9	4.6	<1.0 PSAL	1.3	6.5
	% Sand (0.50mm - 0.25mm) (%)	26.3	20.0	2.0 PSAL	1.4	30.2
	% Sand (0.25mm - 0.125mm) (%)	9.6	18.4	5.6 PSAL	3.7	23.4
	% Sand (0.125mm - 0.063mm) (%)	5.0	12.0	6.8 PSAL	6.7	10.8
	% Silt (0.063mm - 0.0312mm) (%)	12.3	18.6	36.6 PSAL	38.4	12.3
	% Silt (0.0312mm - 0.004mm) (%)	13.6	18.9	37.9 PSAL	39.8	12.5
	% Clay (<4um) (%)	5.5	3.1	6.0 PSAL	6.8	1.9
	Texture	Sandy loam	Sandy loam	Silt loam	Silt loam	Loamy sand
Organic / Inorganic Carbon	Total Organic Carbon (%)	7.61	4.76	10.1	9.00	2.53
Metals	Aluminum (Al) (mg/kg)	6020	8670	6780	7430	8970
	Antimony (Sb) (mg/kg)	0.63	0.61	0.48	0.54	0.80
	Arsenic (As) (mg/kg)	5.66	5.90	3.93	4.08	5.66
	Barium (Ba) (mg/kg)	216	250	300	254	232
	Beryllium (Be) (mg/kg)	0.46	0.56	0.41	0.47	0.58
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	7.9	8.6	10.8	11.6	8.3
	Cadmium (Cd) (mg/kg)	1.22	1.20	1.45	1.71	1.31
	Calcium (Ca) (mg/kg)	75600	52800	99300	84900	37200
	Chromium (Cr) (mg/kg)	12.9	15.2	12.5	13.8	15.6
	Cobalt (Co) (mg/kg)	5.67	8.41	11.7	6.43	8.90
	Copper (Cu) (mg/kg)	9.93	11.7	9.76	11.3	12.6
	Iron (Fe) (mg/kg)	11100	13700	9270	10100	13800
	Lead (Pb) (mg/kg)	5.61	7.51	5.71	6.18	8.12
	Lithium (Li) (mg/kg)	6.6	8.9	6.7	7.8	9.4
	Magnesium (Mg) (mg/kg)	4970	5190	5000	5420	5950
	Manganese (Mn) (mg/kg)	200	252	254	134	169
	Mercury (Hg) (mg/kg)	0.0242	0.0366	0.0343	0.0380	0.0397
	Molybdenum (Mo) (mg/kg)	1.15	1.42	0.87	0.94	1.19
	Nickel (Ni) (mg/kg)	26.9	33.7	39.6	37.0	36.0
	Phosphorus (P) (mg/kg)	1250	1220	1140	1360	1280
	Potassium (K) (mg/kg)	1570	1940	1590	1820	1860
	Selenium (Se) (mg/kg)	2.59	1.63	4.48	4.79	2.03
	Silver (Ag) (mg/kg)	0.11	0.15	0.17	0.17	0.17

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508964-1	L2508964-2	L2508964-3	L2508964-4	L2508964-5
	Description	SE	SE	SE	SE	SE
	Sampled Date	19-SEP-20	19-SEP-20	19-SEP-20	19-SEP-20	17-SEP-20
	Sampled Time	11:25	11:40	11:55	12:15	17:00
	Client ID	RG_MI5_SE-1_2020-09-19_1125	RG_MI5_SE-3_2020-09-19_1140	RG_MI5_SE-4_2020-09-19_1155	RG_MI5_SE-5_2020-09-19_1215	RG_MI5_SE-2_2020-09-17_1700
Grouping	**Analyte**					
SOIL						
Metals	Sodium (Na) (mg/kg)	182	126	259	283	119
	Strontium (Sr) (mg/kg)	114	104	146	122	70.1
	Sulfur (S) (mg/kg)	1500	<1000	2100	2400	<1000
	Thallium (Tl) (mg/kg)	0.172	0.237	0.189	0.270	0.279
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	34.1	30.3	36.1	36.0	44.3
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	0.967	0.964	0.957	1.02	1.03
	Vanadium (V) (mg/kg)	31.4	41.2	26.1	31.1	41.6
	Zinc (Zn) (mg/kg)	78.0	97.4	80.8	97.4	106
	Zirconium (Zr) (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	DLHM <0.013	DLHM 0.0067	DLHM <0.013	DLCI <0.016	DLHM <0.0075
	Acenaphthylene (mg/kg)	DLHM <0.013	DLHM <0.0065	DLHM <0.013	DLHM <0.015	DLHM <0.0075
	Acridine (mg/kg)	DLHM <0.025	DLHM 0.014	DLHM <0.025	DLHM <0.025	DLHM <0.015
	Anthracene (mg/kg)	DLHM 0.018	DLHM <0.0052	DLHM 0.015	DLCI <0.025	DLHM <0.0060
	Benz(a)anthracene (mg/kg)	DLHM 0.029	DLHM 0.023	DLHM <0.025	DLHM <0.025	DLHM 0.017
	Benzo(a)pyrene (mg/kg)	DLHM <0.025	DLHM <0.013	DLHM <0.025	DLHM <0.025	DLHM <0.015
	Benzo(b&j)fluoranthene (mg/kg)	DLHM <0.025	DLHM 0.033	DLHM 0.031	DLHM 0.030	DLHM 0.032
	Benzo(b+j+k)fluoranthene (mg/kg)	<0.035	0.033	<0.035	<0.035	0.032
	Benzo(e)pyrene (mg/kg)	DLHM <0.025	DLHM 0.037	DLHM 0.033	DLHM 0.036	DLHM 0.034
	Benzo(g,h,i)perylene (mg/kg)	DLHM <0.025	DLHM 0.014	DLHM <0.025	DLHM <0.025	DLHM <0.015
	Benzo(k)fluoranthene (mg/kg)	DLHM <0.025	DLHM <0.013	DLHM <0.025	DLHM <0.025	DLHM <0.015
	Chrysene (mg/kg)	DLHM 0.042	DLHM 0.070	DLCI <0.050	DLHM 0.069	DLCI <0.060
	Dibenz(a,h)anthracene (mg/kg)	DLHM <0.013	DLHM <0.0065	DLHM <0.013	DLHM <0.015	DLHM <0.0075
	Fluoranthene (mg/kg)	DLHM 0.049	DLHM 0.035	DLHM <0.025	DLHM 0.039	DLHM 0.025
	Fluorene (mg/kg)	DLHM <0.025	DLHM 0.019	DLHM <0.025	DLHM 0.028	DLHM <0.015
	Indeno(1,2,3-c,d)pyrene (mg/kg)	DLHM <0.025	DLHM <0.013	DLHM <0.025	DLHM <0.025	DLHM <0.015
	1-Methylnaphthalene (mg/kg)	DLHM 0.057	DLHM 0.162	DLHM 0.081	DLHM 0.103	DLHM 0.089
	2-Methylnaphthalene (mg/kg)	DLHM 0.065	DLHM 0.208	DLHM 0.122	DLHM 0.142	DLHM 0.121
	Naphthalene (mg/kg)	DLHM 0.042	DLHM 0.106	DLHM 0.064	DLHM 0.079	DLHM 0.062
	Perylene (mg/kg)	DLHM <0.025	DLHM <0.013	DLHM <0.025	DLHM <0.025	DLHM <0.015
	Phenanthrene (mg/kg)	DLHM 0.110	DLHM 0.256	DLHM 0.146	DLHM 0.174	DLHM 0.157
	Pyrene (mg/kg)	DLHM 0.044	DLHM 0.035	DLHM 0.027	DLHM 0.035	DLHM 0.028
	Quinoline (mg/kg)	DLHM <0.025	DLHM <0.013	DLHM <0.025	DLHM <0.025	DLHM <0.015
	Surrogate: d10-Acenaphthene (%)	97.0	101.6	100.0	106.6	94.9
	Surrogate: d12-Chrysene (%)	95.1	101.5	101.9	109.3	98.3

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508964-1	L2508964-2	L2508964-3	L2508964-4	L2508964-5
	Description	SE	SE	SE	SE	SE
	Sampled Date	19-SEP-20	19-SEP-20	19-SEP-20	19-SEP-20	17-SEP-20
	Sampled Time	11:25	11:40	11:55	12:15	17:00
	Client ID	RG_MI5_SE-1_2020-09-19_1125	RG_MI5_SE-3_2020-09-19_1140	RG_MI5_SE-4_2020-09-19_1155	RG_MI5_SE-5_2020-09-19_1215	RG_MI5_SE-2_2020-09-17_1700
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d8-Naphthalene (%)	93.5	98.6	96.8	101.1	90.4
	Surrogate: d10-Phenanthrene (%)	100.0	108.7	105.7	111.6	101.0
	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)	0.026	<0.020	0.026	0.028	<0.020
	IACR (CCME)	0.33	0.39	0.39	0.41	0.36

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLCI	Detection Limit Raised: Chromatographic Interference due to co-elution.
DLHM	Detection Limit Adjusted: Sample has High Moisture Content
PSAL	Limited sample was available for PSA (100g minimum is standard). Measurement Uncertainty for PSA results may be higher than usual.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-TIC-PCT-SK	Soil	Total Inorganic Carbon in Soil	CSSS (2008) P216-217

A known quantity of acetic acid is consumed by reaction with carbonates in the soil. The pH of the resulting solution is measured and compared against a standard curve relating pH to weight of carbonate.

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-1:9-CL	Soil	pH (1:9 H2O)	CSSS Ch. 16

Soil and de-ionized water (by volume) are mixed in a defined ratio. The slurry is allowed to stand, shaken, and then allowed to stand again prior to taking measurements. After equilibration, the pH of the liquid portion of the extract is measured by a pH meter. Field Measurement is recommended where accurate pH measurements are required, due to the 15 minute recommended hold time.

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

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.

ALS Environmental

Quality Control Report

Workorder: L2508964 Report Date: 09-OCT-20

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TIC-PCT-SK	**Soil**							
Batch R5251839								
WG3414810-4 IRM		**08-109_SOIL**						
Inorganic Carbon			95.7		%		80-120	08-OCT-20
WG3414810-2 LCS		**0.5**						
Inorganic Carbon			99.2		%		90-110	08-OCT-20
WG3414810-3 MB								
Inorganic Carbon			<0.050		%		0.05	08-OCT-20
C-TOT-LECO-SK	**Soil**							
Batch R5251117								
WG3414875-2 IRM		**08-109_SOIL**						
Total Carbon by Combustion			95.3		%		80-120	06-OCT-20
WG3414875-4 LCS		**SULFADIAZINE**						
Total Carbon by Combustion			97.0		%		90-110	06-OCT-20
WG3414875-3 MB								
Total Carbon by Combustion			<0.05		%		0.05	06-OCT-20
HG-200.2-CVAA-CL	**Soil**							
Batch R5244664								
WG3416136-14 CRM		**TILL-1**						
Mercury (Hg)			102.9		%		70-130	03-OCT-20
WG3416136-19 CRM		**TILL-1**						
Mercury (Hg)			100.3		%		70-130	03-OCT-20
WG3416136-13 LCS								
Mercury (Hg)			101.0		%		80-120	03-OCT-20
WG3416136-18 LCS								
Mercury (Hg)			99.7		%		80-120	03-OCT-20
WG3416136-11 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	03-OCT-20
WG3416136-16 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	03-OCT-20
MET-200.2-CCMS-CL	**Soil**							
Batch R5243567								
WG3416136-14 CRM		**TILL-1**						
Aluminum (Al)			112.6		%		70-130	01-OCT-20
Antimony (Sb)			102.6		%		70-130	01-OCT-20
Arsenic (As)			104.4		%		70-130	01-OCT-20
Barium (Ba)			97.4		%		70-130	01-OCT-20
Beryllium (Be)			99.6		%		70-130	01-OCT-20
Bismuth (Bi)			95.2		%		70-130	01-OCT-20

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5243567								
WG3416136-14 CRM		**TILL-1**						
Boron (B)			3.3		mg/kg		0-8.2	01-OCT-20
Cadmium (Cd)			103.5		%		70-130	01-OCT-20
Calcium (Ca)			112.7		%		70-130	01-OCT-20
Chromium (Cr)			114.1		%		70-130	01-OCT-20
Cobalt (Co)			108.4		%		70-130	01-OCT-20
Copper (Cu)			105.3		%		70-130	01-OCT-20
Iron (Fe)			106.1		%		70-130	01-OCT-20
Lead (Pb)			97.3		%		70-130	01-OCT-20
Lithium (Li)			100.2		%		70-130	01-OCT-20
Magnesium (Mg)			118.6		%		70-130	01-OCT-20
Manganese (Mn)			107.9		%		70-130	01-OCT-20
Molybdenum (Mo)			104.1		%		70-130	01-OCT-20
Nickel (Ni)			107.9		%		70-130	01-OCT-20
Phosphorus (P)			109.6		%		70-130	01-OCT-20
Potassium (K)			120.4		%		70-130	01-OCT-20
Selenium (Se)			0.32		mg/kg		0.11-0.51	01-OCT-20
Silver (Ag)			0.22		mg/kg		0.13-0.33	01-OCT-20
Sodium (Na)			121.8		%		70-130	01-OCT-20
Strontium (Sr)			113.6		%		70-130	01-OCT-20
Thallium (Tl)			0.130		mg/kg		0.077-0.18	01-OCT-20
Tin (Sn)			1.1		mg/kg		0-3.1	01-OCT-20
Titanium (Ti)			128.8		%		70-130	01-OCT-20
Tungsten (W)			0.15		mg/kg		0-0.66	01-OCT-20
Uranium (U)			108.2		%		70-130	01-OCT-20
Vanadium (V)			112.2		%		70-130	01-OCT-20
Zinc (Zn)			110.3		%		70-130	01-OCT-20
Zirconium (Zr)			0.8		mg/kg		0-1.8	01-OCT-20
WG3416136-19 CRM		**TILL-1**						
Aluminum (Al)			111.3		%		70-130	01-OCT-20
Antimony (Sb)			105.8		%		70-130	01-OCT-20
Arsenic (As)			108.5		%		70-130	01-OCT-20
Barium (Ba)			101.2		%		70-130	01-OCT-20
Beryllium (Be)			100.2		%		70-130	01-OCT-20
Bismuth (Bi)			98.0		%		70-130	01-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5243567								
WG3416136-19 CRM		**TILL-1**						
Boron (B)			2.8		mg/kg		0-8.2	01-OCT-20
Cadmium (Cd)			111.4		%		70-130	01-OCT-20
Calcium (Ca)			104.6		%		70-130	01-OCT-20
Chromium (Cr)			110.2		%		70-130	01-OCT-20
Cobalt (Co)			108.0		%		70-130	01-OCT-20
Copper (Cu)			107.3		%		70-130	01-OCT-20
Iron (Fe)			106.5		%		70-130	01-OCT-20
Lead (Pb)			98.9		%		70-130	01-OCT-20
Lithium (Li)			101.1		%		70-130	01-OCT-20
Magnesium (Mg)			113.9		%		70-130	01-OCT-20
Manganese (Mn)			107.8		%		70-130	01-OCT-20
Molybdenum (Mo)			101.6		%		70-130	01-OCT-20
Nickel (Ni)			107.3		%		70-130	01-OCT-20
Phosphorus (P)			107.3		%		70-130	01-OCT-20
Potassium (K)			105.9		%		70-130	01-OCT-20
Selenium (Se)			0.38		mg/kg		0.11-0.51	01-OCT-20
Silver (Ag)			0.24		mg/kg		0.13-0.33	01-OCT-20
Sodium (Na)			110.0		%		70-130	01-OCT-20
Strontium (Sr)			104.0		%		70-130	01-OCT-20
Thallium (Tl)			0.128		mg/kg		0.077-0.18	01-OCT-20
Tin (Sn)			1.1		mg/kg		0-3.1	01-OCT-20
Titanium (Ti)			110.5		%		70-130	01-OCT-20
Tungsten (W)			0.17		mg/kg		0-0.66	01-OCT-20
Uranium (U)			103.3		%		70-130	01-OCT-20
Vanadium (V)			110.2		%		70-130	01-OCT-20
Zinc (Zn)			106.3		%		70-130	01-OCT-20
Zirconium (Zr)			0.7		mg/kg		0-1.8	01-OCT-20
WG3416136-13 LCS								
Aluminum (Al)			103.8		%		80-120	01-OCT-20
Antimony (Sb)			104.7		%		80-120	01-OCT-20
Arsenic (As)			103.5		%		80-120	01-OCT-20
Barium (Ba)			98.9		%		80-120	01-OCT-20
Beryllium (Be)			97.1		%		80-120	01-OCT-20
Bismuth (Bi)			96.2		%		80-120	01-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5243567								
WG3416136-13 LCS								
Boron (B)			92.1		%		80-120	01-OCT-20
Cadmium (Cd)			102.6		%		80-120	01-OCT-20
Calcium (Ca)			98.7		%		80-120	01-OCT-20
Chromium (Cr)			105.2		%		80-120	01-OCT-20
Cobalt (Co)			102.3		%		80-120	01-OCT-20
Copper (Cu)			99.9		%		80-120	01-OCT-20
Iron (Fe)			100.6		%		80-120	01-OCT-20
Lead (Pb)			104.5		%		80-120	01-OCT-20
Lithium (Li)			96.5		%		80-120	01-OCT-20
Magnesium (Mg)			111.7		%		80-120	01-OCT-20
Manganese (Mn)			101.6		%		80-120	01-OCT-20
Molybdenum (Mo)			103.4		%		80-120	01-OCT-20
Nickel (Ni)			101.3		%		80-120	01-OCT-20
Potassium (K)			98.3		%		80-120	01-OCT-20
Selenium (Se)			102.7		%		80-120	01-OCT-20
Silver (Ag)			100.5		%		80-120	01-OCT-20
Sodium (Na)			103.6		%		80-120	01-OCT-20
Strontium (Sr)			105.8		%		80-120	01-OCT-20
Sulfur (S)			97.8		%		80-120	01-OCT-20
Thallium (Tl)			97.1		%		80-120	01-OCT-20
Tin (Sn)			103.0		%		80-120	01-OCT-20
Titanium (Ti)			93.4		%		80-120	01-OCT-20
Tungsten (W)			98.4		%		80-120	01-OCT-20
Uranium (U)			102.2		%		80-120	01-OCT-20
Vanadium (V)			105.3		%		80-120	01-OCT-20
Zinc (Zn)			104.6		%		80-120	01-OCT-20
Zirconium (Zr)			99.9		%		80-120	01-OCT-20
WG3416136-18 LCS								
Aluminum (Al)			102.0		%		80-120	01-OCT-20
Antimony (Sb)			107.5		%		80-120	01-OCT-20
Arsenic (As)			104.0		%		80-120	01-OCT-20
Barium (Ba)			100.2		%		80-120	01-OCT-20
Beryllium (Be)			95.6		%		80-120	01-OCT-20
Bismuth (Bi)			97.2		%		80-120	01-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5243567								
WG3416136-18 LCS								
Boron (B)			90.8		%		80-120	01-OCT-20
Cadmium (Cd)			103.8		%		80-120	01-OCT-20
Calcium (Ca)			98.1		%		80-120	01-OCT-20
Chromium (Cr)			103.1		%		80-120	01-OCT-20
Cobalt (Co)			102.5		%		80-120	01-OCT-20
Copper (Cu)			99.6		%		80-120	01-OCT-20
Iron (Fe)			99.9		%		80-120	01-OCT-20
Lead (Pb)			104.0		%		80-120	01-OCT-20
Lithium (Li)			94.5		%		80-120	01-OCT-20
Magnesium (Mg)			107.4		%		80-120	01-OCT-20
Manganese (Mn)			102.2		%		80-120	01-OCT-20
Molybdenum (Mo)			104.0		%		80-120	01-OCT-20
Nickel (Ni)			101.1		%		80-120	01-OCT-20
Potassium (K)			97.7		%		80-120	01-OCT-20
Selenium (Se)			106.5		%		80-120	01-OCT-20
Silver (Ag)			101.6		%		80-120	01-OCT-20
Sodium (Na)			102.2		%		80-120	01-OCT-20
Strontium (Sr)			102.9		%		80-120	01-OCT-20
Sulfur (S)			99.5		%		80-120	01-OCT-20
Thallium (Tl)			97.0		%		80-120	01-OCT-20
Tin (Sn)			103.1		%		80-120	01-OCT-20
Titanium (Ti)			96.2		%		80-120	01-OCT-20
Tungsten (W)			100.0		%		80-120	01-OCT-20
Uranium (U)			99.4		%		80-120	01-OCT-20
Vanadium (V)			104.7		%		80-120	01-OCT-20
Zinc (Zn)			101.5		%		80-120	01-OCT-20
Zirconium (Zr)			100.8		%		80-120	01-OCT-20
WG3416136-11 MB								
Aluminum (Al)			<50		mg/kg		50	01-OCT-20
Antimony (Sb)			<0.10		mg/kg		0.1	01-OCT-20
Arsenic (As)			<0.10		mg/kg		0.1	01-OCT-20
Barium (Ba)			<0.50		mg/kg		0.5	01-OCT-20
Beryllium (Be)			<0.10		mg/kg		0.1	01-OCT-20
Bismuth (Bi)			<0.20		mg/kg		0.2	01-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5243567								
WG3416136-11 MB								
Boron (B)			<5.0		mg/kg		5	01-OCT-20
Cadmium (Cd)			<0.020		mg/kg		0.02	01-OCT-20
Calcium (Ca)			<50		mg/kg		50	01-OCT-20
Chromium (Cr)			<0.50		mg/kg		0.5	01-OCT-20
Cobalt (Co)			<0.10		mg/kg		0.1	01-OCT-20
Copper (Cu)			<0.50		mg/kg		0.5	01-OCT-20
Iron (Fe)			<50		mg/kg		50	01-OCT-20
Lead (Pb)			<0.50		mg/kg		0.5	01-OCT-20
Lithium (Li)			<2.0		mg/kg		2	01-OCT-20
Magnesium (Mg)			<20		mg/kg		20	01-OCT-20
Manganese (Mn)			<1.0		mg/kg		1	01-OCT-20
Molybdenum (Mo)			<0.10		mg/kg		0.1	01-OCT-20
Nickel (Ni)			<0.50		mg/kg		0.5	01-OCT-20
Phosphorus (P)			<50		mg/kg		50	01-OCT-20
Potassium (K)			<100		mg/kg		100	01-OCT-20
Selenium (Se)			<0.20		mg/kg		0.2	01-OCT-20
Silver (Ag)			<0.10		mg/kg		0.1	01-OCT-20
Sodium (Na)			<50		mg/kg		50	01-OCT-20
Strontium (Sr)			<0.50		mg/kg		0.5	01-OCT-20
Sulfur (S)			<1000		mg/kg		1000	01-OCT-20
Thallium (Tl)			<0.050		mg/kg		0.05	01-OCT-20
Tin (Sn)			<2.0		mg/kg		2	01-OCT-20
Titanium (Ti)			<1.0		mg/kg		1	01-OCT-20
Tungsten (W)			<0.50		mg/kg		0.5	01-OCT-20
Uranium (U)			<0.050		mg/kg		0.05	01-OCT-20
Vanadium (V)			<0.20		mg/kg		0.2	01-OCT-20
Zinc (Zn)			<2.0		mg/kg		2	01-OCT-20
Zirconium (Zr)			<1.0		mg/kg		1	01-OCT-20
WG3416136-16 MB								
Aluminum (Al)			<50		mg/kg		50	01-OCT-20
Antimony (Sb)			<0.10		mg/kg		0.1	01-OCT-20
Arsenic (As)			<0.10		mg/kg		0.1	01-OCT-20
Barium (Ba)			<0.50		mg/kg		0.5	01-OCT-20
Beryllium (Be)			<0.10		mg/kg		0.1	01-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5243567								
WG3416136-16 MB								
Bismuth (Bi)			<0.20		mg/kg		0.2	01-OCT-20
Boron (B)			<5.0		mg/kg		5	01-OCT-20
Cadmium (Cd)			<0.020		mg/kg		0.02	01-OCT-20
Calcium (Ca)			<50		mg/kg		50	01-OCT-20
Chromium (Cr)			<0.50		mg/kg		0.5	01-OCT-20
Cobalt (Co)			<0.10		mg/kg		0.1	01-OCT-20
Copper (Cu)			<0.50		mg/kg		0.5	01-OCT-20
Iron (Fe)			<50		mg/kg		50	01-OCT-20
Lead (Pb)			<0.50		mg/kg		0.5	01-OCT-20
Lithium (Li)			<2.0		mg/kg		2	01-OCT-20
Magnesium (Mg)			<20		mg/kg		20	01-OCT-20
Manganese (Mn)			<1.0		mg/kg		1	01-OCT-20
Molybdenum (Mo)			<0.10		mg/kg		0.1	01-OCT-20
Nickel (Ni)			<0.50		mg/kg		0.5	01-OCT-20
Phosphorus (P)			<50		mg/kg		50	01-OCT-20
Potassium (K)			<100		mg/kg		100	01-OCT-20
Selenium (Se)			<0.20		mg/kg		0.2	01-OCT-20
Silver (Ag)			<0.10		mg/kg		0.1	01-OCT-20
Sodium (Na)			<50		mg/kg		50	01-OCT-20
Strontium (Sr)			<0.50		mg/kg		0.5	01-OCT-20
Sulfur (S)			<1000		mg/kg		1000	01-OCT-20
Thallium (Tl)			<0.050		mg/kg		0.05	01-OCT-20
Tin (Sn)			<2.0		mg/kg		2	01-OCT-20
Titanium (Ti)			<1.0		mg/kg		1	01-OCT-20
Tungsten (W)			<0.50		mg/kg		0.5	01-OCT-20
Uranium (U)			<0.050		mg/kg		0.05	01-OCT-20
Vanadium (V)			<0.20		mg/kg		0.2	01-OCT-20
Zinc (Zn)			<2.0		mg/kg		2	01-OCT-20
Zirconium (Zr)			<1.0		mg/kg		1	01-OCT-20
MOISTURE-CL	**Soil**							
Batch R5243824								
WG3416213-2 LCS								
Moisture			99.6		%		90-110	01-OCT-20
WG3416213-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-CL	**Soil**							
Batch R5243824								
WG3416213-1 MB								
Moisture			<0.25		%		0.25	01-OCT-20
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245163								
WG3418493-14 IRM		**ALS PAH RM2**						
Acenaphthene			99.4		%		60-130	05-OCT-20
Acenaphthylene			119.8		%		60-130	05-OCT-20
Anthracene			120.2		%		60-130	05-OCT-20
Acridine			104.2		%		60-130	05-OCT-20
Benz(a)anthracene			102.0		%		60-130	05-OCT-20
Benzo(a)pyrene			96.7		%		60-130	05-OCT-20
Benzo(b&j)fluoranthene			94.7		%		60-130	05-OCT-20
Benzo(e)pyrene			105.1		%		60-130	05-OCT-20
Benzo(g,h,i)perylene			97.5		%		60-130	05-OCT-20
Benzo(k)fluoranthene			90.8		%		60-130	05-OCT-20
Chrysene			101.2		%		60-130	05-OCT-20
Dibenz(a,h)anthracene			94.1		%		60-130	05-OCT-20
Fluoranthene			96.0		%		60-130	05-OCT-20
Fluorene			97.9		%		60-130	05-OCT-20
Indeno(1,2,3-c,d)pyrene			128.4		%		60-130	05-OCT-20
2-Methylnaphthalene			96.0		%		60-130	05-OCT-20
Naphthalene			102.0		%		50-130	05-OCT-20
Perylene			111.7		%		60-130	05-OCT-20
Phenanthrene			99.2		%		60-130	05-OCT-20
Pyrene			100.0		%		60-130	05-OCT-20
1-Methylnaphthalene			95.2		%		60-130	05-OCT-20
WG3418493-17 IRM		**ALS PAH RM2**						
Acenaphthene			105.0		%		60-130	06-OCT-20
Acenaphthylene			125.6		%		60-130	06-OCT-20
Anthracene			127.5		%		60-130	06-OCT-20
Acridine			114.8		%		60-130	06-OCT-20
Benz(a)anthracene			106.7		%		60-130	06-OCT-20
Benzo(a)pyrene			93.0		%		60-130	06-OCT-20
Benzo(b&j)fluoranthene			95.0		%		60-130	06-OCT-20
Benzo(e)pyrene			100.4		%		60-130	06-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245163								
WG3418493-17 IRM		**ALS PAH RM2**						
Benzo(g,h,i)perylene			94.4		%		60-130	06-OCT-20
Benzo(k)fluoranthene			89.3		%		60-130	06-OCT-20
Chrysene			105.0		%		60-130	06-OCT-20
Dibenz(a,h)anthracene			98.1		%		60-130	06-OCT-20
Fluoranthene			98.2		%		60-130	06-OCT-20
Fluorene			101.5		%		60-130	06-OCT-20
Indeno(1,2,3-c,d)pyrene			111.9		%		60-130	06-OCT-20
2-Methylnaphthalene			97.4		%		60-130	06-OCT-20
Naphthalene			99.6		%		50-130	06-OCT-20
Perylene			96.2		%		60-130	06-OCT-20
Phenanthrene			102.1		%		60-130	06-OCT-20
Pyrene			101.7		%		60-130	06-OCT-20
1-Methylnaphthalene			94.3		%		60-130	06-OCT-20
WG3418493-3 IRM		**ALS PAH RM2**						
Acenaphthene			106.5		%		60-130	04-OCT-20
Acenaphthylene			128.6		%		60-130	04-OCT-20
Anthracene			122.3		%		60-130	04-OCT-20
Acridine			123.8		%		60-130	04-OCT-20
Benz(a)anthracene			110.1		%		60-130	04-OCT-20
Benzo(a)pyrene			107.5		%		60-130	04-OCT-20
Benzo(b&j)fluoranthene			100.1		%		60-130	04-OCT-20
Benzo(e)pyrene			110.1		%		60-130	04-OCT-20
Benzo(g,h,i)perylene			104.5		%		60-130	04-OCT-20
Benzo(k)fluoranthene			97.3		%		60-130	04-OCT-20
Chrysene			107.0		%		60-130	04-OCT-20
Dibenz(a,h)anthracene			106.5		%		60-130	04-OCT-20
Fluoranthene			102.1		%		60-130	04-OCT-20
Fluorene			102.0		%		60-130	04-OCT-20
Indeno(1,2,3-c,d)pyrene			130.0		%		60-130	04-OCT-20
2-Methylnaphthalene			100.6		%		60-130	04-OCT-20
Naphthalene			104.0		%		50-130	04-OCT-20
Perylene			102.7		%		60-130	04-OCT-20
Phenanthrene			104.3		%		60-130	04-OCT-20
Pyrene			105.4		%		60-130	04-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245163								
WG3418493-3 IRM		**ALS PAH RM2**						
1-Methylnaphthalene			98.8		%		60-130	04-OCT-20
WG3418493-7 IRM		**ALS PAH RM2**						
Acenaphthene			97.4		%		60-130	05-OCT-20
Acenaphthylene			116.7		%		60-130	05-OCT-20
Anthracene			123.5		%		60-130	05-OCT-20
Acridine			120.9		%		60-130	05-OCT-20
Benz(a)anthracene			106.3		%		60-130	05-OCT-20
Benzo(a)pyrene			103.2		%		60-130	05-OCT-20
Benzo(b&j)fluoranthene			94.6		%		60-130	05-OCT-20
Benzo(e)pyrene			104.7		%		60-130	05-OCT-20
Benzo(g,h,i)perylene			91.1		%		60-130	05-OCT-20
Benzo(k)fluoranthene			89.3		%		60-130	05-OCT-20
Chrysene			103.8		%		60-130	05-OCT-20
Dibenz(a,h)anthracene			90.6		%		60-130	05-OCT-20
Fluoranthene			94.4		%		60-130	05-OCT-20
Fluorene			95.2		%		60-130	05-OCT-20
Indeno(1,2,3-c,d)pyrene			122.3		%		60-130	05-OCT-20
2-Methylnaphthalene			90.4		%		60-130	05-OCT-20
Naphthalene			92.1		%		50-130	05-OCT-20
Perylene			99.6		%		60-130	05-OCT-20
Phenanthrene			99.9		%		60-130	05-OCT-20
Pyrene			98.6		%		60-130	05-OCT-20
1-Methylnaphthalene			87.3		%		60-130	05-OCT-20
WG3418493-13 LCS								
Acenaphthene			84.9		%		60-130	05-OCT-20
Acenaphthylene			77.5		%		60-130	05-OCT-20
Anthracene			76.6		%		60-130	05-OCT-20
Acridine			76.0		%		60-130	05-OCT-20
Benz(a)anthracene			81.3		%		60-130	05-OCT-20
Benzo(a)pyrene			78.9		%		60-130	05-OCT-20
Benzo(b&j)fluoranthene			73.8		%		60-130	05-OCT-20
Benzo(e)pyrene			76.6		%		60-130	05-OCT-20
Benzo(g,h,i)perylene			76.7		%		60-130	05-OCT-20
Benzo(k)fluoranthene			78.9		%		60-130	05-OCT-20
Chrysene			80.1		%		60-130	05-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245163								
WG3418493-13 LCS								
Dibenz(a,h)anthracene			89.9		%		60-130	05-OCT-20
Fluoranthene			81.0		%		60-130	05-OCT-20
Fluorene			78.8		%		60-130	05-OCT-20
Indeno(1,2,3-c,d)pyrene			85.0		%		60-130	05-OCT-20
2-Methylnaphthalene			81.3		%		60-130	05-OCT-20
Naphthalene			85.2		%		50-130	05-OCT-20
Perylene			76.7		%		60-130	05-OCT-20
Phenanthrene			83.0		%		60-130	05-OCT-20
Pyrene			84.8		%		60-130	05-OCT-20
1-Methylnaphthalene			82.1		%		60-130	05-OCT-20
Quinoline			75.9		%		60-130	05-OCT-20
WG3418493-16 LCS								
Acenaphthene			95.8		%		60-130	06-OCT-20
Acenaphthylene			86.3		%		60-130	06-OCT-20
Anthracene			85.0		%		60-130	06-OCT-20
Acridine			84.8		%		60-130	06-OCT-20
Benz(a)anthracene			95.2		%		60-130	06-OCT-20
Benzo(a)pyrene			79.9		%		60-130	06-OCT-20
Benzo(b&j)fluoranthene			83.7		%		60-130	06-OCT-20
Benzo(e)pyrene			89.2		%		60-130	06-OCT-20
Benzo(g,h,i)perylene			83.7		%		60-130	06-OCT-20
Benzo(k)fluoranthene			89.3		%		60-130	06-OCT-20
Chrysene			91.7		%		60-130	06-OCT-20
Dibenz(a,h)anthracene			85.0		%		60-130	06-OCT-20
Fluoranthene			89.5		%		60-130	06-OCT-20
Fluorene			86.8		%		60-130	06-OCT-20
Indeno(1,2,3-c,d)pyrene			84.7		%		60-130	06-OCT-20
2-Methylnaphthalene			92.4		%		60-130	06-OCT-20
Naphthalene			97.9		%		50-130	06-OCT-20
Perylene			84.7		%		60-130	06-OCT-20
Phenanthrene			92.8		%		60-130	06-OCT-20
Pyrene			96.1		%		60-130	06-OCT-20
1-Methylnaphthalene			92.4		%		60-130	06-OCT-20
Quinoline			87.9		%		60-130	06-OCT-20
WG3418493-2 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245163								
WG3418493-2 LCS								
Acenaphthene			103.5		%		60-130	04-OCT-20
Acenaphthylene			94.2		%		60-130	04-OCT-20
Anthracene			90.0		%		60-130	04-OCT-20
Acridine			88.5		%		60-130	04-OCT-20
Benz(a)anthracene			96.4		%		60-130	04-OCT-20
Benzo(a)pyrene			99.7		%		60-130	04-OCT-20
Benzo(b&j)fluoranthene			90.7		%		60-130	04-OCT-20
Benzo(e)pyrene			96.5		%		60-130	04-OCT-20
Benzo(g,h,i)perylene			92.0		%		60-130	04-OCT-20
Benzo(k)fluoranthene			91.1		%		60-130	04-OCT-20
Chrysene			95.5		%		60-130	04-OCT-20
Dibenz(a,h)anthracene			91.3		%		60-130	04-OCT-20
Fluoranthene			95.9		%		60-130	04-OCT-20
Fluorene			94.1		%		60-130	04-OCT-20
Indeno(1,2,3-c,d)pyrene			99.9		%		60-130	04-OCT-20
2-Methylnaphthalene			101.8		%		60-130	04-OCT-20
Naphthalene			106.2		%		50-130	04-OCT-20
Perylene			91.2		%		60-130	04-OCT-20
Phenanthrene			99.5		%		60-130	04-OCT-20
Pyrene			100.2		%		60-130	04-OCT-20
1-Methylnaphthalene			100.4		%		60-130	04-OCT-20
Quinoline			95.6		%		60-130	04-OCT-20
WG3418493-6 LCS								
Acenaphthene			95.8		%		60-130	05-OCT-20
Acenaphthylene			85.9		%		60-130	05-OCT-20
Anthracene			87.1		%		60-130	05-OCT-20
Acridine			86.0		%		60-130	05-OCT-20
Benz(a)anthracene			94.2		%		60-130	05-OCT-20
Benzo(a)pyrene			98.5		%		60-130	05-OCT-20
Benzo(b&j)fluoranthene			88.5		%		60-130	05-OCT-20
Benzo(e)pyrene			91.3		%		60-130	05-OCT-20
Benzo(g,h,i)perylene			83.3		%		60-130	05-OCT-20
Benzo(k)fluoranthene			87.9		%		60-130	05-OCT-20
Chrysene			87.6		%		60-130	05-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245163								
WG3418493-6 LCS								
Dibenz(a,h)anthracene			83.7		%		60-130	05-OCT-20
Fluoranthene			88.9		%		60-130	05-OCT-20
Fluorene			87.3		%		60-130	05-OCT-20
Indeno(1,2,3-c,d)pyrene			71.0		%		60-130	05-OCT-20
2-Methylnaphthalene			91.3		%		60-130	05-OCT-20
Naphthalene			96.9		%		50-130	05-OCT-20
Perylene			97.6		%		60-130	05-OCT-20
Phenanthrene			93.6		%		60-130	05-OCT-20
Pyrene			92.6		%		60-130	05-OCT-20
1-Methylnaphthalene			90.7		%		60-130	05-OCT-20
Quinoline			85.0		%		60-130	05-OCT-20
WG3418493-1 MB								
Acenaphthene			<0.0050		mg/kg		0.005	04-OCT-20
Acenaphthylene			<0.0050		mg/kg		0.005	04-OCT-20
Anthracene			<0.0040		mg/kg		0.004	04-OCT-20
Acridine			<0.010		mg/kg		0.01	04-OCT-20
Benz(a)anthracene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	04-OCT-20
Chrysene			<0.010		mg/kg		0.01	04-OCT-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	04-OCT-20
Fluoranthene			<0.010		mg/kg		0.01	04-OCT-20
Fluorene			<0.010		mg/kg		0.01	04-OCT-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	04-OCT-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	04-OCT-20
Naphthalene			<0.010		mg/kg		0.01	04-OCT-20
Perylene			<0.010		mg/kg		0.01	04-OCT-20
Phenanthrene			<0.010		mg/kg		0.01	04-OCT-20
Pyrene			<0.010		mg/kg		0.01	04-OCT-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	04-OCT-20
Quinoline			<0.050		mg/kg		0.05	04-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245163								
WG3418493-1 MB								
Surrogate: d8-Naphthalene			91.4		%		50-130	04-OCT-20
Surrogate: d10-Acenaphthene			92.4		%		60-130	04-OCT-20
Surrogate: d10-Phenanthrene			90.1		%		60-130	04-OCT-20
Surrogate: d12-Chrysene			99.0		%		60-130	04-OCT-20
WG3418493-12 MB								
Acenaphthene			<0.0050		mg/kg		0.005	05-OCT-20
Acenaphthylene			<0.0050		mg/kg		0.005	05-OCT-20
Anthracene			<0.0040		mg/kg		0.004	05-OCT-20
Acridine			<0.010		mg/kg		0.01	05-OCT-20
Benz(a)anthracene			<0.010		mg/kg		0.01	05-OCT-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	05-OCT-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	05-OCT-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	05-OCT-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	05-OCT-20
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	05-OCT-20
Chrysene			<0.010		mg/kg		0.01	05-OCT-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	05-OCT-20
Fluoranthene			<0.010		mg/kg		0.01	05-OCT-20
Fluorene			<0.010		mg/kg		0.01	05-OCT-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	05-OCT-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	05-OCT-20
Naphthalene			<0.010		mg/kg		0.01	05-OCT-20
Perylene			<0.010		mg/kg		0.01	05-OCT-20
Phenanthrene			<0.010		mg/kg		0.01	05-OCT-20
Pyrene			<0.010		mg/kg		0.01	05-OCT-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	05-OCT-20
Quinoline			<0.050		mg/kg		0.05	05-OCT-20
Surrogate: d8-Naphthalene			86.3		%		50-130	05-OCT-20
Surrogate: d10-Acenaphthene			86.0		%		60-130	05-OCT-20
Surrogate: d10-Phenanthrene			85.4		%		60-130	05-OCT-20
Surrogate: d12-Chrysene			96.1		%		60-130	05-OCT-20
WG3418493-5 MB								
Acenaphthene			<0.0050		mg/kg		0.005	04-OCT-20
Acenaphthylene			<0.0050		mg/kg		0.005	04-OCT-20
Anthracene			<0.0040		mg/kg		0.004	04-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245163								
WG3418493-5 MB								
Acridine			<0.010		mg/kg		0.01	04-OCT-20
Benz(a)anthracene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	04-OCT-20
Chrysene			<0.010		mg/kg		0.01	04-OCT-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	04-OCT-20
Fluoranthene			<0.010		mg/kg		0.01	04-OCT-20
Fluorene			<0.010		mg/kg		0.01	04-OCT-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	04-OCT-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	04-OCT-20
Naphthalene			<0.010		mg/kg		0.01	04-OCT-20
Perylene			<0.010		mg/kg		0.01	04-OCT-20
Phenanthrene			<0.010		mg/kg		0.01	04-OCT-20
Pyrene			<0.010		mg/kg		0.01	04-OCT-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	04-OCT-20
Quinoline			<0.050		mg/kg		0.05	04-OCT-20
Surrogate: d8-Naphthalene			94.6		%		50-130	04-OCT-20
Surrogate: d10-Acenaphthene			99.0		%		60-130	04-OCT-20
Surrogate: d10-Phenanthrene			97.8		%		60-130	04-OCT-20
Surrogate: d12-Chrysene			98.8		%		60-130	04-OCT-20
WG3418493-9 MB								
Acenaphthene			<0.0050		mg/kg		0.005	05-OCT-20
Acenaphthylene			<0.0050		mg/kg		0.005	05-OCT-20
Anthracene			<0.0040		mg/kg		0.004	05-OCT-20
Acridine			<0.010		mg/kg		0.01	05-OCT-20
Benz(a)anthracene			<0.010		mg/kg		0.01	05-OCT-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	05-OCT-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	05-OCT-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	05-OCT-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	05-OCT-20
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	05-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245163								
WG3418493-9 MB								
Chrysene			<0.010		mg/kg		0.01	05-OCT-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	05-OCT-20
Fluoranthene			<0.010		mg/kg		0.01	05-OCT-20
Fluorene			<0.010		mg/kg		0.01	05-OCT-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	05-OCT-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	05-OCT-20
Naphthalene			<0.010		mg/kg		0.01	05-OCT-20
Perylene			<0.010		mg/kg		0.01	05-OCT-20
Phenanthrene			<0.010		mg/kg		0.01	05-OCT-20
Pyrene			<0.010		mg/kg		0.01	05-OCT-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	05-OCT-20
Quinoline			<0.050		mg/kg		0.05	05-OCT-20
Surrogate: d8-Naphthalene			87.6		%		50-130	05-OCT-20
Surrogate: d10-Acenaphthene			89.5		%		60-130	05-OCT-20
Surrogate: d10-Phenanthrene			89.4		%		60-130	05-OCT-20
Surrogate: d12-Chrysene			96.4		%		60-130	05-OCT-20
PH-1:9-CL	**Soil**							
Batch R5245112								
WG3417924-4 DUP		**L2508964-5**						
pH (1:9)		7.29	7.27	J	pH	0.02	0.3	03-OCT-20
WG3417924-6 IRM		**SAL-STD10**						
pH (1:9)			8.29		pH		7.96-8.56	03-OCT-20
WG3417924-3 LCS								
pH (1:9)			6.99		pH		6.7-7.3	03-OCT-20
PSA-PIPET-DETAIL-SK	**Soil**							
Batch R5251857								
WG3419172-2 IRM		**2017-PSA**						
% Sand (2.00mm - 1.00mm)			2.9		%		0-7.6	07-OCT-20
% Sand (1.00mm - 0.50mm)			3.7		%		0-8.9	07-OCT-20
% Sand (0.50mm - 0.25mm)			10.1		%		5.3-15.3	07-OCT-20
% Sand (0.25mm - 0.125mm)			14.7		%		10-20	07-OCT-20
% Sand (0.125mm - 0.063mm)			12.7		%		7.3-17.3	07-OCT-20
% Silt (0.063mm - 0.0312mm)			14.6		%		9.9-19.9	07-OCT-20
% Silt (0.0312mm - 0.004mm)			23.2		%		17.6-27.6	07-OCT-20
% Clay (<4um)			18.0		%		13.4-23.4	07-OCT-20

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

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID:	CMO LAEMP Sept 2020	TURNAROUND TIME:	

PROJECT/CLIENT INFO

Facility Name	REP
Project Manager	Cait Good
Email	cait.good@teck.com
Address	421 Pine Avenue
City	Sparwood
Province	BC
Postal Code	V0B 2G0
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Phone Number	250-425-8202

LABORATORY

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Country	Canada
Phone Number	1 403 407 1794

	Excel	PDF	EDD
cait.good@teck.com	x	x	x
teckcoal@equisonline.com			x
Jings@minnow.ca	x	x	x
carlie.meyer@teck.com	x	x	x
sweech@minnow.ca	x	x	x

PO number: 689999

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.	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
PRESERV.								NONE	NONE	NONE	NONE	NONE
RG_MI5_SE-1_2020-09-19_1125	RG_MI5	SE	No	19-Sep-20	11:25	G	2	X	X	X	X	X
RG_MI5_SE-3_2020-09-19_1140	RG_MI5	SE	No	19-Sep-20	11:40	G	2	X	X	X	X	X
RG_MI5_SE-4_2020-09-19_1155	RG_MI5	SE	No	19-Sep-20	11:55	G	2	X	X	X	X	X
RG_MI5_SE-5_2020-09-19_1215	RG_MI5	SE	No	19-Sep-20	12:15	G	2	X	X	X	X	X
RG_MI5_SE-2_2020-09-17_1700	RG_MI5	SE	No	17-Sep-20	17:00	G	2	X	X	X	X	X

L2508964-COFC

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	
	Jennifer Ings	September 23, 2020		9/23 900

10

NB 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		Date/Time	September 23, 2020
Emergency (1 Business Day) - 100% surcharge					
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

Methods and QC Report 2021

Project ID: CMO Nickel (20-83)

Client: Minnow Environmental

Prepared by:
Cordillera Consulting Inc.
Summerland, BC

Unit 1, 13216 Henry Ave B1202
Summerland, BC, V0H 1Z0
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Sample Reception

On September 29, 2020, Cordillera Consulting received 9 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
CM_MC2_BIC-1_2020-09-19	CC210840	9/19/2020	400µM	1
CM_MC2_BIC-2_2020-09-19	CC210841	9/19/2020	400µM	1
CM_MC2_BIC-3_2020-09-19	CC210842	9/19/2020	400µM	1
RG_MIDAG-S1_BIC-1_2020-09-18	CC210843	9/18/2020	400µM	2
RG_MIDAG-S1_BIC-2_2020-09-18	CC210844	9/18/2020	400µM	1
RG_MIDAG-S1_BIC-3_2020-09-18	CC210845	9/18/2020	400µM	1
RG_MIDAG-S2_BIC-1_2020-09-17	CC210846	9/17/2020	400µM	1
RG_MIDAG-S2_BIC-2_2020-09-17	CC210847	9/17/2020	400µM	1
RG_MIDAG-S2_BIC-3_2020-09-17	CC210848	9/17/2020	400µM	1

Sample Sorting

- Using a gridded Petri dish, fine forceps and a low power stereo-microscope (Olympus, Nikon, Leica) the sorting technicians removed the invertebrates and sorted them into family/orders.
- The sorting technician kept a running tally of total numbers excluding organisms from Porifera, Nemata, Platyhelminthes, Ostracoda, Copepoda, Cladocera and terrestrial drop-ins such as aphids. These organisms were marked for their presence (given a value of 1) only and left in the sample. They were not included towards the 300-organism subsample count.
- Where specimens are broken or damaged, only heads were counted.
- Subsampling was conducted with the use of a Marchant Box.
- When using the Marchant box, cells were extracted at the same time in the order indicated by a random number table. If the 300th organism was found part way into

sorting a cell then the balance of that cell was sorted. If the organism count had not reached 300 by the 50th cell then the entire sample was sorted.

- The total number of cells sorted and the number of organisms removed were recorded manually on a bench sheet and then recorded into INSTAR1
- Organisms were stored in vials containing 80% ethanol and an interior label indicating the site names, date of sampling, site code numbers and portion subsampled. This information was also recorded on the laboratory bench sheet and on INSTAR1.
- The sorted portion of the debris was preserved and labeled separately from the unsorted portion and was tested for sorting efficiency (Sorting Quality Control – Sorting Efficiency). The unsorted portion was also labeled and preserved in separate jars.

Percent sub-sampled and total countable invertebrates pulled from the samples were summarized in the table below.

Table 2: Percent sub-sample and invertebrate count for each sample

Sample	Date	CC#	400 micron fraction	
			% Sampled	# Invertebrates
CM_MC2_BIC-1_2020-09-19	19-Sep-20	CC210840	5%	655
CM_MC2_BIC-2_2020-09-19	19-Sep-20	CC210841	5%	553
CM_MC2_BIC-3_2020-09-19	19-Sep-20	CC210842	5%	419
RG_MIDAG-S1_BIC-1_2020-09-18	18-Sep-20	CC210843	5%	1460
RG_MIDAG-S1_BIC-2_2020-09-18	18-Sep-20	CC210844	5%	1440
RG_MIDAG-S1_BIC-3_2020-09-18	18-Sep-20	CC210845	5%	1066
RG_MIDAG-S2_BIC-1_2020-09-17	17-Sep-20	CC210846	5%	1853
RG_MIDAG-S2_BIC-2_2020-09-17	17-Sep-20	CC210847	5%	1212
RG_MIDAG-S2_BIC-3_2020-09-17	17-Sep-20	CC210848	5%	1696

Sorting Quality Control - Sorting Efficiency

As a part of Cordillera's laboratory policy, all projects undergo sorting efficiency checks.

- As sorting progresses, 10% of samples were randomly chosen by senior members of the sorting team for resorting.
- All sorters working on a project had at least 1 sample resorted by another sorter.
- An efficiency of 90 % was expected (95% for CABIN samples).
- If 90/95% efficiency was not met, samples from that sorter were resorted.
- To calculated sorting efficiency the following formula was used:

$$\frac{\#OrganismsMissed}{TotalOrganismsFound}*100 = \%OM$$

Table 3 Summary of sorting efficiency

			Total from Sample	Percent Efficiency
Site - QC, Sample - QC1, CC# - CC210844, Percent sampled = 5%, Sieve size = 400				
Ephemeroptera		6		
Plecoptera		7		
	Total:	**13**	**1440**	**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
210842	CM_MC@_BIC-3_2020-09-19	419	472	491	394	424	434	415	394	441	479	442	426	455	409	436	431	420	441	435	427	AR	995	8685	0.00	19.76	0.06	13.07

Taxonomic Effort

The next procedure was the identification to genus-species level where possible of all the organisms in the sample.

- Identifications were made at the genus/species level for all insect organisms found including Chironomidae (Based on CABIN protocol).
- Non-insect organisms (except those not included in CABIN count) were identified to genus/species where possible and to a minimum of family level with intact and mature specimens.
- The Standard Taxonomic Effort lists compiled by the CABIN manual[1], SAFIT[2] , and PNAMP[3] were used as a guide line for what level of identification to achieve where the condition and maturity of the organism enabled.
- Organisms from the same families/order were kept in separate vials with 80% ethanol and an interior label of printed laser paper.
- Chironomidae was identified to genus/species level where possible and was aided by slide mounts. CMC-10 was used to clear and mount the slide.
- Oligochaetes was identified to family/genus level with the aid of slide mounts. CMC-10 was used to clear and mount the slide.
- Other Annelida (leeches, polychaetes) were identified to the family/genus/species level with undamaged, mature specimens.
- Mollusca was identified to family and genus/species where possible
- Decapoda, Amphipoda and Isopoda were identified at family/genus/species level where possible.
- Bryozoans and Nemata remained at the phylum level
- Hydrachnidae and Cnidaria were identified at the family/genus level where possible.
- When requested, reference collections were made containing at least one individual from each taxa listed. Organisms represented will have been identified to the lowest practical level.
- Reference collection specimens were stored in 55 mm glass vials with screw-cap lids with polyseal inserts (museum quality). They were labeled with taxa name, site code, date identified and taxonomist name. The same information was applied to labels on the slide mounts.

Taxonomists

The taxonomists for this project were certified by the Society of Freshwater Science (SFS) Taxonomic Certification Program at level 2 which is the required certification for CABIN projects:

Scott Finlayson: Group 1 General Arthropods (East/West); Group 2 EPT (East/West);
Group 3 Chironomidae (East/West); Group 4 Oligochaeta

Adam Bliss: Group 1 General Arthropods (East/West); Group 2 EPT (East/West); Group 3 Chironomidae
Rita Avery: Group 1 General Arthropods (East/West); Group 2 EPT (East/West)

Taxonomic QC

Taxonomic QC was performed in house by someone other than the original taxonomist.

- Quality control protocol involved complete, blind re-identification and re-enumeration of at least 10% of samples by a second SFS-certified taxonomist.
- Samples for taxonomic quality control were randomly selected and quality control procedures were conducted as the project progresses through the laboratories.

- The second (QC) taxonomist will calculate and record four types of errors:
    1. Misidentification error
    2. Enumeration error
    3. Questionable taxonomic resolution error
    4. Insufficient taxonomic resolution error

The QC coordinator then calculates the following estimates of taxonomic precision.

1. The percent total identification error rate is calculated as:

$$\frac{Sum\ of\ incorrect\ identifications}{total\ organisms\ counted\ in\ audit} * (100)$$

The average total identification error rate of audited samples did not exceed 5%. All samples that exceed a 5% error rate were re-evaluated to determine whether repeated errors or patterns in error contributed.

2. The percent difference in enumeration (PDE) to quantify the consistency of specimen counts.

$$PDE = \frac{|n_1 - n_2|}{n_1 + n_2} x100$$

3. The percent taxonomic disagreement (PTD) to quantify the shared precision between two sets of identifications.

$$PTD = \left(1 - \left[\frac{a}{N}\right]\right) x100$$

4. Bray Curtis dissimilarity Index to quantify the differences in identifications.

$$BC_{ij} = 1 - \frac{2C_{ij}}{S_j + S_i}$$

Error Summary

All samples report errors within the acceptable limits for CABIN Laboratory methods (less than 5% error).

Table 5 Summary of taxonomic error following QC

Site	Taxa Identified	% Error	PDE	PTD	Bray - Curtis Dissimilarity index
Site - 2020, Sample - CM_MC2_BIC-3_2020-09-19, CC# - CC210842, Percent sampled = 5%, Sieve size = 400	420	0.00	0.11918951	0.71428571	0.00595948

There will always be disagreements between taxonomists regarding the degree of taxonomic resolution in immature specimens and when laboratories make use of different keys for certain groups (Mollusks is an especially disputed group). It is always possible that some taxa found by the original taxonomist were overlooked in QC.

All of the Taxonomic QC samples that were observed passed testing according to the CABIN misidentification protocols. See the tables below for results from taxonomic QC audit.

Error Rationale

Site - 2020, Sample - CM_MC2_BIC-3_2020-09-19, CC# - CC210842, Percent sampled = 5%, Sieve size = 400	Laboratory Count	QC Audit Count	Agreement	Misidentification	Questionable Taxonomic Resolution	Enumeration	Insufficient Taxonomic Resolution	Comments
Antocha	1	1						
Apatania	1	1						
Baetidae	11	11						
Baetis rhodani group	2	2						
Chaetogaster	1	1						
Chelifera/ Metachela	1	1						
Chironomidae	5	5						

Chironomidae	3	3						
Constempellina sp. C	3	3						
Dicranota	1	1						
Doroneuria	1	1						
Drunella doddsii	11	10	No			X		
Enchytraeidae	1	1						
Ephemerellidae	6	7	No			X		
Eukiefferiella	8	8						
Glossosoma	3	3						
Haploperla	1	1						
Heptageniidae	4	4						
Heterlimnius	1	1						
Heterlimnius	1	1						
Hydropsychidae	6	6						
Hydroptilidae	1	1						
Kogotus	3	3						
Lebertia	29	29						
Mallochohelea	5	5						
Megarcys	1	1						
Micrasema	1	1						
Oligophlebodes	4	4						
Orthocladius complex	12	12						
Pagastia	8	8						
Parapsyche	3	3						
Pericoma/Telmatoscopus	117	118	No			X		
Plecoptera	1	1						
Rhyacophila	13	13						
Rhyacophila atrata complex	2	2						
Rhyacophila brunnea/vemna group	1	1						
Rhyacophila hyalinata group	4	4						
Rhyacophila vobara subgroup	2	2						
Simulium	49	49						
Sperchon	9	9						
Taeniopterygidae	5	5						
Thienemannimyia group	4	4						
Zapada	29	28	No			X		
Zapada cinctipes	41	42	No			X		
Zapada oregonensis group	3	3						

Total:	**419**	**420**						
					0	**5**	**0**	
% Total Misidentification Rate =	misidentifications	x100 =	0.00	**Pass**				
	total number							

References

[1] McDermott, H., Paull, T., Strachan, S. (May 2014). Laboratory Methods: Processing, Taxonomy, and Quality Control of Benthic Macroinvertebrate Samples, Environment Canada. ISBN: 978-1-100-25417-3

[2] Southwest Association of Freshwater Invertebrate Taxonomists. (2015). www.safit.org

[3] Pacific Northwest Aquatic Monitoring Partnership (Accessed 2015). www.pnamp.org

Taxonomic Keys

Below is a reference list of taxonomic keys utilized by taxonomists at Cordillera Consulting. Cordillera taxonomists routinely seek out new literature to ensure the most accurate identification keys are being utilized. This is not reflective of the exhaustive list of resources that we use for identification. A more complete list of taxonomic resources can be found at Southwest Association of Freshwater Invertebrate Taxonomists. (2015).
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TrichAnalytics Inc.

Tissue Microchemistry Analysis Report

Client:	Jennifer Ings	Date Received:	22 Sep 2020
	Aquatic Scientist		29 Sep 2020
	Minnow Environmental	Date of Analysis:	24 Sep 2020
Phone:	250-595-1627		25 Sep 2020
Email:	jings@minnow.ca		02 Oct 2020
		Final Report Date:	02 Oct 2020
		Project No.:	2020-144
		Method No.:	MET-002.04

Client Project: Teck Coal Limited/Minnow CMO LAEMP (20-07)

Analytical Request: Benthic Invertebrate Tissue Microchemistry (total metals and moisture) – 29 samples.
See chain of custody form provided for sample identification numbers.

Notes:

Analytical results are expressed in part per million (ppm) dry weight.
Samples quantified using DORM-4, NIST-1566b, and NIST-2976 certified reference standards.
Aluminum concentrations above 1,000 ppm are outside linear range of the calibration curve.
Client specific DQO for Selenium accuracy is 90 - 110% of the certified value; (average achieved 98%; range 90 - 107%).
CoC transcription errors noted for sample IDs RG_MIDAG_INV-1_2020-09-15 and RG_MIDAG_INV-3_2020-09-16 were corrected for reporting as per Client request.
RPD values calculated according to the British Columbia Environmental Laboratory Manual (2020) criteria.

This report provides the analytical results only for tissue samples noted above as received from the Client.

02 Oct 2020

Reviewed and Approved by Jennie Christensen, PhD, RPBio — Date

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CALA Testing Accreditation No. A4196

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_AGCK_INV-1_2020-09-10	RG_AGCK_INV-2_2020-09-10	RG_AGCK_INV-3_2020-09-10	RG_LE1_INV-1_2020-09-17	RG_LE1_INV-2_2020-09-17
		Lab ID	001	002	003	004	005
		Wet Weight (g)	1.9435	1.1322	1.3622	1.7721	1.5248
		Dry Weight (g)	0.3220	0.2713	0.2951	0.4406	0.3584
		Moisture (%)	83.4	76.0	78.3	75.1	76.5
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.004	0.013	0.195	0.194	0.237	0.286	0.408
11B	0.101	0.337	0.507	0.547	0.620	0.883	0.731
23Na	2.0	6.7	4,259	2,920	4,562	3,598	3,365
24Mg	0.044	0.147	1,269	1,247	1,404	1,210	1,104
27Al	0.043	0.143	127	243	263	532	627
31P	80	267	12,105	10,154	12,821	10,963	10,267
39K	18	60	10,646	9,919	12,125	9,577	8,665
44Ca	24	80	1,828	1,758	1,478	1,159	1,221
49Ti	0.236	0.787	6.8	17	15	32	40
51V	0.018	0.060	0.255	0.464	0.405	1.5	1.7
52Cr	0.324	1.1	1.9	2.9	2.4	3.3	4.7
55Mn	0.013	0.043	13	16	19	57	87
57Fe	6.1	20	108	182	175	410	487
59Co	0.005	0.017	0.098	0.183	0.140	0.451	0.770
60Ni	0.013	0.043	4.5	6.0	5.7	4.8	9.0
63Cu	0.005	0.017	9.2	9.3	8.8	18	17
66Zn	0.752	2.5	224	219	216	164	161
75As	0.418	1.4	1.7	1.2	1.5	0.462	0.511
77Se	0.235	0.783	6.4	4.9	7.2	4.5	5.2
88Sr	0.001	0.003	4.7	4.4	3.5	2.2	2.6
95Mo	0.008	0.027	0.261	0.261	0.298	0.553	0.661
107Ag	0.001	0.003	0.042	0.036	0.051	0.197	0.145
111Cd	0.039	0.130	0.522	0.481	0.532	2.2	2.7
118Sn	0.025	0.083	0.135	0.182	0.088	0.070	0.135
121Sb	0.007	0.023	0.014	0.014	0.014	0.040	0.033
137Ba	0.001	0.003	13	21	26	65	105
202Hg	0.030	0.100	0.052	0.043	0.069	0.146	0.107
205Tl	0.001	0.003	0.224	0.131	0.245	0.030	0.035
208Pb	0.001	0.003	0.084	0.071	0.080	0.232	0.294
238U	0.001	0.003	0.027	0.032	0.037	0.048	0.056

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited
Tissue Analysis Results

		Client ID	RG_LE1_INV-3_2020-09-17	RG_MI25_INV-1_2020-09-11	RG_MI25_INV-2_2020-09-11	RG_MI25_INV-3_2020-09-11	RG_CORCK_INV-1_2020-09-12
		Lab ID	006	007	008	009	010
		Wet Weight (g)	0.9388	1.6383	0.7727	0.8806	0.2708
		Dry Weight (g)	0.1853	0.3211	0.1552	0.1766	0.0819
		Moisture (%)	80.3	80.4	79.9	79.9	69.8
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.004	0.013	0.276	0.550	0.938	0.540	0.179
11B	0.101	0.337	0.585	2.9	5.2	3.0	0.820
23Na	2.0	6.7	3,857	3,075	4,649	4,682	3,465
24Mg	0.044	0.147	1,239	1,126	1,797	1,378	1,670
27Al	0.043	0.143	325	1,154	2,636	1,273	59
31P	80	267	12,294	9,517	12,438	11,933	8,695
39K	18	60	10,219	8,536	15,405	11,840	7,504
44Ca	24	80	895	1,353	2,105	1,804	3,433
49Ti	0.236	0.787	16	65	190	83	2.9
51V	0.018	0.060	0.939	1.3	3.0	1.6	0.114
52Cr	0.324	1.1	2.5	3.7	5.9	4.8	2.4
55Mn	0.013	0.043	63	53	95	50	51
57Fe	6.1	20	254	532	991	563	109
59Co	0.005	0.017	0.381	0.745	2.1	1.5	8.2
60Ni	0.013	0.043	3.3	7.6	14	11	11
63Cu	0.005	0.017	17	13	20	19	9.9
66Zn	0.752	2.5	148	139	243	190	132
75As	0.418	1.4	0.547	0.944	2.9	1.1	<0.418
77Se	0.235	0.783	6.0	2.9	4.4	4.1	2.7
88Sr	0.001	0.003	1.8	4.1	7.5	5.9	15
95Mo	0.008	0.027	0.567	0.342	0.746	0.472	0.174
107Ag	0.001	0.003	0.174	0.039	0.064	0.057	0.030
111Cd	0.039	0.130	2.9	1.1	3.4	4.1	0.450
118Sn	0.025	0.083	0.094	0.135	0.369	0.234	0.070
121Sb	0.007	0.023	0.022	0.033	0.061	0.038	0.019
137Ba	0.001	0.003	67	88	212	70	6.0
202Hg	0.030	0.100	0.138	0.052	0.086	0.095	0.034
205Tl	0.001	0.003	0.028	0.038	0.064	0.042	0.017
208Pb	0.001	0.003	0.129	0.628	1.1	0.789	0.019
238U	0.001	0.003	0.026	0.043	0.106	0.068	0.031

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_CORCK_INV-2_2020-09-12	RG_CORCK_INV-3_2020-09-12	RG_MIUCO_INV-1_2020-09-12	RG_MIUCO_INV-2_2020-09-12	RG_MIUCO_INV-3_2020-09-12
		Lab ID	011	012	013	014	015
		Wet Weight (g)	0.4602	0.3275	0.7511	0.3089	0.6252
		Dry Weight (g)	0.1266	0.0992	0.1178	0.0578	0.1295
		Moisture (%)	72.5	69.7	84.3	81.3	79.3
			(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.004	0.013	0.200	0.195	0.460	0.658	0.357
11B	0.101	0.337	0.800	0.714	1.9	2.9	1.4
23Na	2.0	6.7	2,794	2,656	4,406	2,541	4,401
24Mg	0.044	0.147	1,339	1,432	1,539	1,538	1,254
27Al	0.043	0.143	76	54	1,006	1,986	912
31P	80	267	7,532	8,123	11,554	10,588	10,487
39K	18	60	5,615	7,206	9,698	8,376	11,037
44Ca	24	80	2,694	1,989	2,208	2,700	1,484
49Ti	0.236	0.787	3.9	2.8	62	129	56
51V	0.018	0.060	0.112	0.085	1.4	2.3	1.0
52Cr	0.324	1.1	2.1	2.1	4.2	4.9	2.7
55Mn	0.013	0.043	52	49	213	108	137
57Fe	6.1	20	106	94	635	1,000	526
59Co	0.005	0.017	8.9	7.5	1.2	1.6	0.939
60Ni	0.013	0.043	8.3	8.0	10	10	5.7
63Cu	0.005	0.017	9.4	10	18	23	19
66Zn	0.752	2.5	142	176	171	207	191
75As	0.418	1.4	<0.418	<0.418	0.655	1.2	0.885
77Se	0.235	0.783	2.6	2.6	5.3	8.1	4.9
88Sr	0.001	0.003	12	13	5.3	6.0	3.4
95Mo	0.008	0.027	0.124	0.137	0.736	0.719	0.416
107Ag	0.001	0.003	0.024	0.033	0.054	0.093	0.059
111Cd	0.039	0.130	0.266	0.225	1.8	4.0	2.1
118Sn	0.025	0.083	0.070	0.059	0.293	0.649	0.225
121Sb	0.007	0.023	0.024	0.024	0.021	0.024	0.017
137Ba	0.001	0.003	4.4	6.2	116	59	41
202Hg	0.030	0.100	<0.030	<0.030	0.051	0.077	0.070
205Tl	0.001	0.003	0.013	0.016	0.036	0.046	0.029
208Pb	0.001	0.003	0.026	0.019	0.326	0.455	0.237
238U	0.001	0.003	0.028	0.027	0.052	0.061	0.032

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_MIDCO_INV-1_2020-09-15	RG_MIDCO_INV-2_2020-09-15	RG_MIDCO_INV-3_2020-09-15	RG_MIDCO_INV-4_2020-09-15	RG_MIDCO_INV-5_2020-09-13
		Lab ID	016	017	018	019	020
		Wet Weight (g)	0.8631	0.9213	0.9214	2.3429	1.5018
		Dry Weight (g)	0.2184	0.2561	0.2873	0.6925	0.2713
		Moisture (%)	74.7	72.2	68.8	70.4	81.9
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.004	0.013	0.239	0.509	0.141	0.302	0.485
11B	0.101	0.337	0.976	2.0	0.861	1.0	2.2
23Na	2.0	6.7	4,630	3,285	2,539	2,686	7,670
24Mg	0.044	0.147	1,530	1,190	1,483	1,255	1,753
27Al	0.043	0.143	252	943	168	648	967
31P	80	267	10,232	8,639	8,816	8,110	8,330
39K	18	60	9,084	8,290	6,208	6,419	6,766
44Ca	24	80	2,379	3,434	1,535	1,725	3,606
49Ti	0.236	0.787	16	66	8.6	38	61
51V	0.018	0.060	0.366	1.3	0.244	0.905	1.3
52Cr	0.324	1.1	2.2	2.8	2.0	1.8	2.9
55Mn	0.013	0.043	41	166	53	116	77
57Fe	6.1	20	157	483	126	346	501
59Co	0.005	0.017	25	51	30	21	28
60Ni	0.013	0.043	11	34	15	17	43
63Cu	0.005	0.017	15	14	18	12	13
66Zn	0.752	2.5	195	185	159	127	173
75As	0.418	1.4	<0.418	0.730	<0.418	<0.418	0.570
77Se	0.235	0.783	2.0	4.1	2.3	2.5	3.2
88Sr	0.001	0.003	6.2	11	4.0	4.0	8.4
95Mo	0.008	0.027	0.182	0.416	0.268	0.208	0.312
107Ag	0.001	0.003	0.069	0.054	0.059	0.050	0.066
111Cd	0.039	0.130	0.373	0.454	0.136	0.136	0.407
118Sn	0.025	0.083	0.113	0.153	<0.025	0.059	0.162
121Sb	0.007	0.023	0.014	0.042	0.014	0.017	0.028
137Ba	0.001	0.003	12	32	5.3	18	16
202Hg	0.030	0.100	0.045	0.038	<0.030	0.038	0.051
205Tl	0.001	0.003	0.033	0.053	0.014	0.018	0.047
208Pb	0.001	0.003	0.083	0.292	0.061	0.207	0.312
238U	0.001	0.003	0.025	0.074	0.015	0.031	0.068

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_MIDAG_INV-1_2020-09-16	RG_MIDAG_INV-2_2020-09-16	RG_MIDAG_INV-3_2020-09-15	RG_MIULE_INV-1_2020-09-16	RG_MIULE_INV-2_2020-09-16
		Lab ID	021	022	023	024	025
		Wet Weight (g)	1.2191	1.0537	0.9518	0.5121	0.5294
		Dry Weight (g)	0.1898	0.2655	0.2824	0.1023	0.1132
		Moisture (%)	84.4	74.8	70.3	80.0	78.6
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.004	0.013	1.5	0.229	0.145	0.138	0.148
11B	0.101	0.337	4.3	0.776	0.596	0.805	0.606
23Na	2.0	6.7	8,633	3,956	2,685	3,018	5,482
24Mg	0.044	0.147	1,905	1,218	1,396	1,316	1,394
27Al	0.043	0.143	2,717	414	192	107	61
31P	80	267	11,016	9,822	8,755	10,890	10,965
39K	18	60	12,328	9,968	8,247	11,203	10,875
44Ca	24	80	3,514	1,926	1,521	2,501	2,590
49Ti	0.236	0.787	198	24	8.6	5.7	3.3
51V	0.018	0.060	4.2	0.598	0.287	0.195	0.117
52Cr	0.324	1.1	13	2.7	2.3	2.6	2.0
55Mn	0.013	0.043	131	56	53	29	34
57Fe	6.1	20	1,202	279	173	130	112
59Co	0.005	0.017	37	21	14	6.6	10
60Ni	0.013	0.043	66	12	9.3	7.4	8.0
63Cu	0.005	0.017	17	15	13	14	12
66Zn	0.752	2.5	171	185	154	192	249
75As	0.418	1.4	1.4	0.545	0.431	0.607	0.738
77Se	0.235	0.783	7.5	5.6	3.5	6.0	6.7
88Sr	0.001	0.003	9.6	4.6	3.7	6.6	8.0
95Mo	0.008	0.027	0.565	0.280	0.300	0.280	0.260
107Ag	0.001	0.003	0.097	0.078	0.078	0.081	0.103
111Cd	0.039	0.130	1.1	0.921	0.537	1.2	2.0
118Sn	0.025	0.083	0.380	0.160	0.063	0.249	0.177
121Sb	0.007	0.023	0.051	0.015	0.011	0.015	0.011
137Ba	0.001	0.003	46	16	16	21	24
202Hg	0.030	0.100	0.067	0.034	<0.030	0.037	0.061
205Tl	0.001	0.003	0.174	0.081	0.038	0.054	0.086
208Pb	0.001	0.003	0.589	0.154	0.089	0.048	0.033
238U	0.001	0.003	0.122	0.028	0.015	0.024	0.024

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

		Client ID	RG_MIULE_INV-3_2020-09-17	RG_MI5_INV-1_2020-09-17	RG_MI5_INV-2_2020-09-19	RG_MI5_INV-3_2020-09-19
		Lab ID	026	027	028	029
		Wet Weight (g)	1.3370	0.3653	2.0514	1.9794
		Dry Weight (g)	0.2627	0.0957	0.4352	0.4011
		Moisture (%)	80.4	73.8	78.8	79.7
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.004	0.013	0.197	0.087	0.214	0.261
11B	0.101	0.337	1.4	0.473	0.833	0.928
23Na	2.0	6.7	4,537	3,277	5,415	5,702
24Mg	0.044	0.147	1,437	1,148	1,897	1,800
27Al	0.043	0.143	166	97	258	485
31P	80	267	10,985	9,836	10,735	11,192
39K	18	60	10,570	10,551	10,611	11,505
44Ca	24	80	2,643	1,493	2,814	2,426
49Ti	0.236	0.787	8.1	4.7	12	29
51V	0.018	0.060	0.292	0.253	0.541	1.2
52Cr	0.324	1.1	2.9	2.6	3.1	6.4
55Mn	0.013	0.043	34	34	37	37
57Fe	6.1	20	196	134	245	385
59Co	0.005	0.017	12	1.6	4.4	4.9
60Ni	0.013	0.043	12	9.9	11	20
63Cu	0.005	0.017	14	12	15	17
66Zn	0.752	2.5	231	216	201	193
75As	0.418	1.4	0.812	<0.418	0.619	0.556
77Se	0.235	0.783	7.1	4.8	6.9	5.3
88Sr	0.001	0.003	7.9	4.7	8.2	6.4
95Mo	0.008	0.027	0.260	0.210	0.245	0.260
107Ag	0.001	0.003	0.081	0.139	0.123	0.154
111Cd	0.039	0.130	1.8	0.721	1.7	2.5
118Sn	0.025	0.083	0.252	0.058	0.329	0.373
121Sb	0.007	0.023	0.015	0.018	0.018	0.026
137Ba	0.001	0.003	25	37	37	52
202Hg	0.030	0.100	0.040	0.061	0.061	0.054
205Tl	0.001	0.003	0.070	0.035	0.060	0.072
208Pb	0.001	0.003	0.068	0.063	0.104	0.152
238U	0.001	0.003	0.032	0.023	0.040	0.055

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_AGCK_INV-3_2020-09-10			RG_MIUCO_INV-1_2020-09-12			RG_MIDCO_INV-4_2020-09-15		
Client ID		RG_AGCK_INV-3_2020-09-10			RG_MIUCO_INV-1_2020-09-12			RG_MIDCO_INV-4_2020-09-15		
Lab ID		003			013			019		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.004	0.237	0.211	11.6	0.460	0.600	26.4	0.302	0.386	24.4
11B	0.101	0.620	0.574	-	1.9	2.4	23.3	1.0	1.5	-
23Na	2.0	4,562	4,045	12.0	4,406	5,013	12.9	2,686	2,602	3.2
24Mg	0.044	1,404	1,239	12.5	1,539	1,674	8.4	1,255	1,399	10.9
27Al	0.043	263	187	33.8	1,006	1,429	34.7	648	709	9.0
31P	80	12,821	13,186	2.8	11,554	12,428	7.3	8,110	7,811	3.8
39K	18	12,125	12,655	4.3	9,698	11,990	21.1	6,419	6,963	8.1
44Ca	24	1,478	1,635	10.1	2,208	2,152	2.6	1,725	2,989	53.6
49Ti	0.236	15	10	40.0	62	61	1.6	38	45	16.9
51V	0.018	0.405	0.351	14.3	1.4	1.9	30.3	0.905	0.885	2.2
52Cr	0.324	2.4	2.5	-	4.2	5.7	30.3	1.8	2.3	-
55Mn	0.013	19	21	10.0	213	207	2.9	116	116	0.0
57Fe	6.1	175	140	22.2	635	844	28.3	346	335	3.2
59Co	0.005	0.140	0.118	17.1	1.2	1.6	28.6	21	28	28.6
60Ni	0.013	5.7	5.2	9.2	10	14	33.3	17	21	21.1
63Cu	0.005	8.8	11	22.2	18	20	10.5	12	12	0.0
66Zn	0.752	216	212	1.9	171	237	32.4	127	134	5.4
75As	0.418	1.5	1.3	-	0.655	0.695	-	<0.418	<0.418	-
77Se	0.235	7.2	6.3	13.3	5.3	5.1	3.8	2.5	2.3	-
88Sr	0.001	3.5	3.8	8.2	5.3	5.5	3.7	4.0	7.3	58.4
95Mo	0.008	0.298	0.261	13.2	0.736	0.814	10.1	0.208	0.225	7.9
107Ag	0.001	0.051	0.041	21.7	0.054	0.076	33.8	0.050	0.064	24.6
111Cd	0.039	0.532	0.532	0.0	1.8	2.6	36.4	0.136	0.190	-
118Sn	0.025	0.088	0.094	-	0.293	0.392	28.9	0.059	0.106	-
121Sb	0.007	0.014	0.014	-	0.021	0.024	-	0.017	0.021	-
137Ba	0.001	26	23	12.2	116	125	7.5	18	19	5.4
202Hg	0.030	0.069	0.034	-	0.051	0.070	-	0.038	0.038	-
205Tl	0.001	0.245	0.228	7.2	0.036	0.043	17.7	0.018	0.025	32.6
208Pb	0.001	0.080	0.076	5.1	0.326	0.416	24.3	0.207	0.192	7.5
238U	0.001	0.037	0.037	0.0	0.052	0.061	15.9	0.031	0.042	30.1

Notes:

ppm = parts per million

RPD = relative percent difference

DL = detection limit

< = less than detection limit

% = percent

Data Quality Objectives:

Laboratory Duplicates - RPD ≤40% for all elements, except Ca and Sr, which are ≤60%

Minimum DQOs apply to individual samples at concentrations above 10x DL

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	0.004	1.21	1.2	95	6.4	1.1	92	11.5
11B	0.101	4.5	5.1	112	2.2	5.1	114	4.0
23Na	2.0	14,000	13,394	96	8.1	13,200	94	11.9
24Mg	0.044	910	834	92	7.5	839	92	12.0
27Al	0.043	197.2	217	110	6.7	208	106	5.0
31P	80	8,000	7,472	93	4.5	7,159	90	11.1
39K	18	15,500	14,514	94	7.0	14,190	92	11.8
44Ca	24	2,360	2,300	97	6.1	2,232	95	6.6
49Ti	0.236	12.24	14	113	8.9	13	103	8.5
51V	0.018	1.57	1.5	94	11.8	1.5	92	10.4
52Cr	0.324	1.87	1.8	99	5.4	1.8	95	11.9
55Mn	0.013	3.17	2.9	93	5.0	2.9	93	11.1
57Fe	6.1	343	332	97	3.9	328	96	10.5
59Co	0.005	0.25	0.229	92	3.6	0.242	97	9.6
60Ni	0.013	1.34	1.3	96	6.1	1.3	96	10.7
63Cu	0.005	15.7	15	95	5.2	15	97	9.4
66Zn	0.752	51.6	52	101	6.2	53	102	7.1
75As	0.418	6.87	6.7	97	2.7	6.0	87	11.2
77Se	0.235	3.45	3.4	98	4.3	3.1	90	9.8
88Sr	0.001	10.1	9.7	96	8.6	9.6	95	13.3
95Mo	0.008	0.29	0.276	95	6.7	0.266	92	9.5
107Ag	0.001	0.0252	0.022	89	12.1	0.027	107	10.0
111Cd	0.039	0.299	0.306	102	6.1	0.297	99	11.4
118Sn	0.025	0.061	0.061	100	**21.4**	0.060	99	9.7
121Sb	0.007	0.011	0.013	120	16.0	0.011	101	14.0
137Ba	0.001	8.6	9.6	111	3.5	9.1	105	2.2
202Hg	0.030	0.412	0.448	109	8.9	0.370	90	12.3
205Tl	0.001	-	-	-	-	-	-	-
208Pb	0.001	0.404	0.368	91	16.4	0.374	93	15.5
238U	0.001	0.05	0.047	95	11.6	0.048	96	12.7

Notes:

ppm = parts per million

% = percent

DL = detection limit

RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Bold indicates DQO exceedance, but result is accepted as it does not impact the reportable results.

Tissue QA/QC Accuracy and Precision Results

Parameter	DL (ppm)	Certified Conc. (ppm)	03 Mean Estimated Conc. (ppm)	03 Accuracy (%)	03 Precision RSD (%)	04 Mean Estimated Conc. (ppm)	04 Accuracy (%)	04 Precision RSD (%)
7Li	0.004	1.21	1.3	107	7.1	1.3	105	9.8
11B	0.101	4.5	5.1	113	1.5	4.6	103	3.2
23Na	2.0	14,000	16,460	118	9.4	14,832	106	4.6
24Mg	0.044	910	971	107	8.7	1,015	112	5.4
27Al	0.043	197.2	208	106	5.7	178	90	3.6
31P	80	8,000	8,473	106	8.1	8,595	107	5.8
39K	18	15,500	17,034	110	9.3	16,261	105	5.6
44Ca	24	2,360	2,287	97	3.7	2,601	110	3.7
49Ti	0.236	12.24	12	98	8.6	12	98	3.8
51V	0.018	1.57	1.7	106	14.4	1.7	111	14.0
52Cr	0.324	1.87	2.0	109	10.3	2	110	6.6
55Mn	0.013	3.17	3.5	110	8.2	3.6	113	1.8
57Fe	6.1	343	380	111	8.8	389	113	2.3
59Co	0.005	0.25	0.282	113	8.3	0.293	117	5.7
60Ni	0.013	1.34	1.5	115	8.5	1.5	113	4.6
63Cu	0.005	15.7	18	113	7.0	17	111	5.1
66Zn	0.752	51.6	60	116	7.3	59	114	3.3
75As	0.418	6.87	7.3	106	7.5	7.3	106	5.2
77Se	0.235	3.45	3.4	98	11.0	3.7	107	9.0
88Sr	0.001	10.1	11	112	8.0	11	109	6.0
95Mo	0.008	0.29	0.294	101	6.2	0.345	119	8.1
107Ag	0.001	0.0252	0.028	110	6.4	0.028	112	10.0
111Cd	0.039	0.299	0.352	118	5.9	0.359	120	12.0
118Sn	0.025	0.061	0.057	94	15.1	0.068	112	12.0
121Sb	0.007	0.011	0.010	87	**21.1**	0.008	77	**36.0**
137Ba	0.001	8.6	9.2	107	3.3	8.6	100	1.0
202Hg	0.030	0.412	0.394	96	13.0	0.454	110	9.0
205Tl	0.001	-	-	-	-	-	-	-
208Pb	0.001	0.404	0.450	111	18.4	0.411	102	14.0
238U	0.001	0.05	0.051	102	12.6	0.054	109	9.4

Notes:

ppm = parts per million

% = percent

DL = detection limit

RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Bold indicates DQO exceedance, but result is accepted as it does not impact the reportable results.

Teck Coal Limited
Sample Group Information

Sample Group ID	Client ID	Lab ID	Date of Analysis
01	RG_AGCK_INV-1_2020-09-10	001	24 Sep 2020
	RG_AGCK_INV-2_2020-09-10	002	
	RG_AGCK_INV-3_2020-09-10	003	
	RG_MI25_INV-1_2020-09-11	007	
	RG_MI25_INV-2_2020-09-11	008	
	RG_MI25_INV-3_2020-09-11	009	
	RG_CORCK_INV-1_2020-09-12	010	
	RG_CORCK_INV-2_2020-09-12	011	
	RG_CORCK_INV-3_2020-09-12	012	
02	RG_MIUCO_INV-1_2020-09-12	013	25 Sep 2020
	RG_MIUCO_INV-2_2020-09-12	014	
	RG_MIUCO_INV-3_2020-09-12	015	
	RG_MIDCO_INV-1_2020-09-15	016	
	RG_MIDCO_INV-2_2020-09-15	017	
	RG_MIDCO_INV-3_2020-09-15	018	
	RG_MIDCO_INV-4_2020-09-15	019	
	RG_MIDCO_INV-5_2020-09-13	020	
03	RG_MIDAG_INV-1_2020-09-16	021	24 Sep 2020
	RG_MIDAG_INV-2_2020-09-16	022	
	RG_MIDAG_INV-3_2020-09-15	023	
	RG_MIULE_INV-1_2020-09-16	024	
	RG_MIULE_INV-2_2020-09-16	025	
	RG_MIULE_INV-3_2020-09-17	026	
	RG_MI5_INV-1_2020-09-17	027	
	RG_MI5_INV-2_2020-09-19	028	
	RG_MI5_INV-3_2020-09-19	029	
04	RG_LE1_INV-1_2020-09-17	004	02 Oct 2020
	RG_LE1_INV-2_2020-09-17	005	
	RG_LE1_INV-3_2020-09-17	006	

TrichAnalytics Inc.
207-1753 Sean Heights, Saanichton, BC, V8M 0B3
Ph (250) 532-1004

Chain of Custody (COC) for LA-ICP-MS Analysis

Invoicing		Reporting (if different from invoicing)	
Project Number: CMO LAEMP (20-07)			
Company Name:	Minnow Environmental	Company Name:	
Contact Name:	Jennifer Ings	Contact Name:	
Address:	2 Lamb Street	Address:	
City, Province:	Georgetown, ON	City, Province:	
Postal Code:	L7G 2G7	Postal Code:	
Phone:	250-595-1627	Phone:	
Email:	jings@minnow.ca	Email:	

Sample Analysis Requested

Trich Sample ID:	Sample Identification:		Sample Type: Species	Sample type
001	1 RG_AGCK_INV-1_2020-09-10	✓		Composite taxa benthic invertebrate tissue samples
002	2 RG_AGCK_INV-2_2020-09-10	✓		Composite taxa benthic invertebrate tissue samples
003	3 RG_AGCK_INV-3_2020-09-10	✓		Composite taxa benthic invertebrate tissue samples
004	4 RG_LE1_INV-1_2020-09-17	*		Composite taxa benthic invertebrate tissue samples
005	5 RG_LE1_INV-2_2020-09-17	*		Composite taxa benthic invertebrate tissue samples
006	6 RG_LE1_INV-3_2020-09-17	*		Composite taxa benthic invertebrate tissue samples
007	7 RG_MI25_INV-1_2020-09-11	✓		Composite taxa benthic invertebrate tissue samples
008	8 RG_MI25_INV-2_2020-09-11	✓		Composite taxa benthic invertebrate tissue samples
009	9 RG_MI25_INV-3_2020-09-11	✓		Composite taxa benthic invertebrate tissue samples
010	10 RG_[illegible]_INV-1_2020-09-[illegible]	✓		Composite taxa benthic invertebrate tissue samples
011	11 RG_[illegible]_INV-2_2020-09-[illegible]	✓		Composite taxa benthic invertebrate tissue samples
012	12 RG_[illegible]_INV-3_2020-09-[illegible]	✓		Composite taxa benthic invertebrate tissue samples
013	13 RG_MI[illegible]_INV-1_2020-09-[illegible]	✓		Composite taxa benthic invertebrate tissue samples
014	14 RG_MI[illegible]_INV-2_2020-09-[illegible]	✓		Composite taxa benthic invertebrate tissue samples
015	15 RG_MI[illegible]_INV-3_2020-09-[illegible]	✓		Composite taxa benthic invertebrate tissue samples
016	16 RG_MI[illegible]_INV-[illegible]_2020-09-[illegible]	✓		Composite taxa benthic invertebrate tissue samples
017	17 RG_MIDCO_INV-2_2020-09-[illegible]	✓		Composite taxa benthic invertebrate tissue samples
018	18 RG_MIDCO_INV-3_2020-09-15	✓		Composite taxa benthic invertebrate tissue samples
019	19 RG_MIDCO_INV-4_2020-09-[illegible]	✓		Composite taxa benthic invertebrate tissue samples
020	20 RG_MIDCO_INV-5_2020-09-[illegible]	✓		Composite taxa benthic invertebrate tissue samples

Sample(s) Released By: Katharina Batchelar		Sample(s) Received By: Gerriene LB
Signature:	KBatchelar	Signature: GERIENE LABINE
Date Sent:	22-Sep-20	Date Received: 22 Sep 2020 (Project # 2020-144)
Sample(s) Returned to Client By:		Shipping Conditions:
		Shipping Container:
Signature:		Date Sent:

* NOTE: Samples were not received on 22Sep2020. Client was notified. GRL 22 Sep 2020
Samples received 29 Sep 2020 with sample containers mislabeled with wrong project number. Client Notified. DJS 01 OCT 2020

TrichAnalytics Inc.	Chain of Custody (COC) for LA-ICP-MS Analysis
207-1753 Sean Heights, Saanichton, BC V8M 0B3 Ph (250) 532-1084	

Invoicing		Reporting (if different from Invoicing)	
Project Number: CMO LAEMP (20-07)			
Company Name:	Minnow Environmental	Company Name:	
Contact Name:	Jennifer Ings	Contact Name:	
Address:	2 Lamb Street	Address:	
City, Province:	Georgetown, ON	City, Province:	
Postal Code:	L7G 2G7	Postal Code:	
Phone:	250-595-1627	Phone:	
Email:	jings@minnow.ca	Email:	

Sample Analysis Requested

Trich Sample ID.		Sample Identification:		Sample Type: Species	Sample type
021	21	RG_MIDAG_INV-1_2020-09-/16 *	✓		Composite taxa benthic invertebrate tissue samples
022	22	RG_MIDAG_INV-2_2020-09-16	✓		Composite taxa benthic invertebrate tissue samples
023	23	RG_MIDAG_INV-3_2020-09-/15 **	✓		Composite taxa benthic invertebrate tissue samples
024	24	RG_MIULE_INV-1_2020-09-16	✓		Composite taxa benthic invertebrate tissue samples
025	25	RG_MIULE_INV-2_2020-09-16	✓		Composite taxa benthic invertebrate tissue samples
026	26	RG_MIULE_INV-3_2020-09-17	✓		Composite taxa benthic invertebrate tissue samples
027	27	RG_MI_INV-1_2020-09-17	✓		Composite taxa benthic invertebrate tissue samples
028	28	RG_MI_INV-2_2020-09-19	✓		Composite taxa benthic invertebrate tissue samples
029.	29	RG_MI_INV-3_2020-09-[illegible]	✓		Composite taxa benthic invertebrate tissue samples
	30				
	31	* Sample ID on container reads "2020-09-16". GOL 23 Sep2020			
	32	** Sample ID on container reads "2020-09-15". GOL 23 Sep2020			
	33	Client indicated that sample container ID is			
	34	correct. DJS 02 OCT 2020			
	35				
	36				
	37				
	38				
	39				
	40				

Sample(s) Released By: Katharina Batchelar		Sample(s) Received By: Gerene LaBine	
Signature:	K Batchelar	Signature:	[signature]
Date Sent:	22-Sep-20	Date Received:	22 Sep 2020 (Project # 2020-144)
Sample(s) Returned to Client By:		Shipping Conditions:	
		Shipping Container:	
Signature:		Date Sent:	

TrichAnalytics Inc.

Tissue Microchemistry Analysis Report

Client:	Jennifer Ings	Date Received:	22 Sep 2020
	Aquatic Scientist	Date of Analysis:	23 Sep 2020
	Minnow Environmental	Final Report Date:	23 Sep 2020
Phone:	250-595-1627	Project No.:	2020-145
Email:	jings@minnow.ca	Method No.:	MET-002.04

Client Project: Teck Coal Limited/Minnow CMO Supplemental Sampling (20-83)

Analytical Request: Benthic Invertebrate Tissue Microchemistry (total metals and moisture) – 9 samples.
See chain of custody form provided for sample identification numbers.

Notes:

Analytical results are expressed in part per million (ppm) dry weight.
Samples quantified using DORM-4, NIST-1566b, and NIST-2976 certified reference standards.
Aluminum concentrations above 1,000 ppm are outside linear range of the calibration curve.
Client specific DQO for Selenium accuracy is 90 - 110% of the certified value; (result achieved 109%).
RPD values calculated according to the British Columbia Environmental Laboratory Manual (2020) criteria.

This report provides the analytical results only for tissue samples noted above as received from the Client.

Reviewed and Approved by Jennie Christensen, PhD, RPBio

23 Sep 2020
Date

TrichAnalytics Inc.
207-1753 Sean Heights
Saanichton, BC V8M 0B3
www.trichanalytics.com

CALA Testing Accreditation No. A4196

Teck Coal Limited

Tissue Analysis Results

Parameter	DL (ppm)	LOQ (ppm)	CM_MC2_INV-1_2020-09-18	CM_MC2_INV-2_2020-09-19	CM_MC2_INV-3_2020-09-19	RG_MIDAG-S1_INV-1_2020-09-18	RG_MIDAG-S1_INV-2_2020-09-18
		Lab ID	030	031	032	033	034
		Wet Weight (g)	0.9452	1.1022	1.5551	1.9794	1.9773
		Dry Weight (g)	0.2375	0.2056	0.4386	0.4270	0.4690
		Moisture (%)	74.9	81.3	71.8	78.4	76.3
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.004	0.013	0.714	0.876	0.231	0.275	0.378
11B	0.078	0.260	3.0	4.6	1.0	0.966	1.5
23Na	0.781	2.6	3,869	5,233	2,583	3,247	2,919
24Mg	0.034	0.113	1,512	1,590	1,536	1,186	971
27Al	0.036	0.120	1,292	1,621	211	427	808
31P	60	200	8,756	8,788	9,326	7,725	9,324
39K	0.929	3.1	9,035	9,895	7,106	7,242	10,076
44Ca	8.0	27	8,420	4,696	2,496	1,237	1,107
49Ti	0.203	0.677	89	119	12	34	54
51V	0.014	0.047	1.7	2.2	0.317	0.715	1.2
52Cr	0.077	0.257	5.7	4.9	2.1	3.3	3.4
55Mn	0.004	0.013	134	103	78	54	73
57Fe	0.553	1.8	703	813	181	270	392
59Co	0.005	0.017	52	44	37	17	16
60Ni	0.006	0.020	53	53	18	16	21
63Cu	0.004	0.013	12	13	10	9.3	11
66Zn	0.383	1.3	168	174	156	177	142
75As	0.249	0.830	0.805	0.882	0.408	0.562	0.706
77Se	0.156	0.520	4.0	4.0	2.7	4.0	3.7
88Sr	0.001	0.003	16	14	7.9	3.7	3.9
95Mo	0.006	0.020	0.300	0.342	0.197	0.207	0.254
107Ag	0.001	0.003	0.049	0.049	0.050	0.049	0.068
111Cd	0.035	0.117	0.431	0.449	0.305	0.682	0.422
118Sn	0.015	0.050	0.137	0.265	0.148	0.117	0.132
121Sb	0.006	0.020	0.039	0.033	0.019	0.019	0.031
137Ba	0.001	0.003	42	34	12	17	19
202Hg	0.023	0.077	<0.023	0.036	0.032	0.058	0.039
205Tl	0.001	0.003	0.071	0.071	0.031	0.083	0.085
208Pb	0.001	0.003	0.313	0.395	0.074	0.139	0.276
238U	0.001	0.003	0.128	0.111	0.035	0.025	0.053

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_MIDAG-S1_INV-3_2020-09-18	RG_MIDAG-S2_INV-1_2020-09-17	RG_MIDAG-S2_INV-2_2020-09-17	RG_MIDAG-S2_INV-3_2020-09-17
		Lab ID	035	036	037	038
		Wet Weight (g)	1.9865	1.8716	1.6711	1.5046
		Dry Weight (g)	0.4865	0.4594	0.4098	0.3158
		Moisture (%)	75.5	75.5	75.5	79.0
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.004	0.013	0.283	0.275	0.305	0.785
11B	0.078	0.260	1.0	1.2	1.4	3.0
23Na	0.781	2.6	3,268	3,141	3,645	4,080
24Mg	0.034	0.113	1,116	1,186	1,285	1,643
27Al	0.036	0.120	452	597	687	2,069
31P	60	200	8,541	10,502	10,127	10,372
39K	0.929	3.1	7,381	10,601	9,670	11,142
44Ca	8.0	27	1,046	1,289	1,359	2,076
49Ti	0.203	0.677	29	44	43	152
51V	0.014	0.047	0.707	0.890	0.902	3.1
52Cr	0.077	0.257	2.6	3.5	3.1	7.3
55Mn	0.004	0.013	93	76	49	86
57Fe	0.553	1.8	319	355	322	884
59Co	0.005	0.017	26	18	12	30
60Ni	0.006	0.020	23	20	15	41
63Cu	0.004	0.013	9.9	13	9.4	13
66Zn	0.383	1.3	161	169	145	181
75As	0.249	0.830	0.661	1.0	0.766	1.5
77Se	0.156	0.520	4.2	4.5	3.2	5.6
88Sr	0.001	0.003	3.5	4.8	4.1	7.4
95Mo	0.006	0.020	0.280	0.290	0.228	0.373
107Ag	0.001	0.003	0.054	0.065	0.047	0.070
111Cd	0.035	0.117	0.413	0.520	0.377	0.933
118Sn	0.015	0.050	0.041	0.168	0.097	0.206
121Sb	0.006	0.020	0.027	0.027	0.019	0.050
137Ba	0.001	0.003	24	30	15	35
202Hg	0.023	0.077	0.052	0.032	0.036	0.045
205Tl	0.001	0.003	0.072	0.059	0.057	0.141
208Pb	0.001	0.003	0.204	0.205	0.197	0.521
238U	0.001	0.003	0.052	0.047	0.035	0.098

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue QA/QC Relative Percent Difference Results

Client ID		RG_MIDAG-S2_INV-1_2020-09-17		
Lab ID		036		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.004	0.275	0.295	7.0
11B	0.078	1.2	1.4	15.4
23Na	0.781	3,141	3,109	1.0
24Mg	0.034	1,186	1,127	5.1
27Al	0.036	597	565	5.5
31P	60	10,502	9,652	8.4
39K	0.929	10,601	10,148	4.4
44Ca	8.0	1,289	1,409	8.9
49Ti	0.203	44	47	6.6
51V	0.014	0.890	0.853	4.2
52Cr	0.077	3.5	3.1	12.1
55Mn	0.004	76	77	1.3
57Fe	0.553	355	313	12.6
59Co	0.005	18	15	18.2
60Ni	0.006	20	18	10.5
63Cu	0.004	13	10	26.1
66Zn	0.383	169	176	4.1
75As	0.249	1.0	0.937	-
77Se	0.156	4.5	4.1	9.3
88Sr	0.001	4.8	4.8	0.0
95Mo	0.006	0.290	0.321	10.1
107Ag	0.001	0.065	0.054	18.5
111Cd	0.035	0.520	0.466	11.0
118Sn	0.015	0.168	0.173	2.9
121Sb	0.006	0.027	0.023	-
137Ba	0.001	30	31	3.3
202Hg	0.023	0.032	0.052	-
205Tl	0.001	0.121	0.140	14.6
208Pb	0.001	0.205	0.216	5.2
238U	0.001	0.047	0.050	6.2

Notes:

ppm = parts per million

RPD = relative percent difference

DL = detection limit

< = less than detection limit

% = percent

Data Quality Objectives:

Laboratory Duplicates - RPD ≤40% for all elements, except Ca and Sr, which are ≤60%

Minimum DQOs apply to individual samples at concentrations above 10x DL

Teck Coal Limited

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	0.004	1.21	1.3	110	2.8
11B	0.078	4.5	5.0	110	2.9
23Na	0.781	14,000	16,245	116	3.7
24Mg	0.034	910	1,034	114	3.5
27Al	0.036	197.2	207	105	7.2
31P	60	8,000	8,829	110	5.4
39K	0.929	15,500	16,855	109	6.2
44Ca	8.0	2,360	2,381	101	4.8
49Ti	0.203	12.24	12	102	9.1
51V	0.014	1.57	1.9	122	3.8
52Cr	0.077	1.87	2.2	118	3.1
55Mn	0.004	3.17	3.6	115	5.0
57Fe	0.553	343	408	119	3.2
59Co	0.005	0.25	0.274	110	4.5
60Ni	0.006	1.34	1.5	114	4.1
63Cu	0.004	15.7	18	114	3.6
66Zn	0.383	51.6	58	112	4.0
75As	0.249	6.87	7.6	111	3.9
77Se	0.156	3.45	3.7	109	5.5
88Sr	0.001	10.1	12	115	4.6
95Mo	0.006	0.29	0.327	113	8.3
107Ag	0.001	0.0252	0.028	111	8.6
111Cd	0.035	0.299	0.335	112	4.2
118Sn	0.015	0.061	0.075	123	13.2
121Sb	0.006	0.011	0.009	85	**22.8**
137Ba	0.001	8.6	9.6	111	3.7
202Hg	0.023	0.412	0.436	106	5.6
205Tl	0.001	-	-	-	-
208Pb	0.001	0.404	0.515	128	8.1
238U	0.001	0.05	0.057	114	6.0

Notes:

ppm = parts per million

% = percent

DL = detection limit

RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% was established for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Bold indicates DQO exceedance, but result is accepted as it does not impact the reportable results.

Teck Coal Limited
Sample Group Information

Sample Group ID	Client ID	Lab ID	Date of Analysis
01	CM_MC2_INV-1_2020-09-18	030	23 Sep 2020
	CM_MC2_INV-2_2020-09-19	031	
	CM_MC2_INV-3_2020-09-19	032	
	RG_MIDAG-S1_INV-1_2020-09-18	033	
	RG_MIDAG-S1_INV-2_2020-09-18	034	
	RG_MIDAG-S1_INV-3_2020-09-18	035	
	RG_MIDAG-S2_INV-1_2020-09-17	036	
	RG_MIDAG-S2_INV-2_2020-09-17	037	
	RG_MIDAG-S2_INV-3_2020-09-17	038	

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: CMO Supplemental Sampling (20-83)			
Company Name:	Minnow Environmental	Company Name:	
Contact Name:	Jennifer Ings	Contact Name:	
Address:	2 Lamb Street	Address:	
City, Province:	Georgetown, ON	City, Province:	
Postal Code:	L7G 2G7	Postal Code:	
Phone:	250-595-1627	Phone:	
Email:	jings@minnow.ca	Email:	

Sample Analysis Requested

Trich Sample IDs:		Sample Identification:		Sample Type: Species	Sample type
030	1	CM_MC2_INV-1_2020-09-18	✓	-	Composite-taxa benthic invertebrate tissue samples
031	2	CM_MC2_INV-2_2020-09-19	✓	-	Composite-taxa benthic invertebrate tissue samples
032	3	CM_MC2_INV-3_2020-09-19	✓	-	Composite-taxa benthic invertebrate tissue samples
033	4	RG_MIDAG-S1_INV-1_2020-09-18	✓	-	Composite-taxa benthic invertebrate tissue samples
034	5	RG_MIDAG-S1_INV-2_2020-09-18	✓	-	Composite-taxa benthic invertebrate tissue samples
035	6	RG_MIDAG-S1_INV-3_2020-09-18	✓	-	Composite-taxa benthic invertebrate tissue samples
036	7	RG_MIDAG-S2_INV-1_2020-09-17	✓	-	Composite-taxa benthic invertebrate tissue samples
037	8	RG_MIDAG-S2_INV-2_2020-09-17	✓	-	Composite-taxa benthic invertebrate tissue samples
038	9	RG_MIDAG-S2_INV-3_2020-09-17	✓	-	Composite-taxa benthic invertebrate tissue samples
	10				
	11				
	12				
	13				
	14				
	15				
	16				
	17				
	18				
	19				
	20				

Sample(s) Released By: Katharina Batchelar	Sample(s) Received By: Geriene LaBine
Signature: KBatchelar	Signature: Geriene LB
Date Sent: 22-Sep-20	Date Received: 22 Sep 2020 (Project #: 2020-145)
Sample(s) Returned to Client By:	Shipping Conditions:
	Shipping Container:
Signature:	Date Sent:

APPENDIX E

Water Quality Screening

Table E-1: Water Quality Screening at Stations in Michel Creek and at CORCK, CMO LAEMP, 2020

Location		BC Water Quality Guidelines for the Protection of Aquatic Life		Compliance Limits and Site Performance Objectives[l]	Elk Valley Water Quality Plan Benchmarks and Screening Values											Reference Sites			Mine-Influenced Sites								
Watercourse																Michel Creek	Andy Goode Creek	Leach Creek	Michel Creek	Corbin Creek	Michel Creek	Michel Creek	Michel Creek	Michel Creek	Michel Creek	Michel Creek	Michel Creek
Station																MI25	AGCK	LE1	MIUCO	CORCK	MIDCO	CM_CM2	MIDAG-S1	MIDAG-S2	MIDAG	MIULE	MI5
Sample ID		Long-term Chronic	Short-term Acute		Invertebrates			Fish			Amphibians			Adult Birds	Juvenile Birds	RG_MI25_WS_2020-09-11_0917	RG_AGCK_WS_2020-09-10_0840	RG_LE1_WS_2020-09-17_1630	RG_MIUCO_WS_2020-09-12_0838	RG_CORCK_WS_2020-09-12_1723	RG_MIDCO_WS_2020-09-13_1246	CM_MC2_WS_2020-09-17_1351	RG_MIDAG-S1_WS_2020-09-17_0900	RG_MIDAG-S2_WS_2020-09-17_1139	RG_MIDAG_WS_2020-09-15_1451	RG_MIULE_WS_2020-09-16_1206	RG_MI5_WS_2020-09-17_1700
Date					Level 1	Level 2	Level 3	Level 1	Level 2	Level 3	Level 1	Level 2	Level 3	Level 1	Level 1	11-Sep-20	10-Sep-20	17-Sep-20	12-Sep-20	12-Sep-20	13-Sep-20	17-Sep-20	17-Sep-20	17-Sep-20	15-Sep-20	16-Sep-20	17-Sep-20
Parameter	Unit																										
Conventional Parameters																											
pH	-	6.5 - 9.0	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	-	-	8.2	8.4	7.9	8.4	8.2	8.3	8.3	8.4	8.5	8.2	8.3	8.3
Specific conductivity	µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	278	236	195	300	1,570	1,120	1,130	802	767	741	634	502
Hardness, as $CaCO_3$	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	152	131	112	172	978	629	621	419	404	406	346	268
Total alkalinity, as $CaCO_3$	mg/L	20[a]	-	-	-	-	-	-	-	-	-	-	-	-	-	149	122	110	161	259	222	232	193	198	186	188	167
Total dissolved solids	mg/L	-	-	-	1,000	1,750	3,000	1,000	2,000	3,000	-	-	-	-	-	162	154	120	189	**1,370**[IA, FA]	879	844	570	541	536	444	340
Total suspended solids	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.2	<1.0	<1.0	<1.0	<1.0	1.3
Total organic carbon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	1.0	1.3	1.5	1.8	1.0	0.80	0.79	<0.5	<0.5	1.1
Dissolved organic carbon	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	1.0	1.1	1.4	1.6	0.89	0.79	0.83	<0.5	<0.5	1.0
Turbidity	NTU	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.14	0.22	0.54	0.25	0.72	0.61	0.55	0.45	0.41	0.19	0.34	0.26
Total acidity	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Major Ions																											
Bicarbonate, as $CaCO_3$	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	149	<1.0	110	156	259	222	230	185	186	186	188	163
Bromide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.25	<0.25	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	43	39	32	48	207	140	139	104	100	100	90	71
Carbonate, as $CaCO_3$	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1.0	<1.0	<1.0	5.0	<1.0	<1.0	2.4	8.4	13	<1.0	<1.0	4.0
Chloride	mg/L	150	600	-	-	-	-	-	-	-	-	-	-	-	-	0.35	0.23	0.13	0.25	2.5	2.3	1.9	1.2	1.1	1.1	1.3	1.1
Fluoride	mg/L	0.12[b]	1.4 - 2.3[c]	-	-	-	-	-	-	-	-	-	-	-	-	0.073	**0.31**[Mn]	0.058	0.089	**0.22**[Mn]	**0.16**[Mn]	**0.13**[Mn]	**0.17**[Mn]	**0.16**[Mn]	**0.16**[Mn]	**0.14**[Mn]	0.11
Hydroxide, as $CaCO_3$	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1.0	122	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	7.8	8.1	13	112	68	66	39	38	38	30	22
Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.51	0.18	0.62	0.44	3.8	2.3	2.3	1.4	1.4	1.3	1.1	0.98
Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.9	0.55	0.87	2.7	60	36	36	21	20	19	13	8.9
Sulphate	mg/L	309 - 429[c, d]	-	500	625	729	1,315	499	674	1,173	481	822	1,545	-	-	15	16	4.2	17	**752**[Mn, IA, IB, FA, FB,	**474**[Mn]	**453**[Mn]	273	254	230	175	128
Ion balance	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	96	94	100	100	105	97	98	96	96	104	100	95
Cation - anion balance	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1.9	<3.2	<0.1	<0.2	2.3	<1.4	<1.0	<2.1	<2.3	1.9	0.10	<2.5
Anion sum	meq/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.3	2.8	2.3	3.6	21	15	14	9.7	9.4	8.6	7.5	6.1
Cation sum	meq/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.2	2.6	2.3	3.6	22	14	14	9.3	9.0	9.0	7.5	5.8
Oxidation-reduction potential	mV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	414	497	440	330	423	448	473	426	458	443	424	361
Nutrients																											
Nitrate	mg-N/L	3.0	33	5.0	3.0 - 7.6[c,l,m]	3.0 - 13[c,l,m]	12 - 52[c,l,m]	5.0 - 22[c,l,m]	6.8 - 30[c,l,m]	15 - 68[c,l,m]	10 - 46[c,l,m]	126 - 562[c,l,m]	501 - 2,238[c,l,m]	-	-	0.021	0.11	0.0051	<0.005	**4.9**[Mn]	2.9	2.8	1.7	1.4	1.3	0.80	0.41
Nitrite	mg-N/L	0.020 - 0.040[e]	0.060 - 0.12[e]	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	0.031	<0.005	0.0095	0.0035	0.0022	0.0027	0.0010	0.0013
Total ammonia	mg-N/L	0.37 - 1.3[f]	1.9 - 7.0[f]	-	-	-	-	-	-	-	-	-	-	-	-	0.035	0.0055	0.0060	<0.005	0.038	0.027	0.012	<0.005	<0.005	0.0050	0.0051	0.0073
Total Kjeldahl Nitrogen	mg-N/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	0.067	<0.05	<0.05	<0.05	0.15	0.21	0.22	0.088	0.23	0.13	<0.25
Total phosphorus	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0057	<0.002	0.015	0.0045	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0045
Orthophosphate	mg-P/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0046	0.0013	0.015	0.0033	<0.001	<0.001	0.0011	0.0016	0.0018	0.0012	0.0014	0.0041
Total Metals																											
Aluminum	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.9	4.0	4.6	5.0	3.2	13	3.9	6.8	6.6	4.9	8.0	<3.0
Antimony	µg/L	9	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	0.51	0.30	0.29	0.20	0.17	0.17	0.12	0.12
Arsenic	µg/L	5.0[b]	5.0	-	-	-	-	-	-	-	-	-	-	-	-	0.20	0.50	0.22	0.17	0.23	0.20	0.22	0.31	0.27	0.27	0.21	0.22
Barium	µg/L	1000	-	-	-	-	-	-	-	-	-	-	-	-	-	57	21	137	76	44	66	67	69	92	87	119	132
Beryllium	µg/L	0.13	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Bismuth	µg/L	0.5[g]	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	µg/L	1200	29000[b]	-	-	-	-	-	-	-	-	-	-	-	-	16	<10	<10	12	99	63	66	38	33	30	22	16
Cadmium	µg/L	-	-	0.15 - 0.90[c]	-	-	-	-	-	-	-	-	-	-	-	0.011	0.012	0.034	0.0073	0.029	0.019	0.020	0.020	0.024	0.025	0.025	0.036
Calcium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	44,000	42,100	28,700	40,300	190,000	132,000	139,000	104,000	99,500	99,600	90,500	67,300
Chromium	µg/L	1.0[h]	-	-	-	-	-	-	-	-	-	-	-	-	-	0.19	0.32	<0.1	0.19	<0.1	0.14	0.13	0.19	0.18	0.65	0.19	0.12
Cobalt	µg/L	4.0	110	-	2.6 - 4.4[c,m]	5.2 - 8.8[c,m]	9.4 - 16[c,m]	355 - 600[c,m]	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	**5.5**[Mn, IA]	1.9	1.7	0.52	0.29	0.25	<0.1	<0.1
Copper	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Iron	µg/L	300[b]	1000	-	-	-	-	-	-	-	-	-	-	-	-	<10	<10	<10	10	38	25	16	12	<10	11	<10	<10
Lead	µg/L	7.0 - 20[c]	94 - 417[c]	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium	µg/L	121.6[g]	-	-	-	-	-	-	-	-	-	-	-	-	-	5.1	2.0	1.8	3.7	65	39	42	23	20	18	13	9.3
Magnesium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11,700	8,750	7,790	12,100	101,000	65,200	62,400	39,200	37,700	37,400	29,800	21,200
Manganese	µg/L	1100 - 4900[c]	1800 - 11,000[c]	-	-	-	-	-	-	-	-	-	-	-	-	0.25	<0.10	1.02	1.95	14.30	5.15	3.85	1.93	2.07	2.02	0.77	0.87
Mercury	µg/L	0.010	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Molybdenum	µg/L	1,000	2,000	-	-	-	-	-	-	-	-	-	-	-	-	0.91	0.76	0.64	0.68	1.9	1.4	1.4	1.1	1.0	1.0	0.93	0.80
Nickel	µg/L	104 - 150[c]	-	-	5.3	15	22	75 - 167	114 - 255	237 - 529	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	**64**[IA, IB, IC]	**31**[IA, IB, IC]	**31**[IA, IB, IC]	**12**[IA]	**7.9**[IA]	**6.2**[IA]	2.5	1.2
Potassium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	506	197	573	411	3,430	2,230	2,440	1,450	1,420	1,370	1,110	922
Selenium	µg/L	2.0	-	19	104	500	-	19	74	-	-	-	-	394	203	0.22	1.4	0.55	0.30	**18**[Mn]	**11**[Mn]	**11**[Mn]	**6.7**[Mn]	**5.9**[Mn]	**5.6**[Mn]	**4.0**[Mn]	**2.7**[Mn]
Silicon	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,270	1,450	2,260	2,220	2,170	2,200	1,880	1,760	1,840	1,880	2,020	1,970
Silver	µg/L	1.5[c]	3.0[c]	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02
Sodium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,190	613	816	2,520	55,300	34,500	38,400	22,000	20,400	18,200	12,500	8,700
Strontium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	175	150	66	141	926	595	601	414	368	367	294	209
Thallium	µg/L	0.80	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	0.044	<0.01	<0.01	0.059	0.029	0.029	0.029	0.022	0.020	<0.01	<0.01

https://golderassociates.sharepoint.com/sites/139643/Project Files/6 Deliverables/3.0 Issued/003-R-Rev0-1000-2020 CMO LAEMP Rpt/Appendix E_WQ Screening/
Appendix E_Water Chemistry Screening_20 April 2021.xlsx

Table E-1: Water Quality Screening at Stations in Michel Creek and at CORCK, CMO LAEMP, 2020

Location		BC Water Quality Guidelines for the Protection of Aquatic Life		Compliance Limits and Site Performance Objectives[l]	Elk Valley Water Quality Plan Benchmarks and Screening Values											Reference Sites			Mine-Influenced Sites									
Watercourse																Michel Creek	Andy Goode Creek	Leach Creek	Michel Creek	Corbin Creek	Michel Creek	Michel Creek	Michel Creek	Michel Creek	Michel Creek	Michel Creek	Michel Creek
Station																MI25	AGCK	LE1	MIUCO	CORCK	MIDCO	CM_CM2	MIDAG-S1	MIDAG-S2	MIDAG	MIULE	MI5
Sample ID		Long-term Chronic	Short-term Acute		Invertebrates			Fish			Amphibians			Adult Birds	Juvenile Birds	RG_MI25_WS_2020-09-11_0917	RG_AGCK_WS_2020-09-10_0840	RG_LE1_WS_2020-09-17_1630	RG_MIUCO_WS_2020-09-12_0838	RG_CORCK_WS_2020-09-12_1723	RG_MIDCO_WS_2020-09-13_1246	CM_MC2_WS_2020-09-17_1351	RG_MIDAG-S1_WS_2020-09-17_0900	RG_MIDAG-S2_WS_2020-09-17_1139	RG_MIDAG_WS_2020-09-15_1451	RG_MIULE_WS_2020-09-16_1206	RG_MI5_WS_2020-09-17_1700
Date					Level 1	Level 2	Level 3	Level 1	Level 2	Level 3	Level 1	Level 2	Level 3	Level 1	Level 1	11-Sep-20	10-Sep-20	17-Sep-20	12-Sep-20	12-Sep-20	13-Sep-20	17-Sep-20	17-Sep-20	17-Sep-20	15-Sep-20	16-Sep-20	17-Sep-20
Parameter	**Unit**																										
Tin	µg/L	300[g]	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Titanium	µg/L	850[g]	-	-	-	-	-	-	-	-	-	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Uranium	µg/L	8.5	33[b]	-	-	-	-	-	-	-	-	-	-	-	-	0.24	0.75	0.22	0.27	6.6	4.0	4.0	2.6	2.4	2.1	1.4	1.0
Vanadium	µg/L	120[i]	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	0.63	<0.5	<0.5	<0.5	<0.5	0.53	<0.5	<0.5	<0.5	0.53
Zinc	µg/L	24 - 188[c]	50 - 341[c]	-	-	-	-	-	-	-	-	-	-	-	-	<3.0	<3.0	<3.0	<3.0	3.4	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Dissolved Metals																											
Aluminum	µg/L	50[j]	100[j]	-	-	-	-	-	-	-	-	-	-	-	-	<3.0	<3.0	4.2	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Antimony	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	0.46	0.28	0.29	0.19	0.17	0.16	0.12	0.12
Arsenic	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.19	0.43	0.17	0.12	0.21	0.17	0.16	0.25	0.22	0.22	0.19	0.18
Barium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	55	20	146	79	45	65	64	68	86	87	116	139
Beryllium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Bismuth	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	<10	<10	12	101	62	65	37	34	32	23	16
Cadmium	µg/L	0.23 - 0.46[c]	0.66 - 2.8[c]	-	0.15 - 0.32[c,m]	0.29 - 0.63[c,m]	2.6 - 5.7[c,m]	0.48 - 1.0[c,m]	2.1 - 4.7[c,m]	2.5 - 5.3[c,m]	412 - 894[c,m]	-	-	-	-	0.0088	0.012	0.034	0.0081	0.027	0.020	0.014	0.019	0.023	0.023	0.019	0.033
Chromium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.19	0.22	<0.1	0.21	0.10	0.12	0.14	0.18	0.18	0.17	0.14	<0.1
Cobalt	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	5.1	1.8	1.5	0.44	0.23	0.22	<0.1	<0.1
Copper	µg/L	0.3 - 1.4[k]	1.7 - 7.9[k]	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	0.25	<0.2	0.26	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Iron	µg/L	-	350	-	-	-	-	-	-	-	-	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Lead	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.3	2.2	1.9	4.3	72	41	40	22	19	20	14	9.0
Manganese	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	0.87	1.5	9.9	3.5	2.6	1.4	1.6	1.6	0.50	0.42
Mercury	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Molybdenum	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.86	0.69	0.64	0.75	1.8	1.3	1.3	1.1	0.94	1.0	0.91	0.83
Nickel	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	67	30	28	12	7.0	6.1	2.3	1.1
Selenium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.18	1.5	0.59	0.32	20	11	10	6.5	5.4	5.4	4.0	2.6
Silicon	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,260	1,330	2,070	2,280	2,050	2,000	1,820	1,630	1,690	1,730	1,860	1,910
Silver	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Strontium	µg/L	2500[i]	-	-	-	-	-	-	-	-	-	-	-	-	-	157	134	65	154	938	625	620	400	361	365	296	227
Thallium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	0.043	<0.01	<0.01	0.055	0.026	0.027	0.024	0.019	0.022	<0.01	<0.01
Tin	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Titanium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Uranium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.23	0.74	0.23	0.28	6.3	3.8	3.8	2.4	2.2	2.0	1.3	1.0
Vanadium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1.0	1.7	<1.0	<1.0	2.3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Note: Data were screened against BC Working and Approved WQGs (BC ENV 2019a, 2021) where available, compliance limits and site performance objectives, and EVWQP benchmarks and screening values. In the absence of BC WQGs, guidelines were adopted from CCME Canadian Environmental Quality Guidelines (CCME 1999), Environment and Climate Change Canada (ECCC) Predicted No Effect Concentration (PNECs; ECCC 2018), or ECCC draft Federal Environmental Quality Guidline (FEQG; ECCC 2017).

(a) = Guideline is a minimum value, unless the background concentration or value is lower.

(b) = Guideline is adopted from Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines (CCME, 1999).

(c) = Guideline is hardness dependent. The guideline range shown is based on the hardness range observed in the dataset (112 to 978 mg/L). The guideline is calculated based on the individual hardness value for each sample.

(d) = For some samples, water hardness was greater than 250 mg/L. At this hardness, no BC ENV water quality guideline has been established for sulphate; however, the observed data were screened against the guideline for very hard water (i.e., 429 mg/L) for comparative purposes.

(e) = Guideline is chloride dependent. The guideline range shown is based on the chloride concentration range observed in the dataset (0.1300 to 2.4900 mg/L). The guideline is calculated based on the individual chloride concentration in each sample.

(f) = The ammonia guideline is pH and temperature dependent. The guideline that results in the minimum ammonia guideline is based on the combination of field pH (8.5) and water temperature (10.0°C).

(g) = Guideline is adopted from Environment and Climate Change Canada's (ECCC) PNEC (ECCC 2018).

(h) = Guideline is for chromium VI.

(i) = Guideline is adopted from Environment and Climate Change Canada's (ECCC) FEQG (ECCC 2017).

(j) = Guideline is pH dependent. The guideline range shown is based on the pH range observed in the dataset (7.9 to 8.5). The guideline is calculated based on the individual pH for each sample.

(k) = Dissolved copper guideline was calculated using the Biotic Ligand Model (BC ENV 2019b) and humic acid was assumed to be 10%.

(l) = The compliance limits (nitrate, sulphate, and selenium) and the site performance objective (cadmium) apply to MIDCO.

(m) = Elk Valley Water Quality Plan (EVWQP) hardness dependent benchmarks and screening values applicable within a range of hardness values, above or below which the minimum or maximum of the range is used. Nitrate benchmarks are from 67 to 500 mg/L $CaCO_3$ with a minimum benchmark value of 3 mg/L N; total cobalt screening values are valid from 52 to 396 mg/L $CaCO_3$ and dissolved cadmium benchmarks are valid from 3.4 to 285 mg/L $CaCO_3$

(n) = EVWQP nitrate benchmark was derived specific to Elk River conditions.

Value(Mn) = concentration exceeds the long-term chronic BC Water Quality Guideline.

Value(C) = concentration exceeds the compliance limit or site performance objective.

Value(IA) = concentration exceeds the invertebrate level 1 EVWQP benchmark or screening value.

Value(IB) = concentration exceeds the invertebrate level 2 EVWQP benchmark or screening value.

Value(IC) = concentration exceeds the invertebrate level 3 EVWQP benchmark or screening value.

Value(FA) = concentration exceeds the fish level 1 EVWQP benchmark or screening value.

Value(FB) = concentration exceeds the fish level 2 EVWQP benchmark or screening value.

Value(A) = concentration exceeds the EVWQP amphibian level 1 benchmark or screening value.

WQG = water quality guideline, PNEC = predicted no effect concentrations, CCME = Canadian Council of Ministers of the Environment, FEQG = federal environmental quality guideline.

- = no guideline or no data; °C = degrees Celsius; µs/cm = microsiemens per centimetre; µg/L = micrograms per litre; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; mV = millivolts; NTU = Nephelometric Turbidity Units; QA/QC = quality assurance/quality; control; PNEC = Predicted No-effect Concentration; FEQG = Federal Environmental Quality Guideline.

Table E-2: Chronic Benchmarks for the Elk Valley Water Quality Plan Constituents

Receptor and Parameter	Unit	Benchmark or Screening Value[b] Level 1	Level 2	Level 3	Rationale
Invertebrates					
Sulphate	mg/L	625	729	1,315	Level 1 benchmark is associated with 10% effect size, reflecting the geometric mean of two independent three-brood reproduction studies of *Ceriodaphnia dubia* (Annex F of the EVWQP, Teck 2014).
Nitrate[a]	mg/L	$=10^{(1.0003*(\text{Log(hardness)})-b)}$ b = 1.82	b = 1.60	b = 0.98	Nitrate benchmarks were derived from 8-day reproductive effects in *C. dubia* in Fording River water (Annex F of the EVWQP, Teck 2014), corresponding to 10% effect (level 1), 20% effect (level 2), and 50% effect (level 3).
Dissolved Cadmium	µg/L	$=(10^{(0.83*\text{Log(hardness)}-b)}$ b = 2.53	b = 2.24	b = 1.28	The level 1 benchmark represents chronic, sublethal toxicity data for the most sensitive organism reviewed for the EVWQP: the geometric mean of 7-day reproduction EC_{10} and 21-day reproduction EC_{16} for *Daphnia magna*. The level 2 benchmark represents the geometric mean of IC_{25} biomass and weight data for *Hyalella azteca* (Annex G, Appendix B of the EVWQP, Teck 2014).
Total Selenium	µg/L	104	500	-	The upper confidence limit of the invertebrate bioaccumulation model reaches the level 1 tissue benchmark for invertebrate reproduction at an aqueous concentration of 104 µg/L (a LOEC for mayfly reproduction). The upper confidence limit of the invertebrate bioaccumulation model reaches the level 2 benchmark for invertebrates beyond the range of aqueous selenium considered in the EVWQP (up to 500 µg/L) and, therefore, level 3 benchmark for invertebrates was not derived (Annex E of the EVWQP, Teck 2014).
Fish					
Sulphate	mg/L	499	674	1,173	Sulphate benchmarks were derived in the EVWQP (Teck 2014). Benchmarks reflect the geometric mean of two independent rainbow trout 21- to 28-day embryo-alevin development (percent swim-up) studies (Annex F of Teck 2014).
Nitrate	mg/L	$=10^{(1.0003*(\text{Log(hardness)})-b)}$ b = 1.35	b = 1.22	b = 0.87	Nitrate benchmarks were derived in the EVWQP (Teck 2014) as hardness-dependent values expressed as an equation. Benchmarks were derived from the concentration causing a 10% effect (EC_{10}) (level 1), causing a 20% effect (EC_{20}) and causing a 50% effect (EC_{50}) (level 2) for 39-day embryo-alevin development (percent swim-up) effects to rainbow trout in Fording River water (Annex F of Teck 2014).
Dissolved Cadmium	µg/L	$=10^{(0.83*\text{Log(hardness)}-b)}$ b = 2.02	b = 1.37	b = 1.31	Cadmium benchmarks were derived in the EVWQP (Teck 2014) as hardness-dependent values expressed as an equation. The level 1 benchmark was derived using the lowest effect concentration for fish reported in Annex G of the Elk Valley Water Quality Plan (EVWQP; Teck 2014), which was a lowest observed effect concentration (LOEC) for Rainbow Trout (*Oncorhynchus mykiss*) growth from a 62-day test with early life stages (embryo-alevin-fry).
Total Selenium	µg/L	19	74	-	Selenium reproduction benchmarks were derived in the EVWQP (Teck 2014) from an integrated assessment of reproductive effects on populations of sensitive fish species. The adopted benchmarks were those derived to be protective of reproductive effects on Westslope Cutthroat Trout (WCT; *Oncorhynchus clarkii lewisi*). As detailed in the EVWQP (Teck 2014), WCT benchmarks are reproductive EC_{10} (level 1), EC_{20} (level 2), and EC_{50} (level 3) values from a site-specific and species-specific dose-response relationship for WCT (i.e., percent survival at swim-up). In egg tissue, the benchmark concentrations are 25 mg/kg dw (level 1), 27 mg/kg dw (level 2), and 33 mg/kg dw (level 3). These tissue-based effects concentrations were then translated into associated aqueous concentrations by applying a site-specific bioaccumulation model.
Amphibians					
Sulphate	mg/L	481	822	1,545	Benchmarks reflect the average of two inhibitory concentration estimates for 21-day survival and growth of Pacific tree frogs (*Pseudacris regilla*) derived from scientific literature (Annex F of the EVWQP, Teck 2014). The lowest level 1 benchmark for sulphate in the EVWQP was 481 mg/L, based on a potential 10% effect on growth of larval amphibians. A slightly lower value of 429 mg/L (equal to the BC WQG for high hardness waters) was adopted as a basis for setting a long-term water quality target for sulphate in the EVWQP and was applied as the lowest level 1 benchmark for amphibians.
Nitrate	µg/L	$=10^{(1.0003)(\text{Log (hardness)})-b}$ b = 1.04	b = -0.05	b = -0.65	The level 1 benchmark was derived from 52-day growth studies in Northern leopard frogs (*Rana pipiens*). Level 2 and 3 benchmarks were derived from 10-day growth studies in Pacific tree frogs (*Pseudacris regilla*) (Annex F of the EVWQP, Teck 2014).
Dissolved Cadmium	µg/L	$=10^{(0.83*\text{Log(hardness)}-b)}$ b = -0.914	-	-	The level 1 screening value was derived using the lowest effect concentration for amphibians reported in Annex G of the EVWQP (Teck 2014), which was a 24-day growth LOEC for Northwestern salamander (*Ambystoma gracile*).
Juvenile Birds					
Total Selenium	µg/L	203	-	-	The upper confidence limit of the invertebrate bioaccumulation model reaches a level 1 dietary benchmark for juvenile bird growth (an EC10 for growth of juvenile mallard, *Anas platyrhynchos*) at 203 µg/L. Waterbirds may, therefore, be affected at an aqueous concentration of 203 µg/L (Annex E of the EVWQP, Teck 2014).
Bird Reproduction					
Total Selenium	µg/L	394	-	-	The level 1 benchmark for reproductive effects on sensitive bird species is 394 µg/L (Annex E of the EVWQP, Teck 2014).

a = Nitrate screening values are for Elk River.

"-" = not derived; µg/L = micrograms per litre; mg/L = milligrams per litre; EC_{10} = concentration causing a 10% effect; EC_{20} = concentration causing a 20% effect; EC_{50} = concentration causing a 50% effect; EVWQP = Elk Valley water quality plan; LOEC = lowest observed effect concentration.

Table E3: Chronic Screening Values for Constituents Not Included in the Elk Valley Water Quality Plan

Receptor and Parameter	Unit	Benchmark or Screening Value[a]			Rationale
		Level 1	Level 2	Level 3	
Invertebrates					
Total Cobalt	µg/L	$= \exp^{(0.414*(\ln(\text{hardness})) - b)}$			Screening values were calculated as percentiles of the Environment Canada (2017) species sensitivity distribution (SSD), rather than individual toxicity values, to increase the amount of toxicity information considered and to evaluate potential effects at the level of both individual species and the broader invertebrate community. The level 1 screening value is the 10th percentile of the SSD, representing a concentration that could result in chronic, sublethal effects to the most sensitive invertebrate species. The level 2 screening value is approximately the 15th percentile of the SSD, a concentration at which more than one sensitive invertebrate species could be affected. The level 3 screening value is approximately the 20th percentile of the SSD, a concentration at which a range of invertebrate species (potentially about one-third of invertebrate species) could be affected.
		$b = 0.99$	$b = 0.3$	$b = -0.29$	
Total Nickel	µg/L	5.3	15	22	Screening values were calculated as percentiles of the European Union (EU; 2008) SSD, rather than individual toxicity values, to increase the amount of toxicity information considered and to evaluate potential effects at the level of both individual species and the broader invertebrate community. The level 1 screening value is the 5th percentile of the SSD, representing a concentration that could result in chronic, sublethal effects to the most sensitive invertebrate species. The level 2 screening value is approximately the 15th percentile of the SSD, which is slightly higher than the third lowest toxicity value (NOEC for *Ceriodaphnia quadrangula*) and approximately equal to the fourth lowest toxicity value (NOEC for *Peracantha truncata*). Because the level 2 and level 3 screening values are based on NOEC values for invertebrates, there is elevated uncertainty and potentially conservatism in the interpretation of potential effects.
Total Dissolved Solids	mg/L	1,000	1,750	3,000	Golder and Nautilus (2013) reported a *C. dubia* reproduction IC_{20} at approximately 1,000 mg/L TDS. Reliable IC_{10} values could not be calculated for this dataset, so Golder and Nautilus (2013) recommended use of IC_{20}. Chapman et al. (2000) reported a 10-day LOEC of 1,750 mg/L for survival of *C. tentans* exposed to synthetic TDS mixtures composed mainly of calcium sulphate, although Hynes (1990) reported no effects on the benthic invertebrate community of a lake receiving treated uranium mill effluent where TDS levels increased from 76 to 2,700 mg/L. The Chapman et al. (2000) LOEC of 1,750 mg/L was selected as a level 2 screening value for TDS. Hammer et al. (1975) reported that freshwater species start to disappear when TDS levels exceed 3,000 mg/L. This concentration was selected as the level 3 screening value for all aquatic species.
Fish					
Total Cobalt	µg/L	$= \exp^{(0.414*(\ln(\text{hardness})) - b)}$			The lowest hardness-normalized toxicity datum for fish was a 34-day survival LC10 for Fathead Minnows (*Pimephales promelas*) of 339 µg/L at hardness of 100 mg/L as $CaCO_3$, which was adopted to set a hardness-dependent equation as the level 1 screening value for fish (Environment Canada 2017). Zebrafish (*Danio rerio*) were similarly sensitive, with a 16-day survival MATC of 340 µg/L (hardness-normalized). The next highest fish datum was an 81-day biomass EC10 for Rainbow Trout at 2,049 µg/L (normalized to 100 mg/L as CaCO3). Level 2 and 3 screening values were not derived because the maximum predicted cobalt concentration was lower than the level 1 screening value.
		$b = -3.92$	-	-	
Total Nickel	µg/L	$10^{(\log(b) - 0.763\times(\log(103)-\log(\text{hardness})) - 0.073\times(\log(0.5)-\log(\text{DOC}))+0.242\times(7.4-\text{pH}))}$			Nickel toxicity data summarized by the EU (2008) indicate that fish are less sensitive than invertebrates, with effects concentrations more than an order of magnitude higher than those calculated for sensitive invertebrate species. EU (2008) identified median hatching time for Zebrafish as the lowest reliable effect concentration for fish. Fathead Minnow survival was a similarly sensitive endpoint, with EU (2008) reporting normalized effect concentrations for Fathead Minnow survival being 8% higher than those reported for Zebrafish. The Zebrafish study did not measure aqueous nickel concentrations, mortality was high in the control treatment, and there is greater uncertainty in the relevance of the test endpoint (hatch time). In comparison, the Fathead Minnow study reported measured aqueous nickel concentrations, control mortality was low, and the survival endpoint was considered relevant. For these reasons, the Fathead Minnow data were relied upon to develop screening values for fish using the following approach. Fathead Minnow survival data for day 32 (the longest test duration in study) and water chemistry were compiled from the EU website[1]; nickel concentrations were log-transformed prior to analyses. A logistic concentration-response curve was fit using US EPA toxicity relationship analysis program (TRAP) (version 1.3) to estimate the following effects concentrations (± 95% confidence limits): LC_{10} = 88 µg/L (43–177), LC_{20} = 134 µg/L (80–225), and LC_{50} = 278 µg/L (210–367). Multiple linear regression (MLR) was used to model the simultaneous effect of three water chemistry constituents (hardness, DOC, and pH) on nickel toxicity, as follows. ■ Appendix G.3 of EU (2008) contains data matrices for nickel Biotic Ligand Model (BLM) estimates. The Rainbow Trout matrices, which were the only matrices reported for fish, were used in the MLR analysis to represent the effect of modifying factors on nickel toxicity to fish (EU 2008). Values within the matrix are EC_{10} on Rainbow Trout that have been predicted by the BLM using the coordinate water quality constituents as inputs for the model. Estimates were generated using the nickel BLMs described by De Schamphelaere et al. (2006). ■ BLM-derived EC_{10} estimates for Rainbow Trout were compiled for three pH values (7, 7.5, 8.1), three DOC values (1, 3, 5 mg/L), and 13 hardness values (80 to 320 mg/L as $CaCO_3$) (total n = 117). Estimates associated with lower hardness (<80 mg/L as $CaCO_3$) and higher DOC (>5 mg/L) were not compiled because these chemistries were outside the typical range observed in Elk Valley waters. ■ Stepwise linear regression methods were used for the MLR analysis. Hardness and DOC were log-transformed prior to running the MLR to stabilize residual variance and linearize the slopes. No transformation was done for pH because pH is a log-transformed variable. The MLR model without interactions of independent variables was determined to be the most appropriate model form and showed good agreement with the BLM. The slopes for the model without interactions were 0.763 (log hardness), 0.073 (log DOC), and -0.242 (pH). Slopes for hardness, DOC, and pH from the MLR were used to describe how the concentration-response curve for Fathead Minnow survival would be adjusted as a function of these variables by converting the LC50 value from the test water chemistry to a target hardness, DOC, and pH. The resulting hardness-, DOC-, and pH-dependent curve for Fathead Minnow survival was used to estimate response sizes for sensitive fish species. Screening values for fish corresponding to 10% (Level 1), 20% (Level 2), and 50% (Level 3) effects can be estimated with this equation based on site-specific hardness, DOC, and pH (e.g., Elk Valley conditions). This equation applies for hardness of 80 to 320 mg/L as $CaCO_3$, DOC of 1 to 5 mg/L, and pH of 7.0 to 8.1.
		$b = 88$	$b = 134$	$b = 278$	

[1] https://echa.europa.eu/registration-dossier/-/registered-dossier/15544/6/2/3/?documentUUID=6f17e5cd-3390-4c00-bff8-1ff25f66b019. EU (2008) reported the following test conditions: hardness = 103 mg/L as $CaCO_3$, DOC of 0 mg/L, and pH = 7.4. For the purpose of the analysis, DOC was set equal to 0.5 mg/L which is the method detection limit in most commercial laboratories.

Table E3: Chronic Screening Values for Constituents Not Included in the Elk Valley Water Quality Plan

Receptor and Parameter	Unit	Benchmark or Screening Value[(a)]			Rationale
		Level 1	Level 2	Level 3	
Total Dissolved Solids	mg/L	1,000	2,000	3,000	Golder and Nautilus (2013) evaluated sulphate toxicity to Rainbow Trout in Fording River waters. The program was designed to assess how the toxicity of sulphate may change in very hard waters and whether the overall ionic content of the water may induce a toxic effect. Therefore, Golder and Nautilus (2013) tested two TDS mixtures to assess how overall ionic content and the associated ionic mixture could affect sulphate toxicity: 1) Fording River water, which is representative of most locations, and 2) Fording River water supplemented with alkalinity (which results in higher bicarbonate) to be representative of conditions in a subset of tributaries, including Kilmarnock Creek. Total alkalinity was ~184 mg/L in the first mixture (average across all treatments) and ~218 mg/L in the second mixture (average across all treatments. Sulphate was introduced into all of the test solutions as calcium sulphate and magnesium sulphate in a calcium-to-magnesium ratio that is comparable to that observed in the Fording River. Therefore, TDS effect concentrations from this study are site-specific and representative of the ionic composition in the upper Fording River watershed. Golder and Nautilus (2013) reported that survival and normal swim-up was the most sensitive endpoint in Rainbow Trout embryos, yielding an EC_{20} for TDS of approximately 1,000 mg/L. Reliable IC_{10} values could not be calculated for this dataset, so Golder and Nautilus (2013) recommended use of IC_{20}. Kimmel and Argent (2009) suggest a range of 2,000 to 3,000 mg/L TDS as a threshold for changes to fish communities in streams receiving coal mine discharge. The lower end of this range was selected as the level 2 screening value for fish. Hammer et al. (1975) reported that freshwater species start to disappear when TDS levels exceed 3,000 mg/L. This concentration was selected as the level 3 screening value for all life stages.

µg/L = micrograms per litre; mg/L = milligrams per litre; BLM = biotic ligand model; $CaCO_3$ = calcium carbonate; DOC = dissolved organic carbon; EC_{20} = concentration causing a 20% effect; EC_{50} = concentration causing a 50% effect; EU = European Union; IC_{10} = concentration causing 10% inhibition; IC_{20} = concentration causing 20% inhibition; LC_{10} = concentration causing 10% lethality; LC_{20}= concentration causing 10% lethality; LC_{50} = concentration causing 50% lethality; LOEC = lowest observed effect concentration; MLR = Multiple Linear Regression; NOEC = no observed effect concentration; SSD = species sensitivity distribution; TDS = total dissolved solids; TRAP = Toxicity Relationship Analysis Program.

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APPENDIX F

Supplemental Figures

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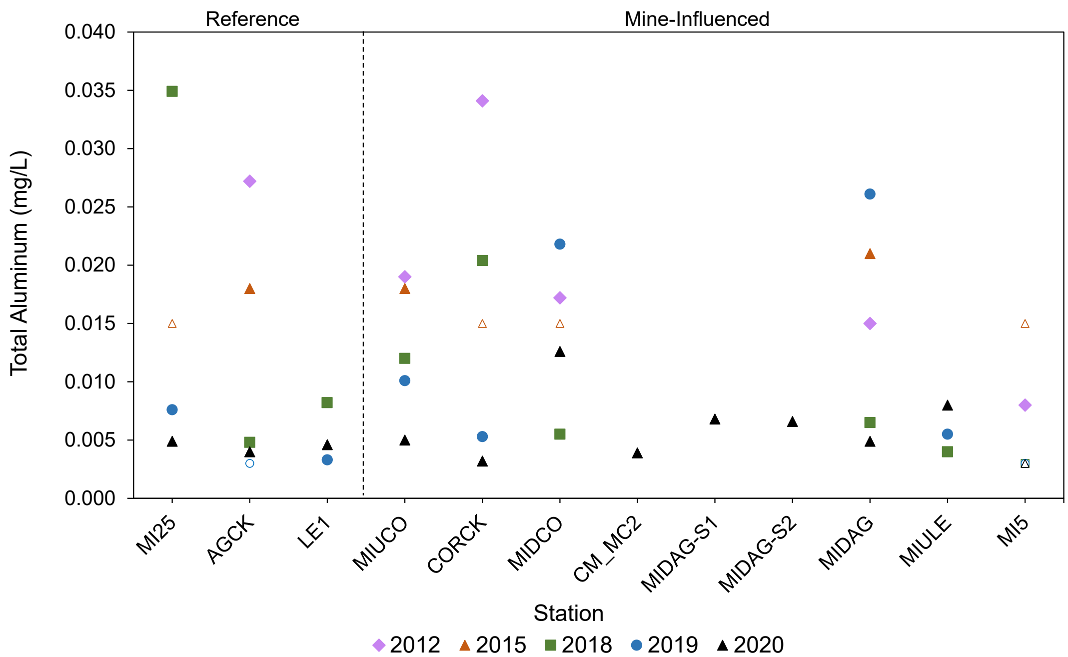
F.1 WATER QUALITY

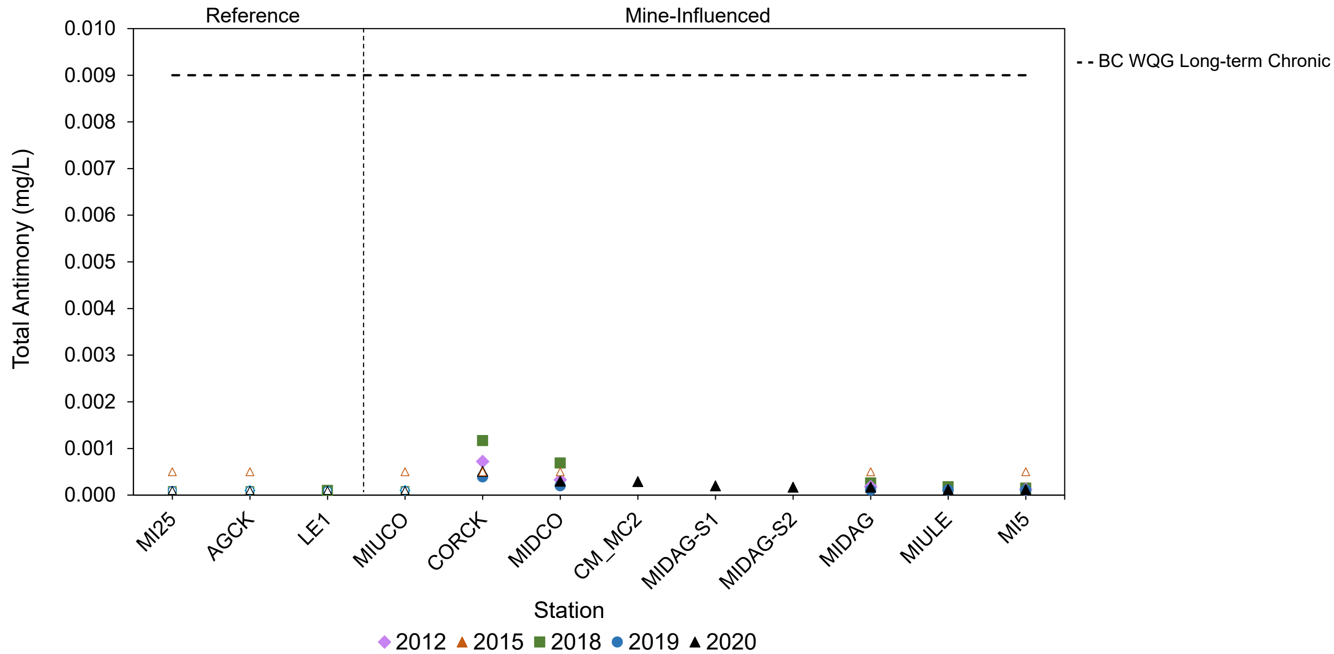
F.1.1 Spatial Trends

Figure 1.1-1: Spatial Variation in Aqueous Aluminum Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



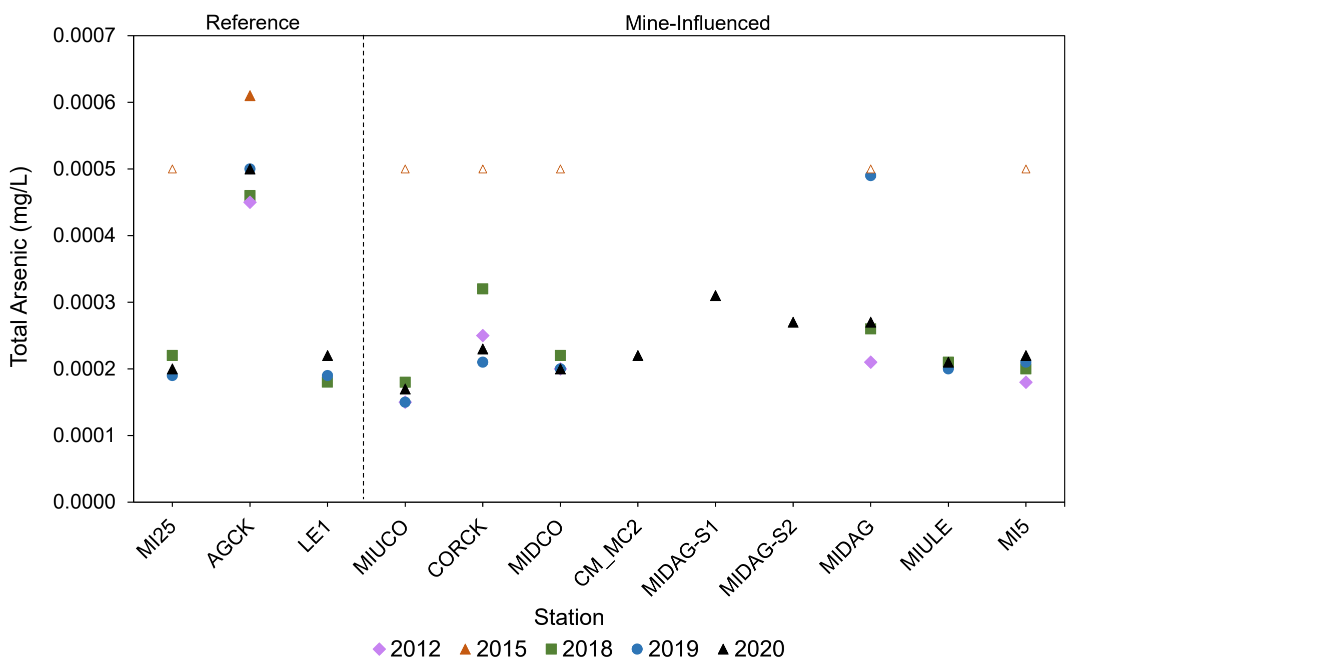
Note: Open symbols represent non-detects.
mg/L = milligrams per litre.

Figure 1.1-2: Spatial Variation in Aqueous Antimony Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



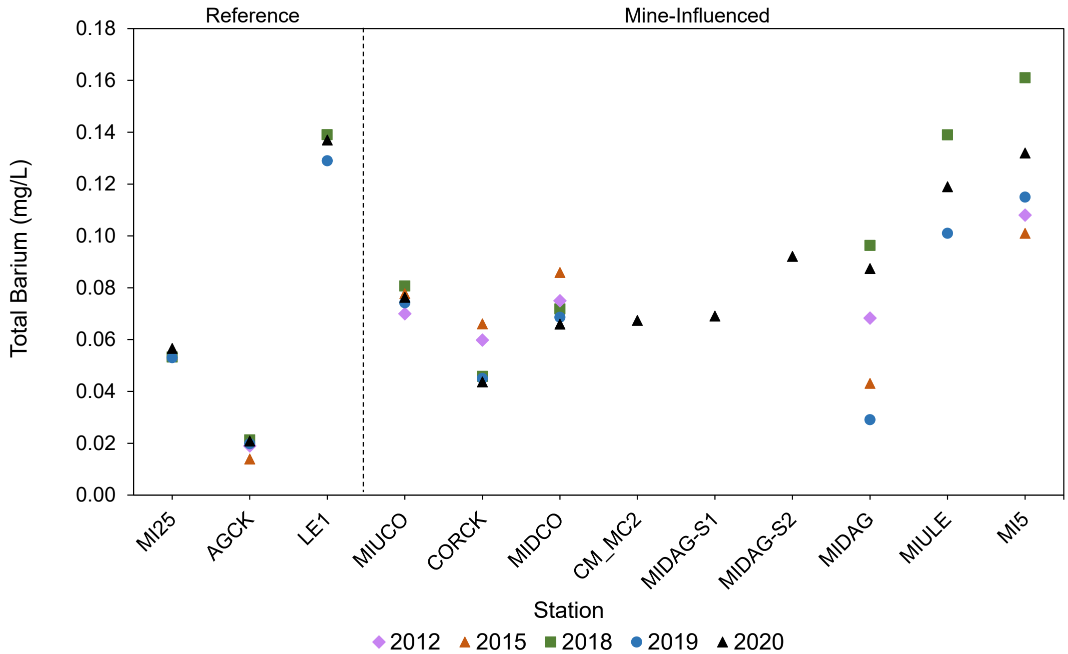
Note: Open symbols represent non-detects.
mg/L = milligrams per litre; WQG = water quality guideline

Figure 1.1-3: Spatial Variation in Aqueous Arsenic Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



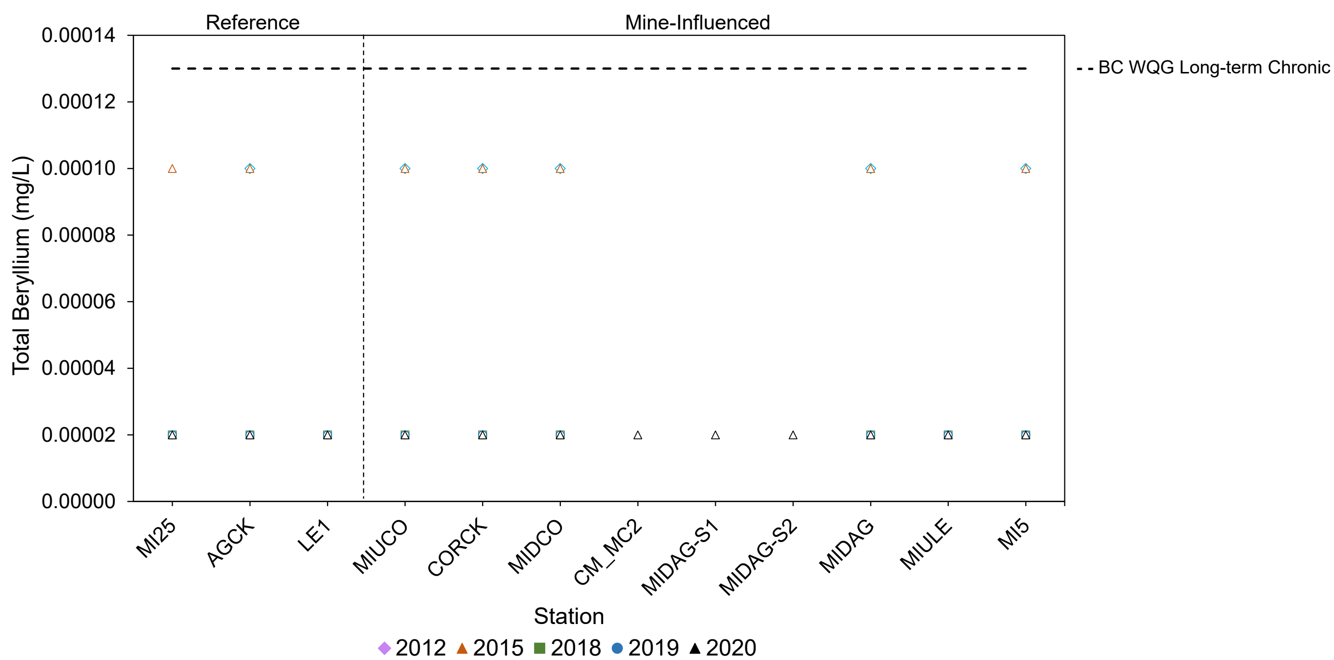
Note: Open symbols represent non-detects. Short-term BC WQG not shown (0.5 mg/L).
mg/L = milligrams per litre.

Figure 1.1-4: Spatial Variation in Aqueous Barium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



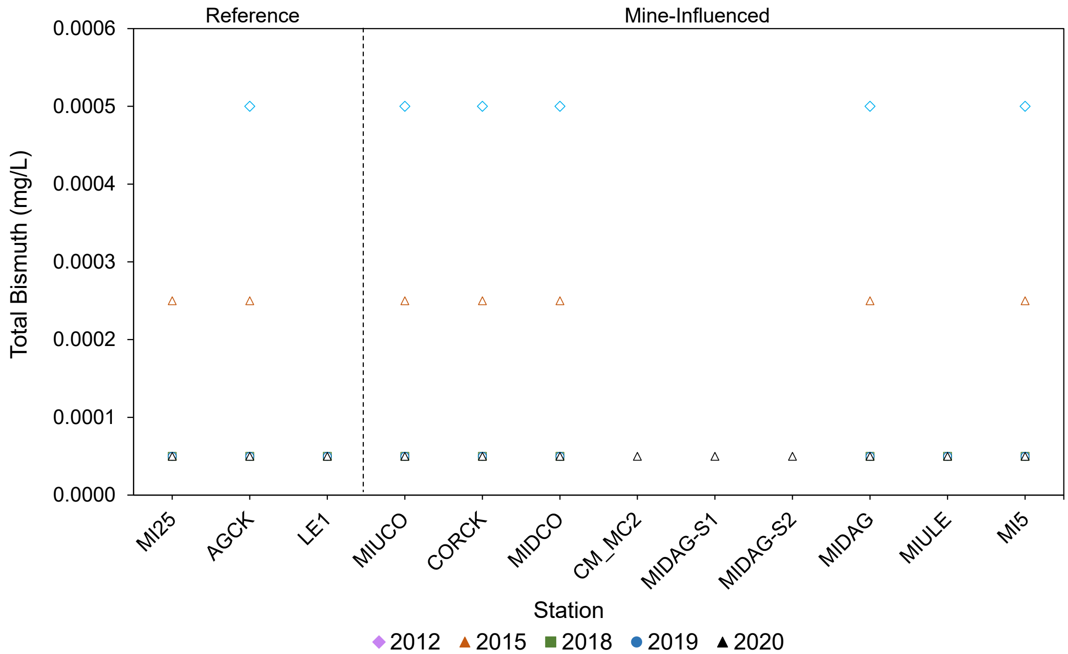
Note: Long-term BC WQG (1.0 mg/L) not shown.
mg/L = milligrams per litre.

Figure 1.1-5: Spatial Variation in Aqueous Beryllium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



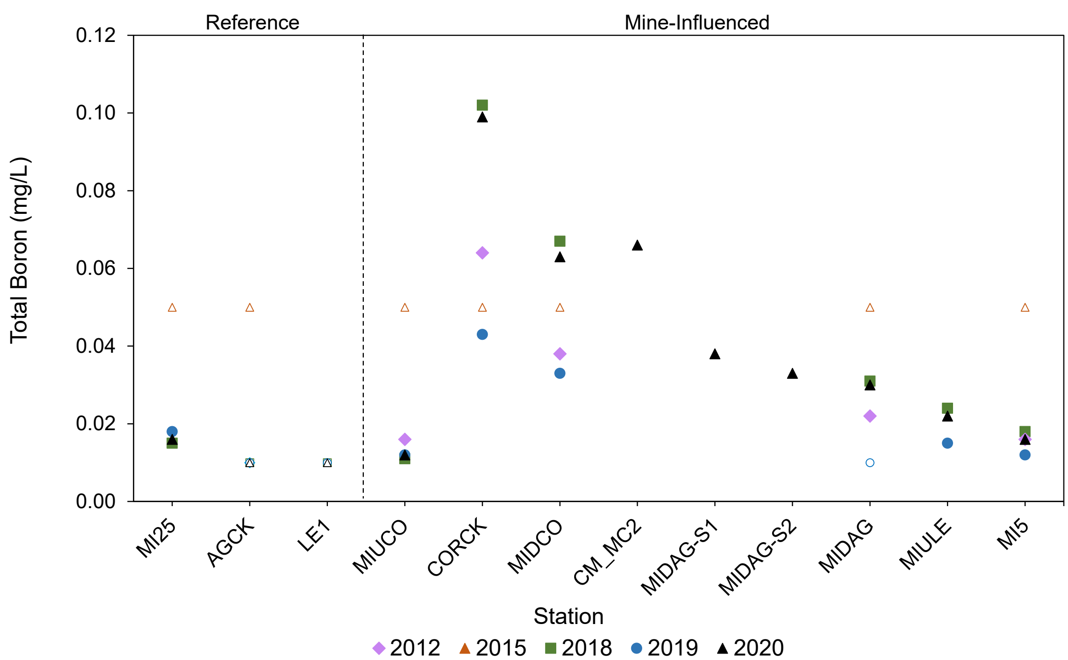
Note: Open symbols represent non-detects.
mg/L = milligrams per litre; WQG = water quality guideline.

Figure 1.1-6: Spatial Variation in Aqueous Bismuth Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



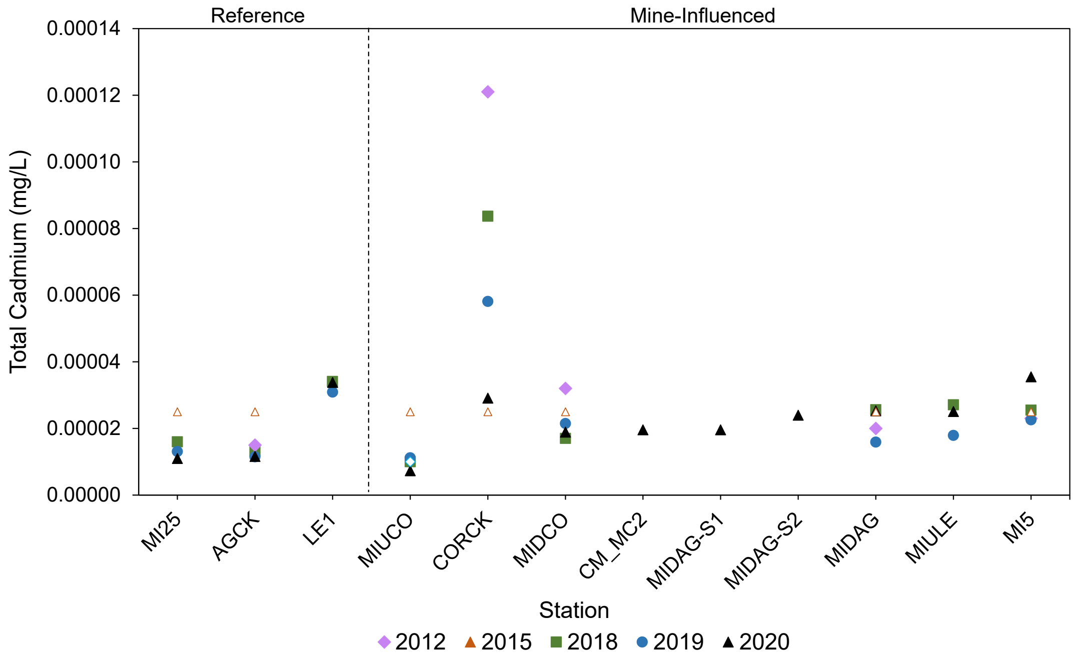
Note: Open symbols represent non-detects.
mg/L = milligrams per litre.

Figure 1.1-7: Spatial Variation in Aqueous Boron Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



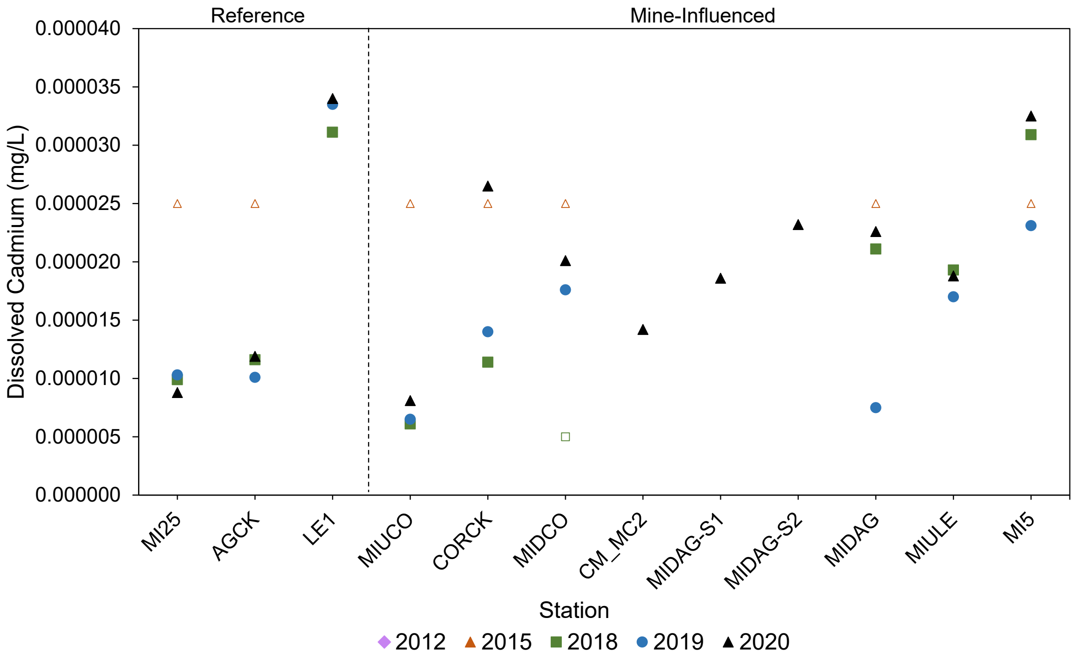
Note: Open symbols represent non-detects. Long-term BC WQG not shown (1.2 mg/L).
mg/L = milligrams per litre.

Figure 1.1-8: Spatial Variation in Aqueous Cadmium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



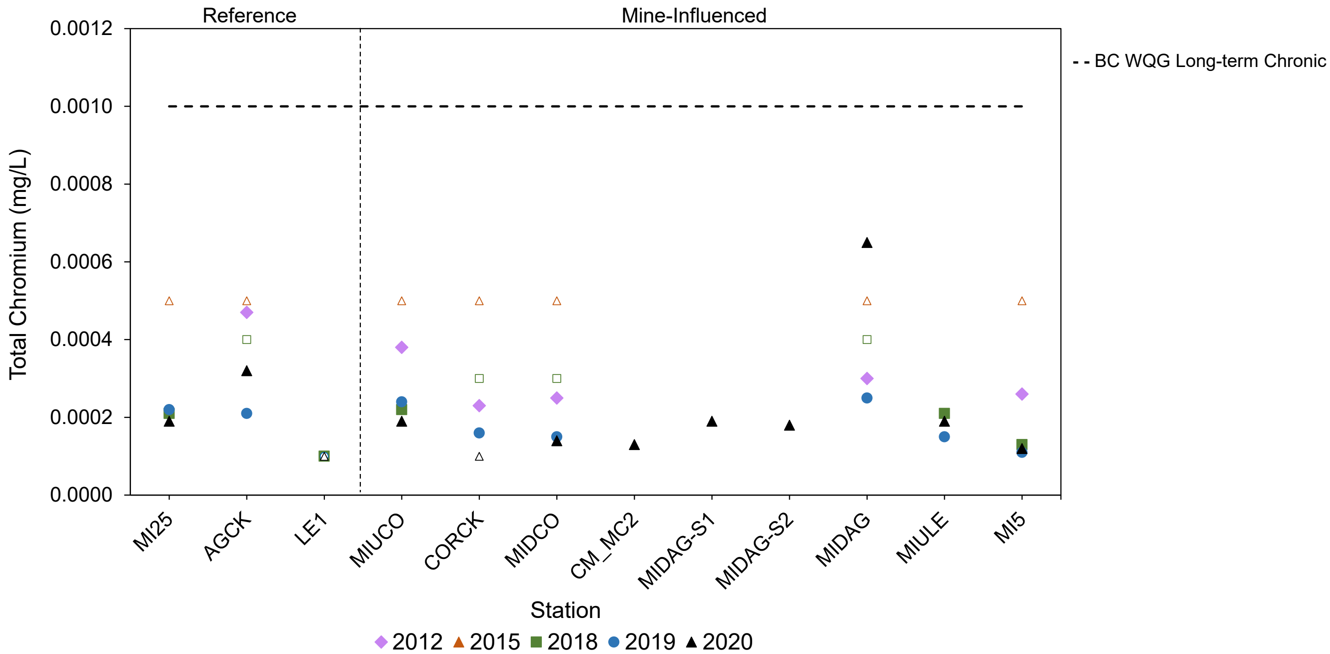
Note: Open symbols represent non-detects. Permit 107517 Site Performance Objective (MIDCO) not shown (0.00015 to 0.0009 mg/L).
mg/L = milligrams per litre.

Figure 1.1-9: Spatial Variation in Aqueous Dissolved Cadmium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



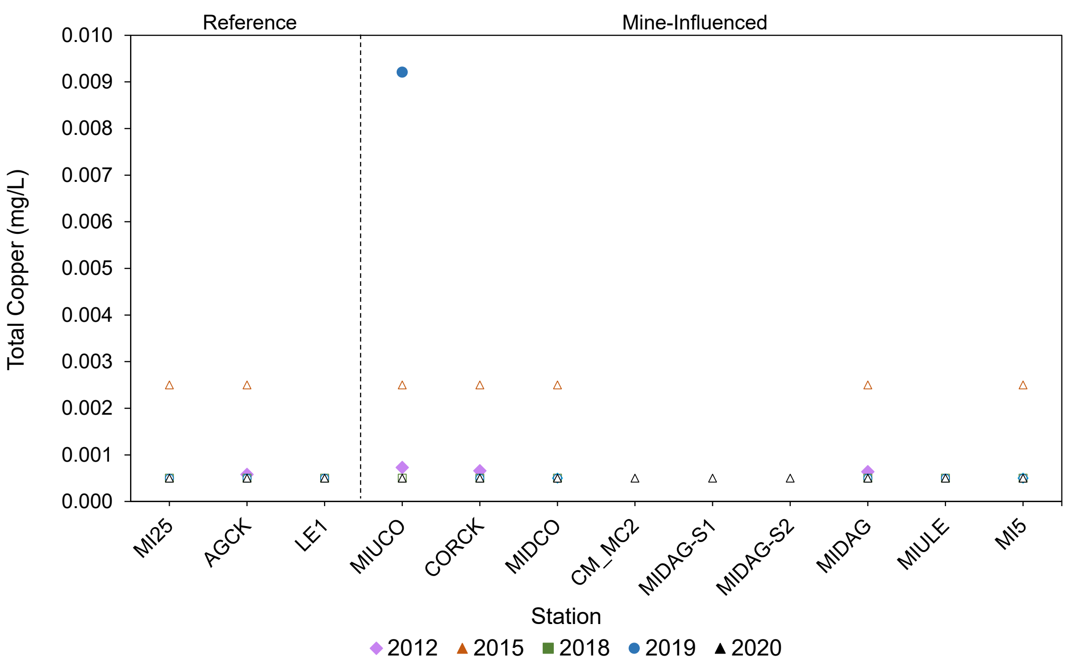
Note: Dissolved cadmium is presented because it is an order constituent (i.e., there is a benchmark for dissolved cadmium unlike other dissolved metals). Open symbols represent non-detects. Guidelines not shown: long-term BC WQG (0.00023 to 0.00046 mg/L); short-term BC WQG (0.00066 to 0.00028 mg/L); EVWQP level 1 invertebrate benchmark (0.00015 to 0.00032 mg/L); EVWQP level 1 fish benchmark (0.00048 to 0.00010 mg/L); and, EVWQP level 1 amphibian benchmark (0.41 to 89 mg/L).
EVWQP = Elk Valley water quality plan; mg/L = milligrams per litre; WQG = water quality guideline.

Figure 1.1-10: Spatial Variation in Aqueous Chromium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



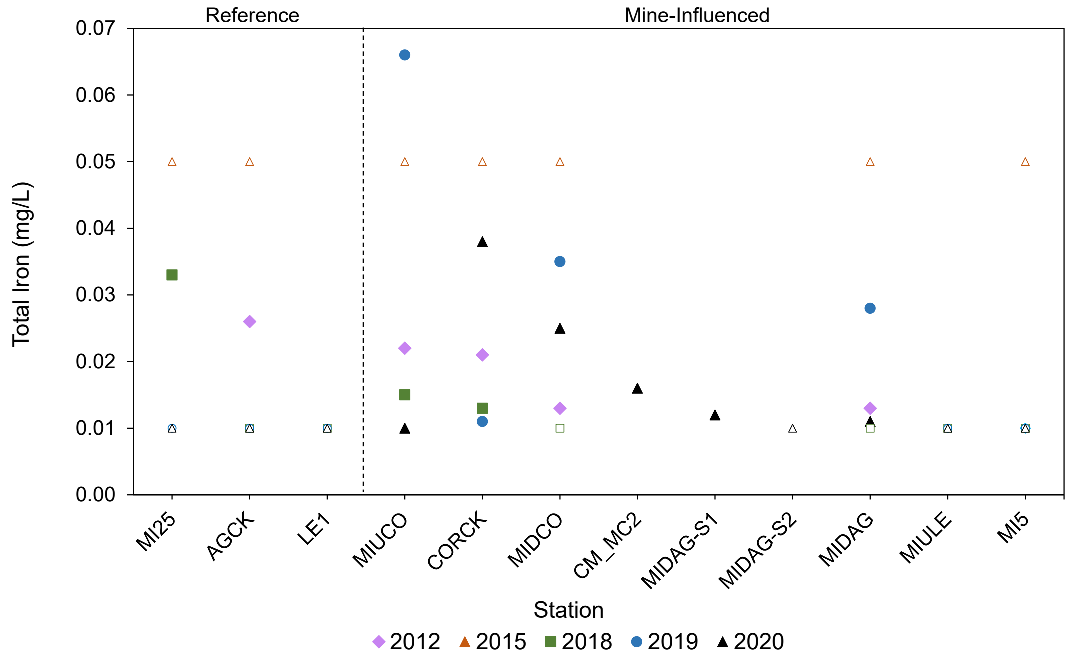
Note: Open symbols represent non-detects.
mg/L = milligrams per litre; WQG = water quality guideline.

Figure 1.1-11: Spatial Variation in Aqueous Copper Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



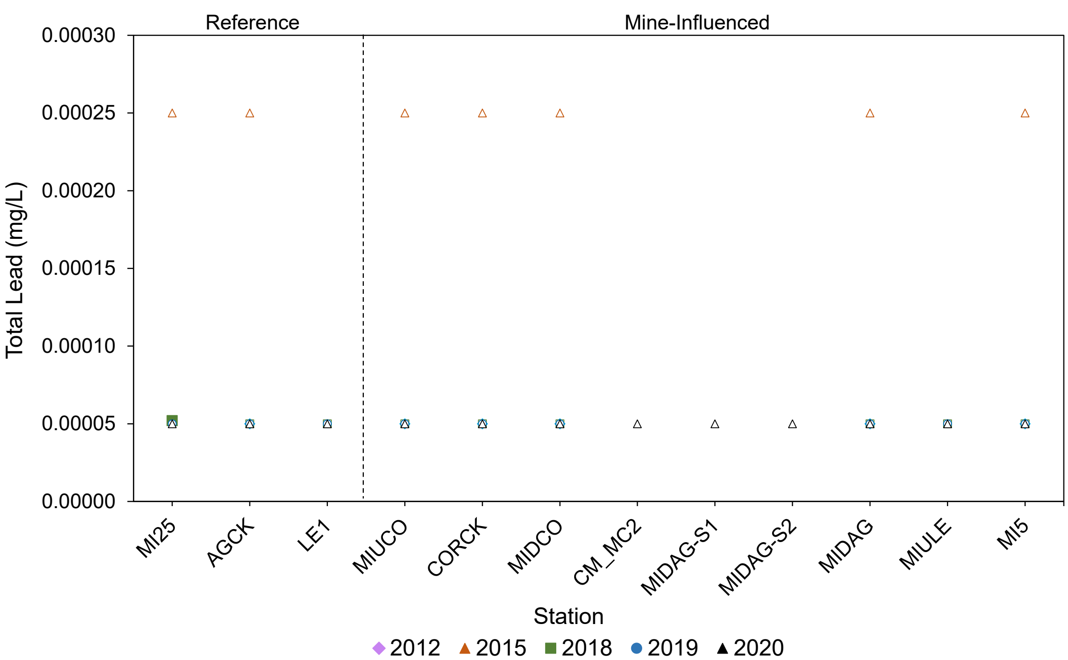
Note: Open symbols represent non-detects.
mg/L = milligrams per litre.

Figure 1.1-12: Spatial Variation in Aqueous Iron Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



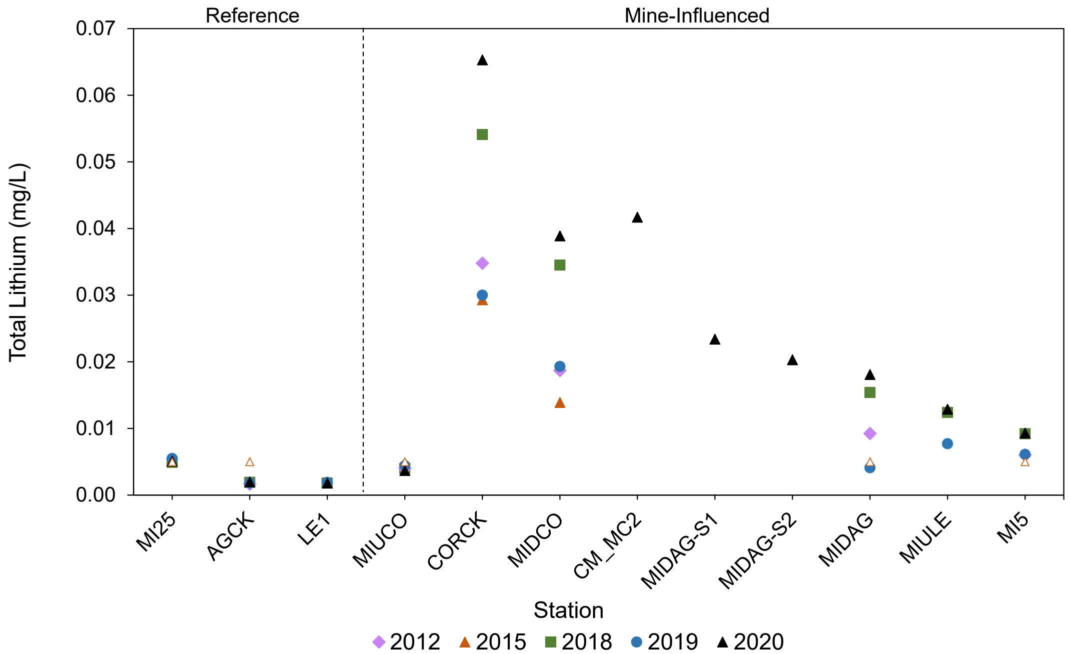
Note: Open symbols represent non-detects. Short-term BC WQG not shown (1.0 mg/L).
mg/L = milligrams per litre.

Figure 1.1-13: Spatial Variation in Aqueous Lead Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



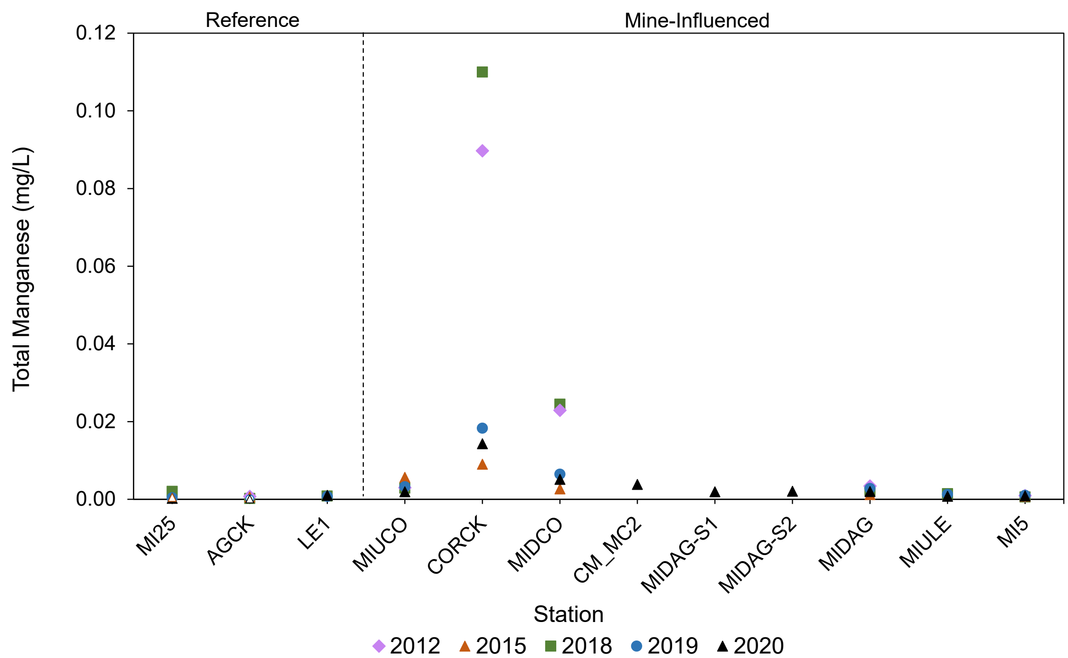
Note: Open symbols represent non-detects. Long-term BC WQG (hardness dependent; 0.007 to 0.020 mg/L) and the short-term BC WQG (0.094 to 0.420 mg/L) not shown.
mg/L = milligrams per litre; WQG = water quality guideline.

Figure 1.1-14: Spatial Variation in Aqueous Lithium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



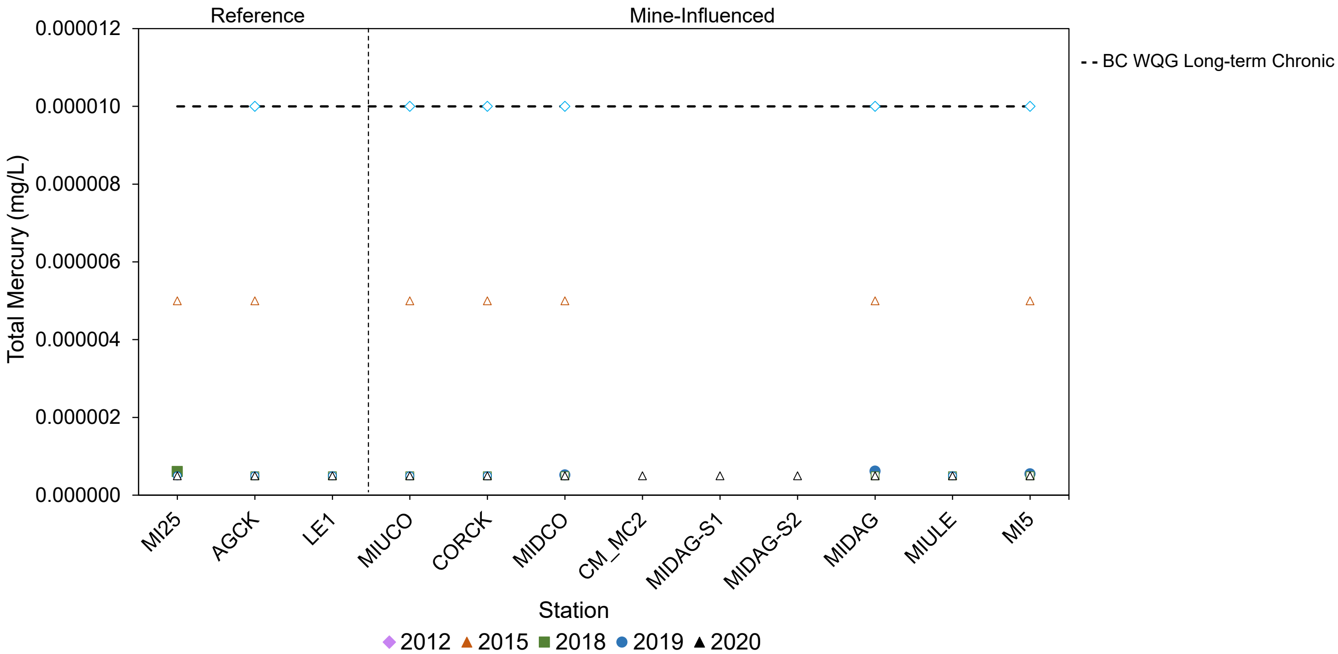
Note: Open symbols represent non-detects. Environment and Climate Change Canada predicted no effect concentration (0.12 mg/L) not shown. mg/L = milligrams per litre.

Figure 1.1-15: Spatial Variation in Aqueous Manganese Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



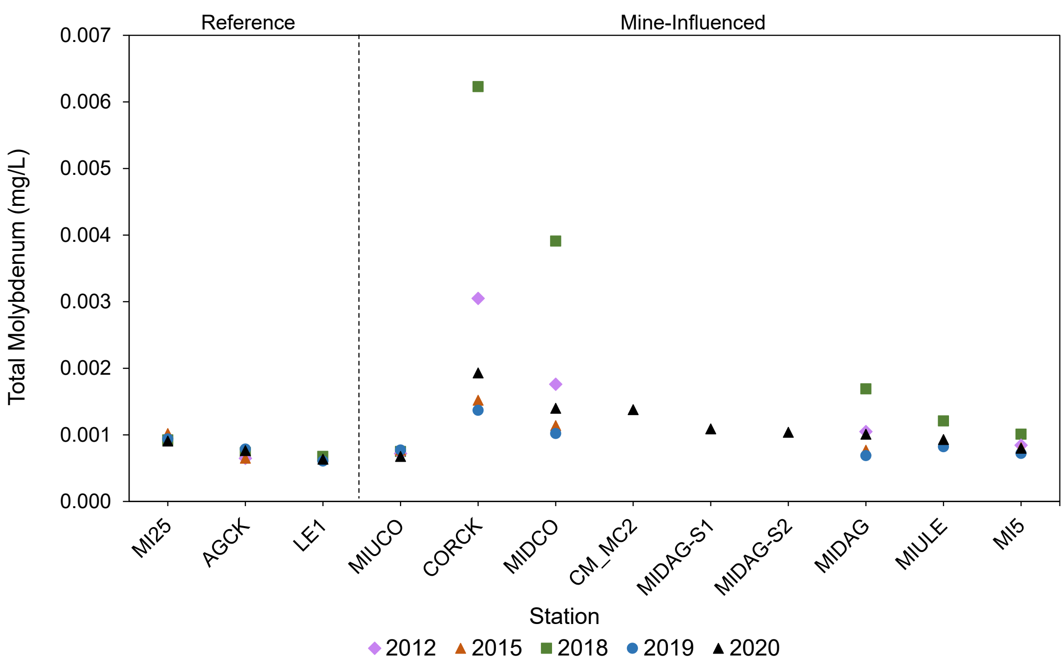
Note: Open symbols represent non-detects. Long-term BC WQG (hardness dependent; 1.1 to 4.9 mg/L) and short-term BC WQG (1.8 to 11 mg/L) not shown.
mg/L = milligrams per litre; WQG = water quality guideline.

Figure 1.1-16: Spatial Variation in Aqueous Mercury Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



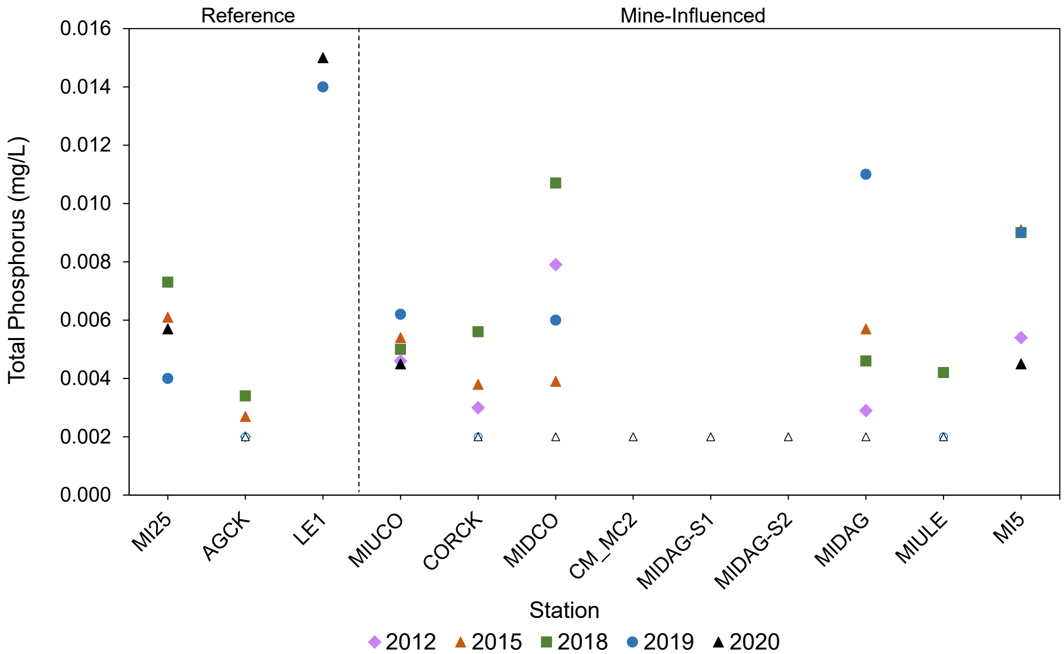
Note: Open symbols represent non-detects.
mg/L = milligrams per litre; WQG = water quality guideline

Figure 1.1-17: Spatial Variation in Aqueous Molybdenum Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



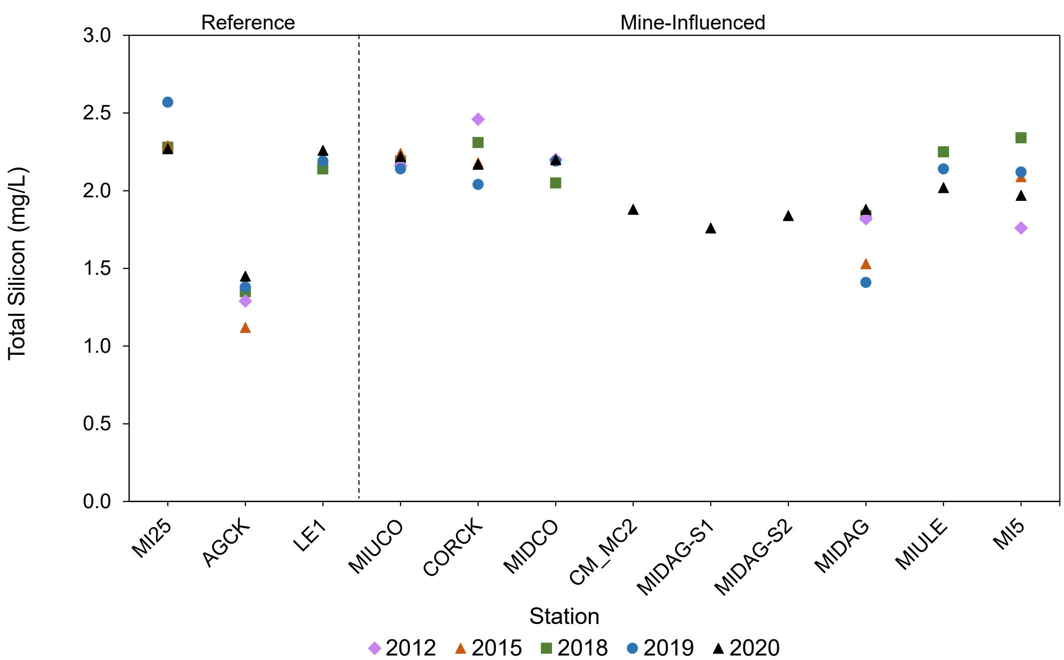
Notes: Open symbols represent non-detects. BC long-term WQG (1.0 mg/L) and BC short-term WQG (2.0 mg/L) not shown).
mg/L = milligrams per litre; WQG = water quality guideline

Figure 1.1-18: Spatial Variation in Aqueous Phosphorus Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



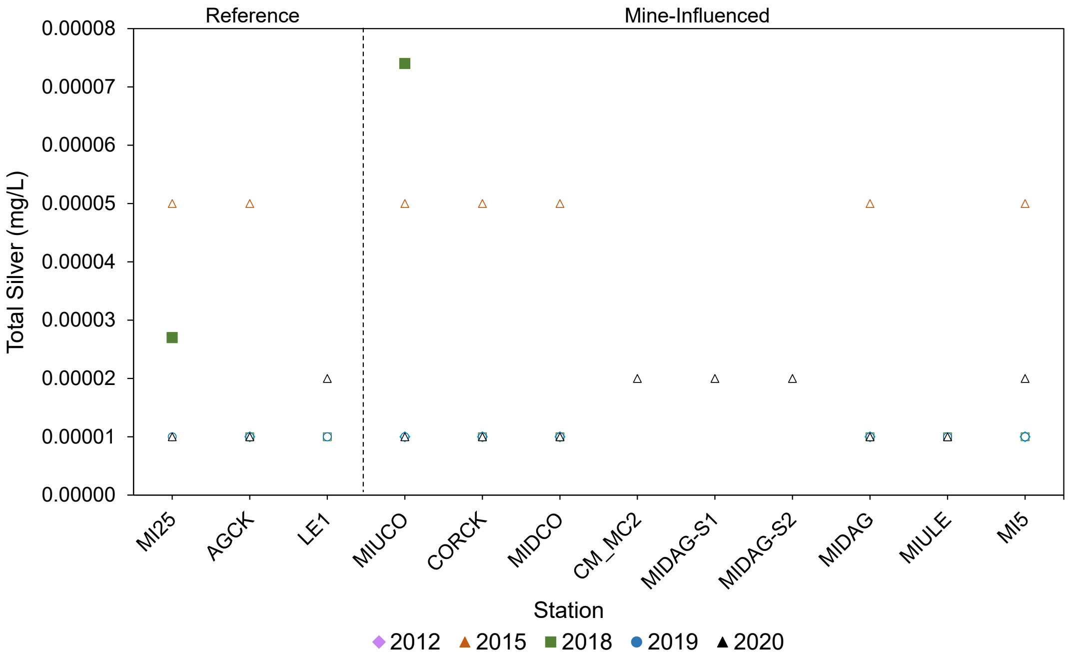
Note: Open symbols represent non-detects.
mg/L = milligrams per litre.

Figure 1.1-19: Spatial Variation in Aqueous Silicon Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



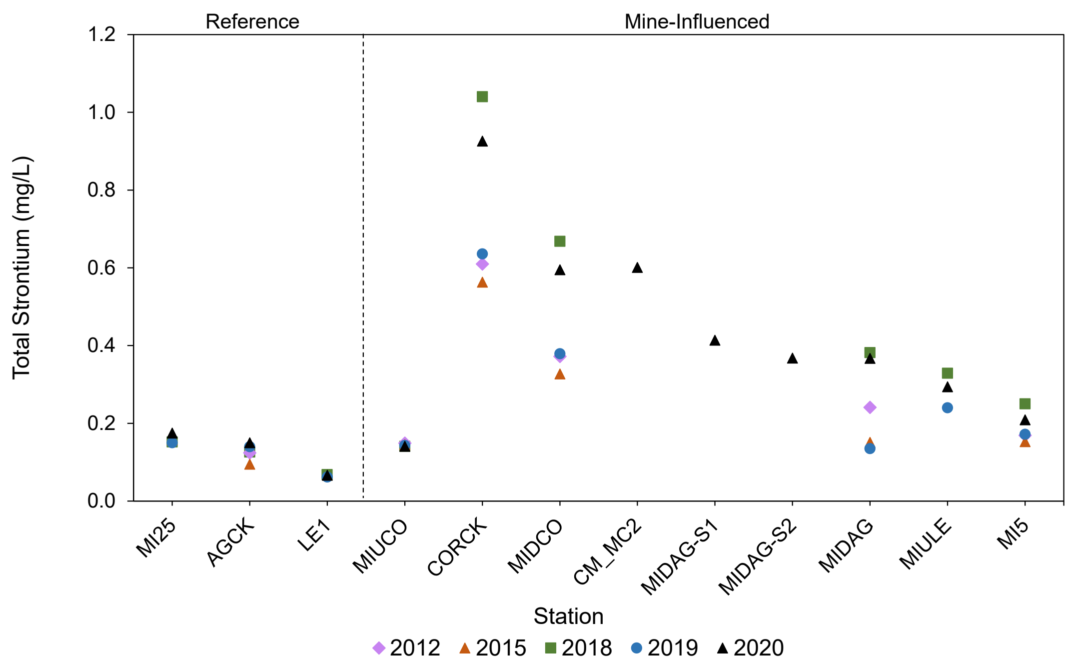
mg/L = milligrams per litre.

Figure 1.1-20: Spatial Variation in Aqueous Silver Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



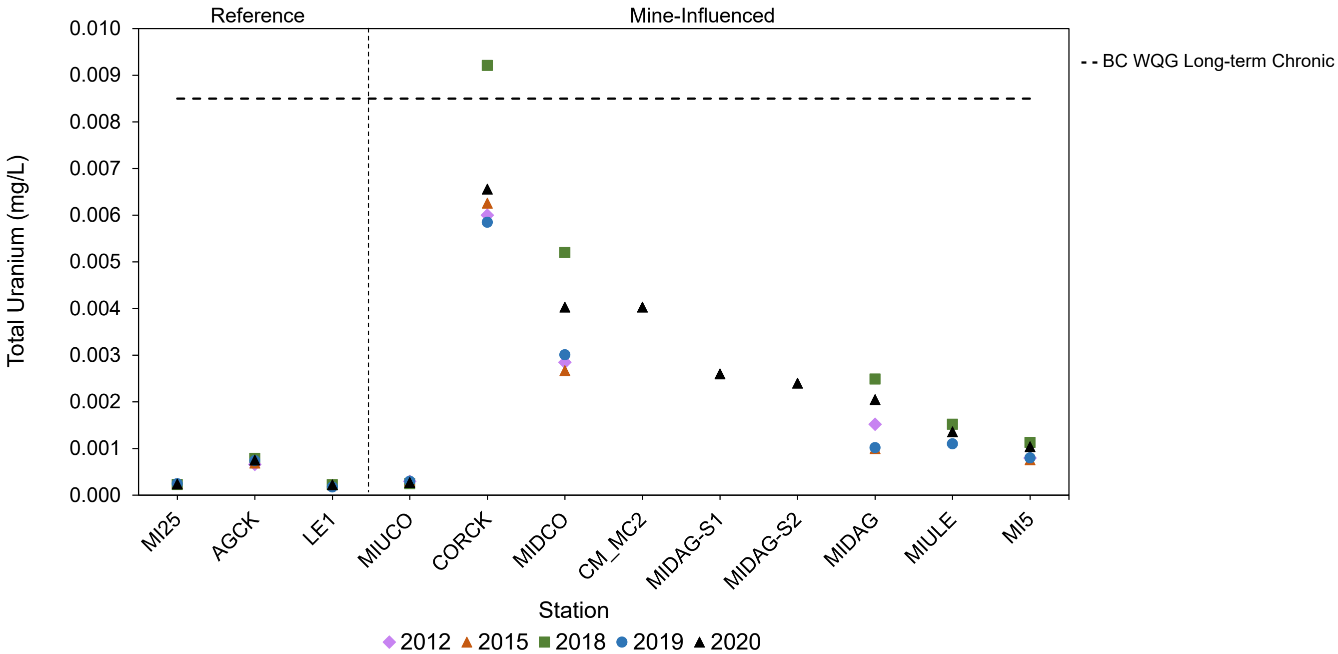
Note: Open symbols represent non-detects. Long-term BC WQG (0.0015 mg/L) and short-term BC WQG (0.003 mg/L) not shown.
mg/L = milligrams per litre; WQG = water quality guideline.

Figure 1.1-21: Spatial Variation in Aqueous Strontium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



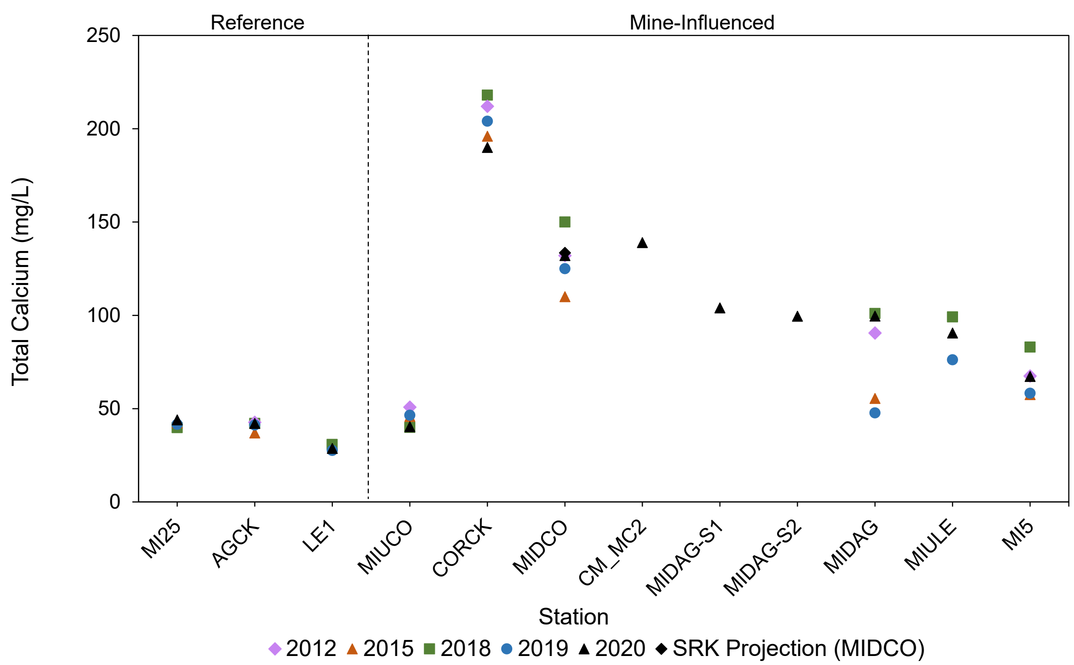
mg/L = milligrams per litre.

Figure 1.1-22: Spatial Variation in Aqueous Uranium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



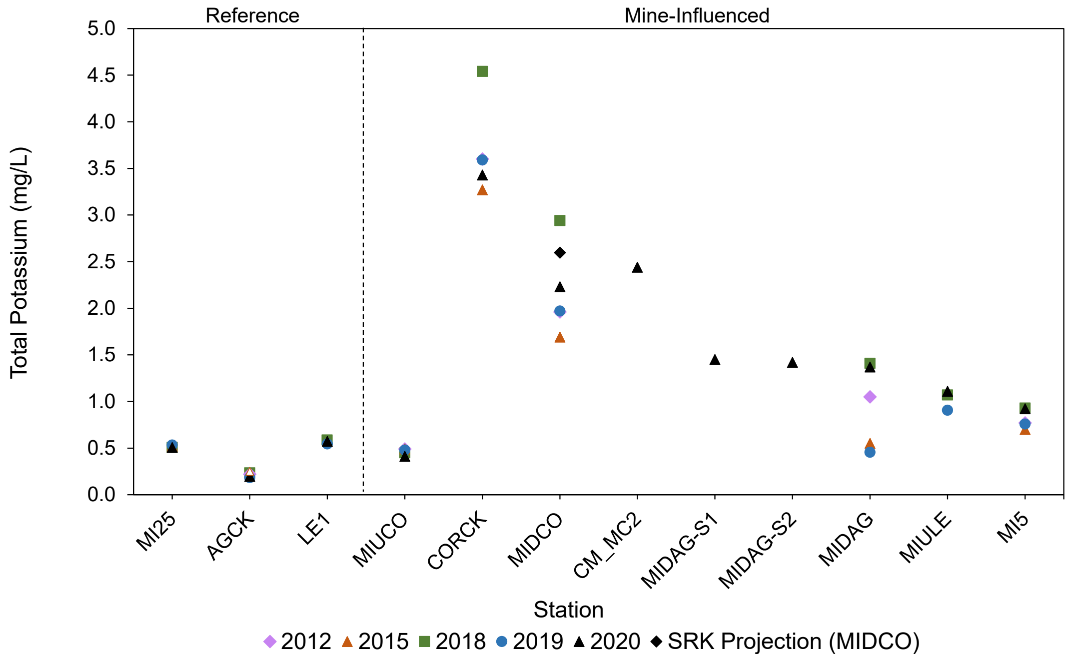
mg/L = milligrams per litre; WQG = water quality guideline

Figure 1.1-23: Spatial Variation in Aqueous Calcium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



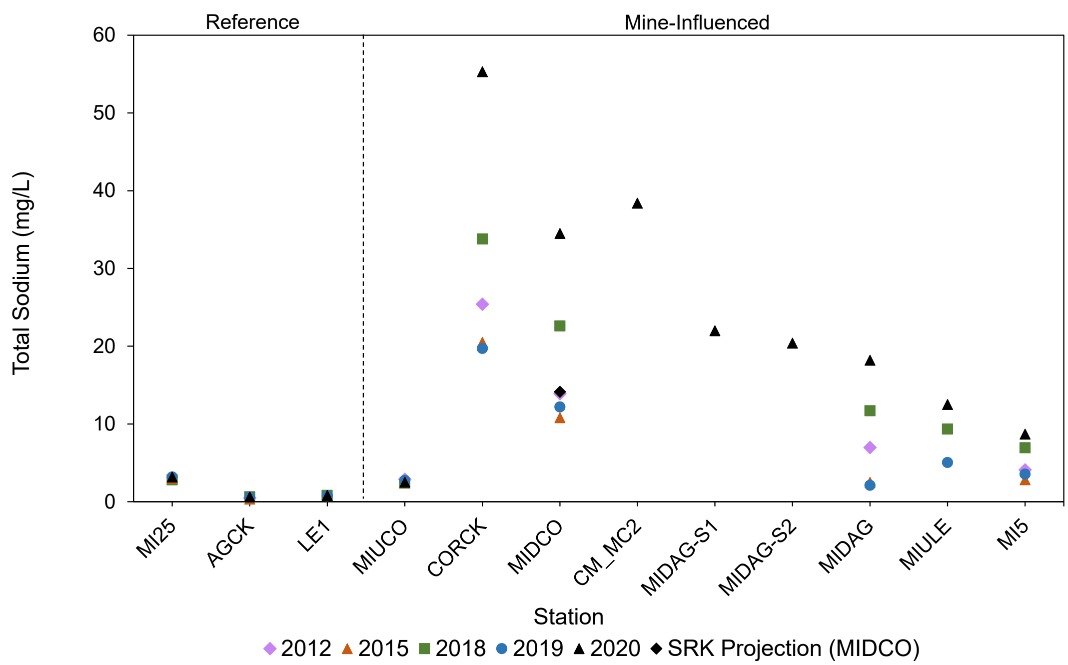
Note: Dissolved calcium is presented because it is an order constituent (i.e., there is a benchmark for dissolved calcium unlike other dissolved metals). SRK projection is for 2020 (SRK 2019).
mg/L = milligrams per litre.

Figure 1.1-24: Spatial Variation in Aqueous Potassium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



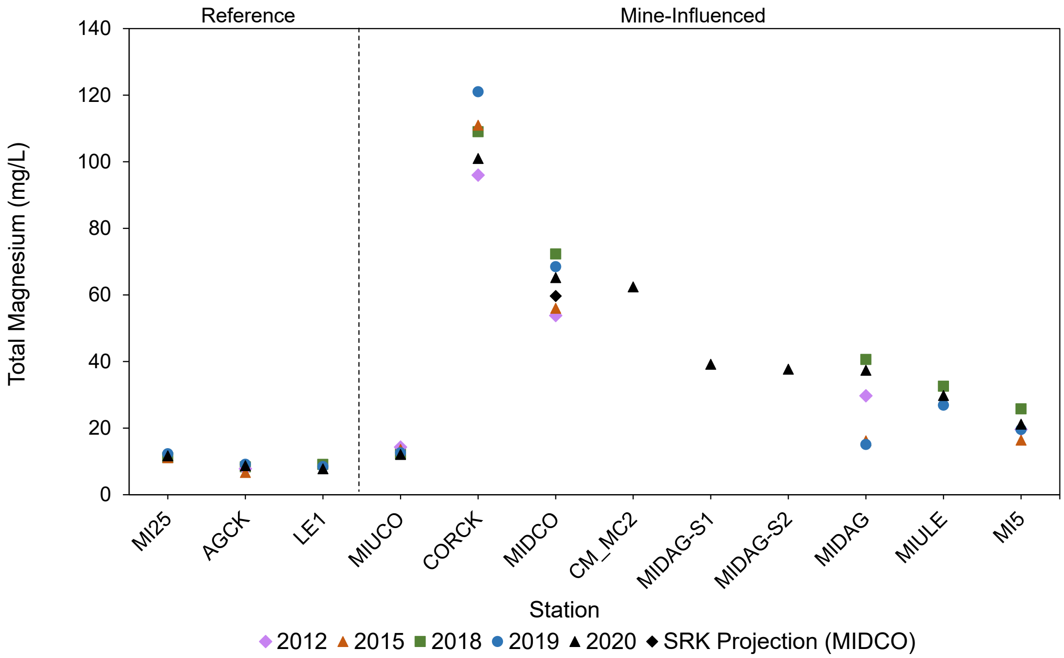
Note: Dissolved potassium is shown here because it is an order constituent (i.e., there is a benchmark for dissolved potassium unlike other dissolved metals). SRK projection is for 2020 (SRK 2019). Open symbols represent non-detects.
mg/L = milligrams per litre.

Figure 1.1-25: Spatial Variation in Aqueous Sodium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



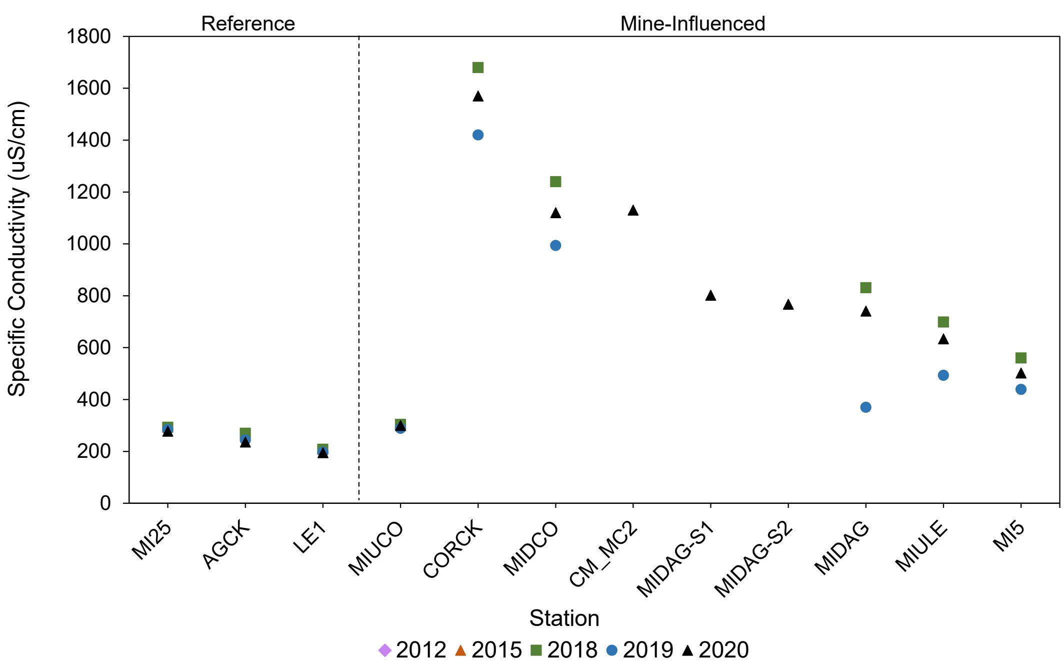
Note: Dissolved sodium is shown here because it is an order constituent (i.e., there is a benchmark for dissolved sodium unlike other dissolved metals). SRK projection is for 2020 (SRK 2019).
mg/L = milligrams per litre.

Figure 1.1-26: Spatial Variation in Aqueous Magnesium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



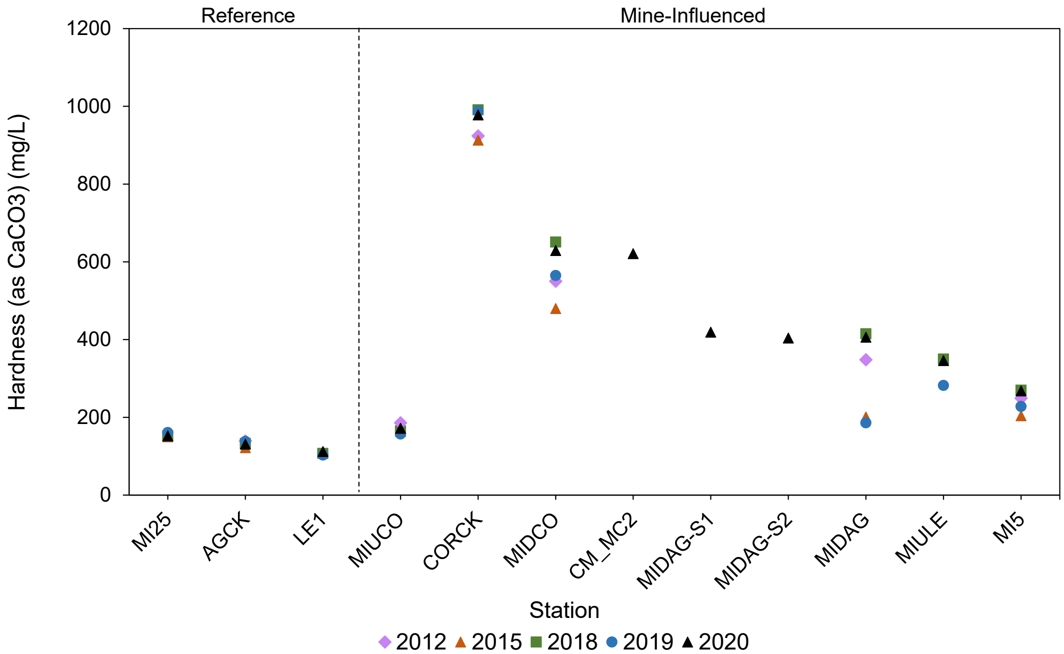
Note: Dissolved magnesium is shown here because it is an order constituent (i.e., there is a benchmark for dissolved magnesium unlike other dissolved metals). SRK projection is for 2020 (SRK 2019).
mg/L = milligrams per litre.

Figure 1.1-27: Spatial Variation in Specific Conductivity in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



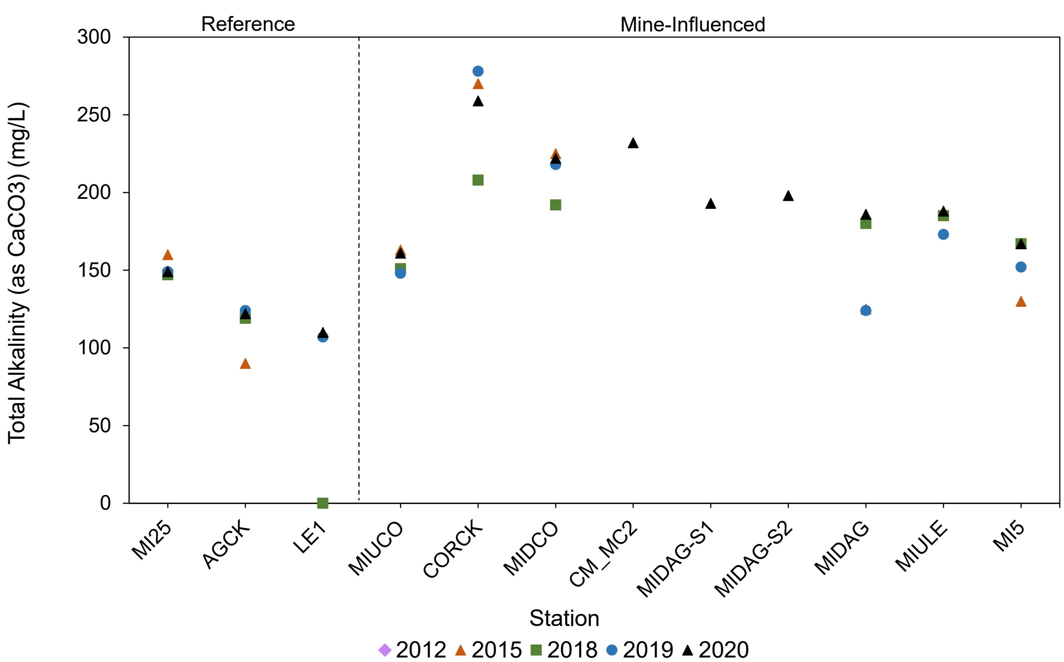
µs/cm = microSiemens per centimeter.

Figure 1.1-28: Spatial Variation in Hardness in samples collected from the Coal Mountain Mine local aquatic effects monitoring program, 2012 to 2020



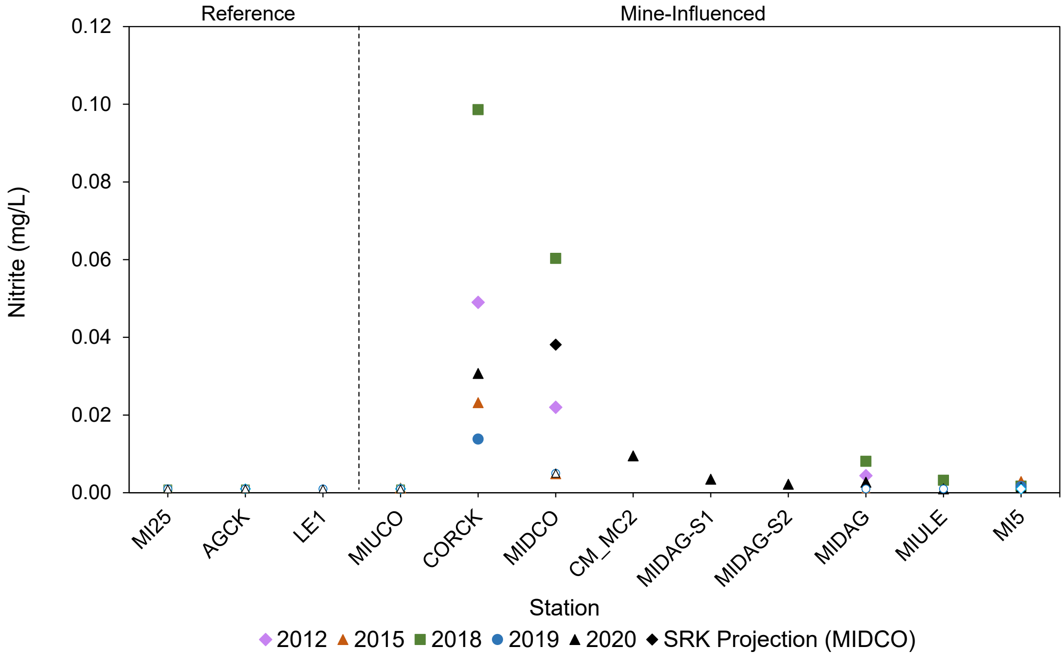
mg/L = milligrams per litre.

Figure 1.1-29: Spatial Variation in Alkalinity in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



mg/L = milligrams per litre.

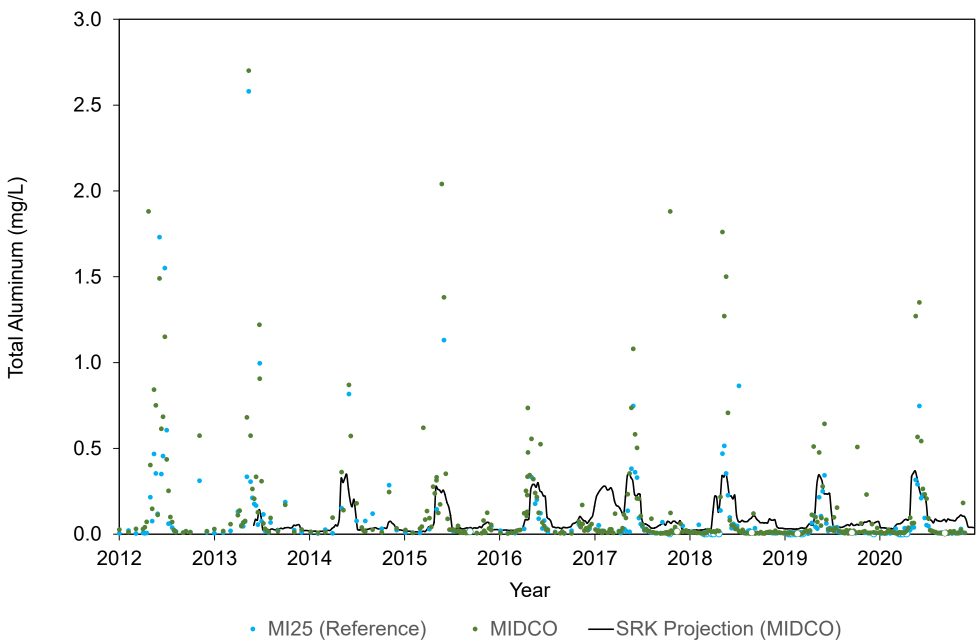
Figure 1.1-30: Spatial Variation in Nitrite in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020

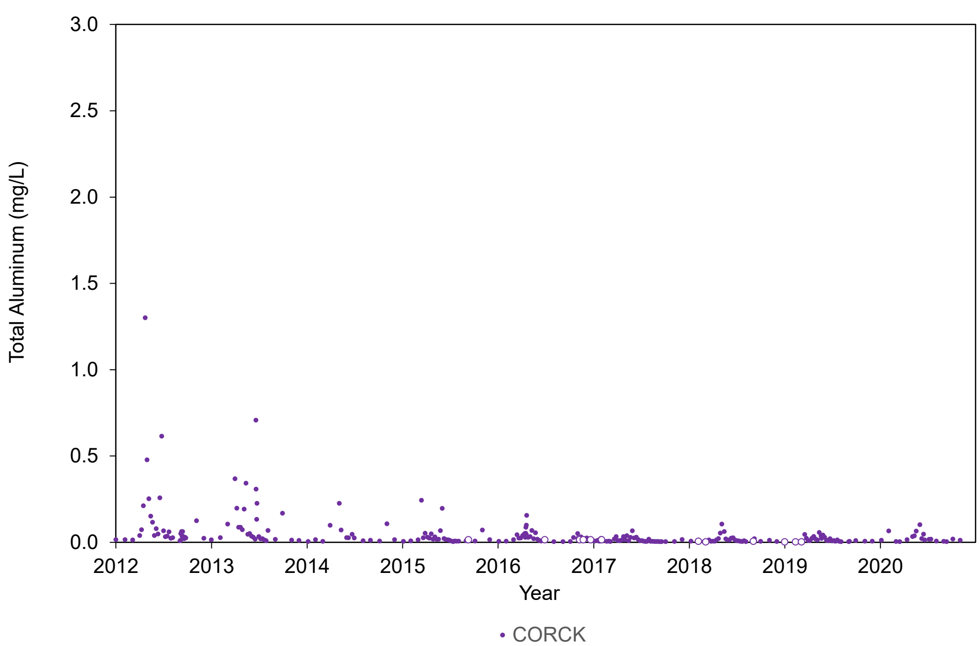


Note: Open symbols represent non-detects. Long-term BC WQG (0.02 mg/L) and short-term BC WQG (0.06 mg/L) not shown.
mg/L = milligrams per litre; WQG = water quality guideline

F.1.2 Temporal Trends

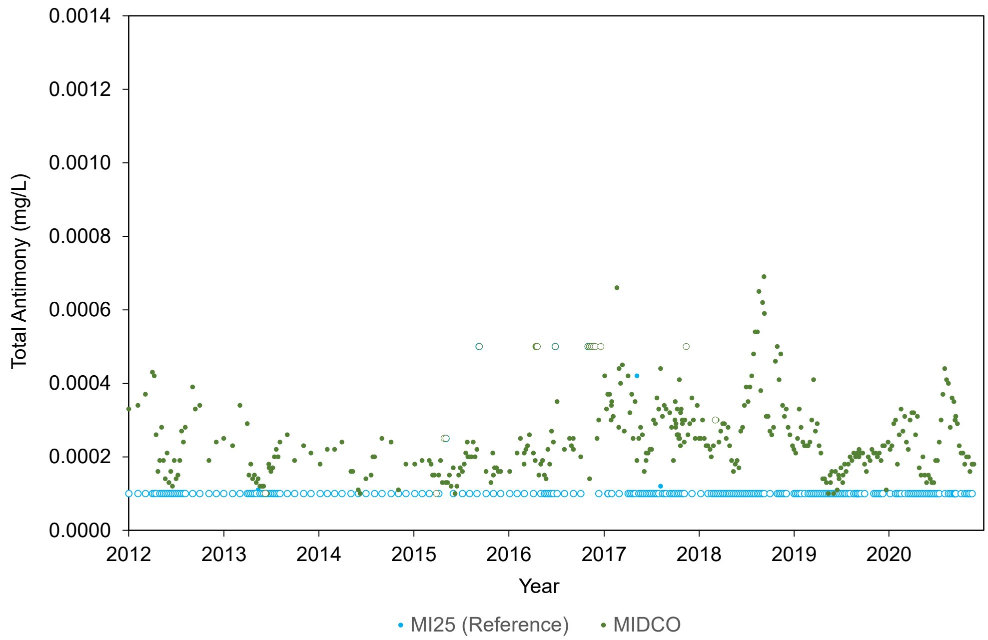
Figure 1.2-1: Temporal Variation in Aqueous Aluminum Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020

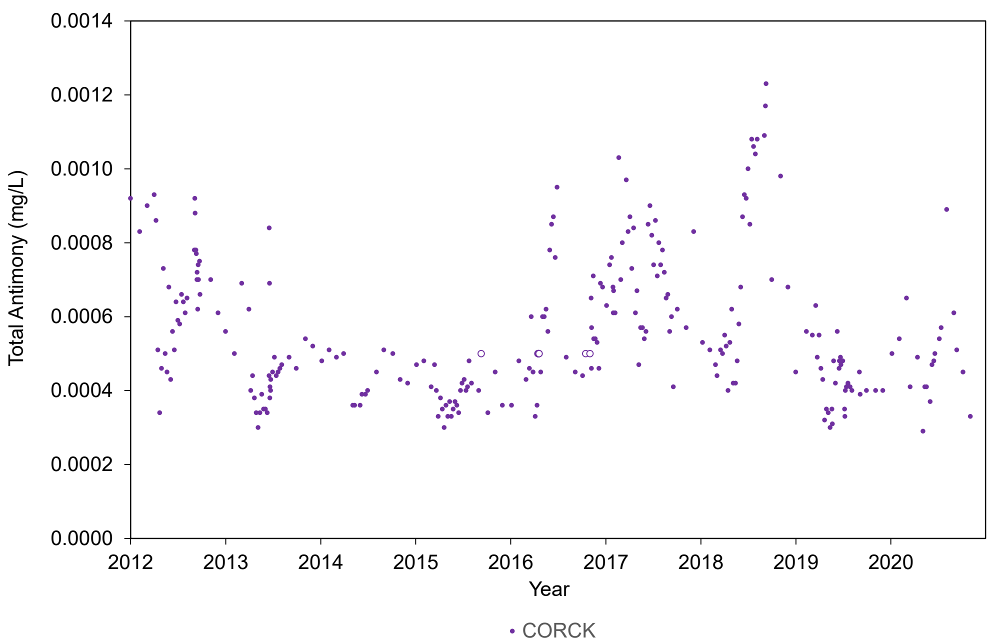




Note: Open symbols represent non-detects. SRK modelled projections for dissolved aluminum are included for comparison (SRK 2019). Two points not shown in the bottom panel (6.3 and 15.2 mg/L in June 2013).
mg/L = milligrams per litre.

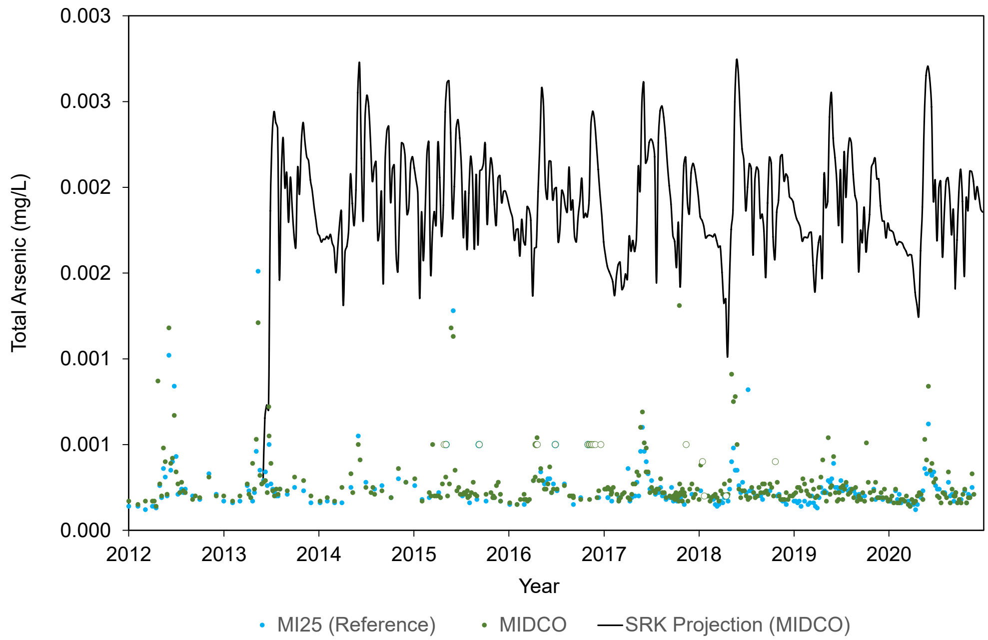
Figure 1.2-2: Temporal Variation in Aqueous Antimony Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020

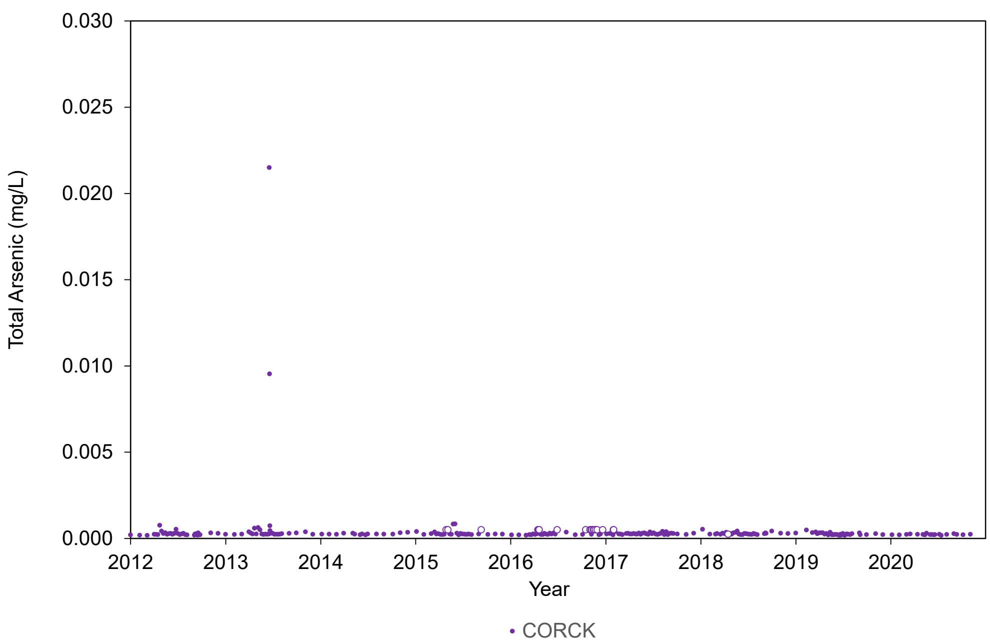




Note: Open symbols represent non-detects. For comparison, SRK modelled projections for dissolved antimony at MIDCO ranged from 0.14 to 25 mg/L (SRK 2019). Long-term BC WQG not shown (0.009 mg/L).
mg/L = milligrams per litre; WQG = water quality guideline.

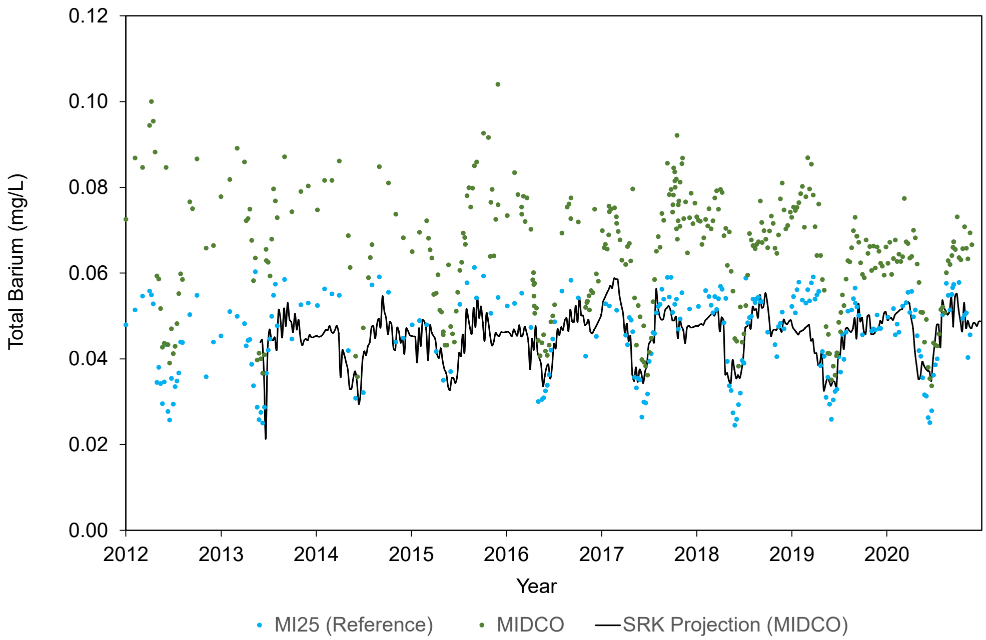
Figure 1.2-3: Temporal Variation in Aqueous Arsenic Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020

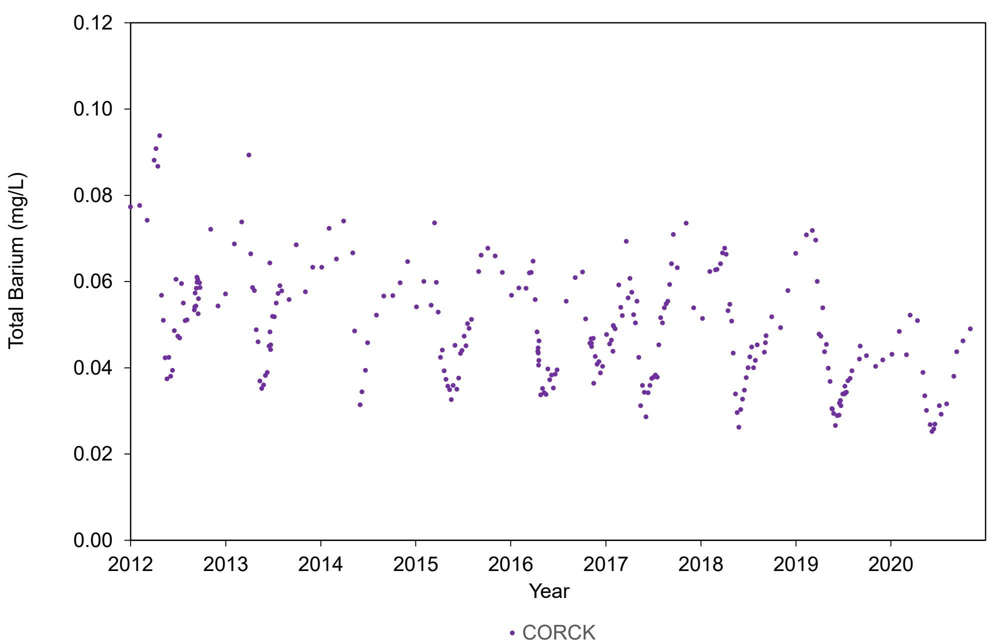




Note: Open symbols represent non-detects. SRK modelled projections for dissolved arsenic are included for comparison (SRK 2019).
Two points not shown in the bottom panel (0.00954 and 0.0215 mg/L in June 2013).
mg/L = milligrams per litre.

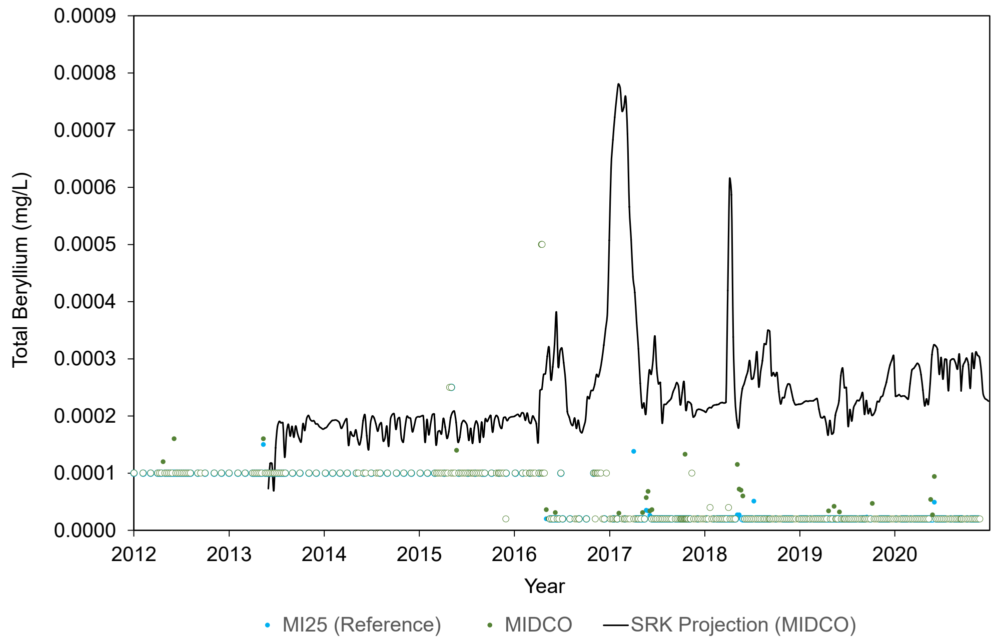
Figure 1.2-4: Temporal Variation in Aqueous Barium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020

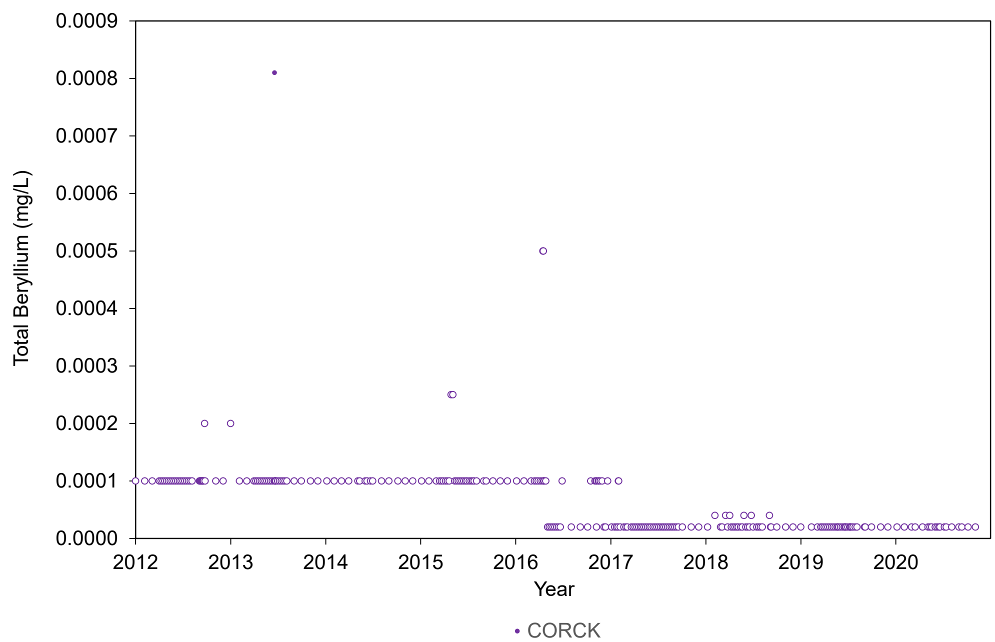




Note: Open symbols represent non-detects. SRK modelled projections for dissolved barium are included for comparison (SRK 2019).
Two points not shown in the bottom panel (0.52 and 1.57 mg/L in June 2013).
mg/L = milligrams per litre.

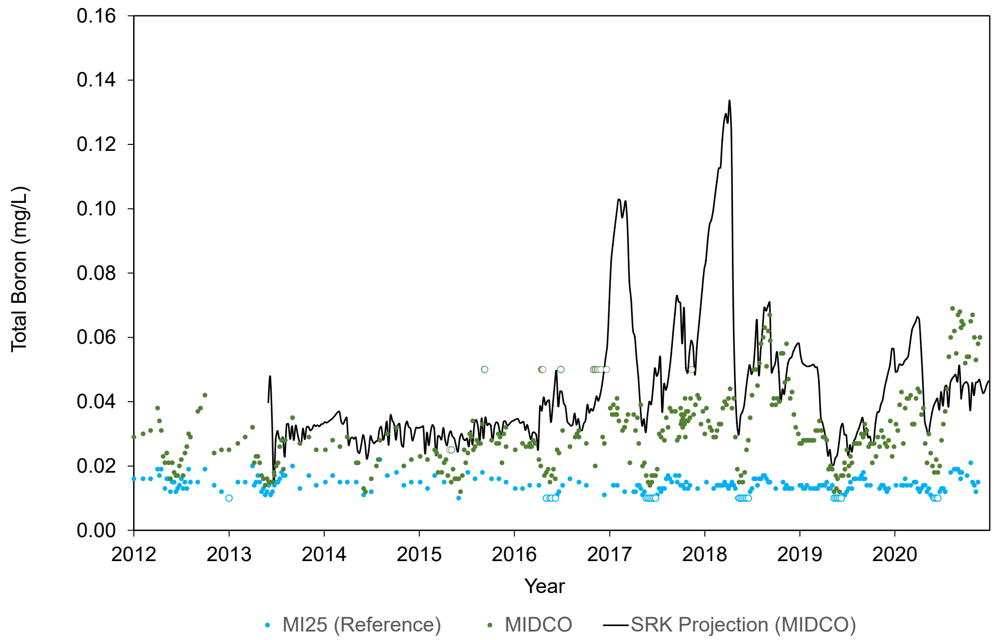
Figure 1.2-5: Temporal Variation in Aqueous Beryllium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020

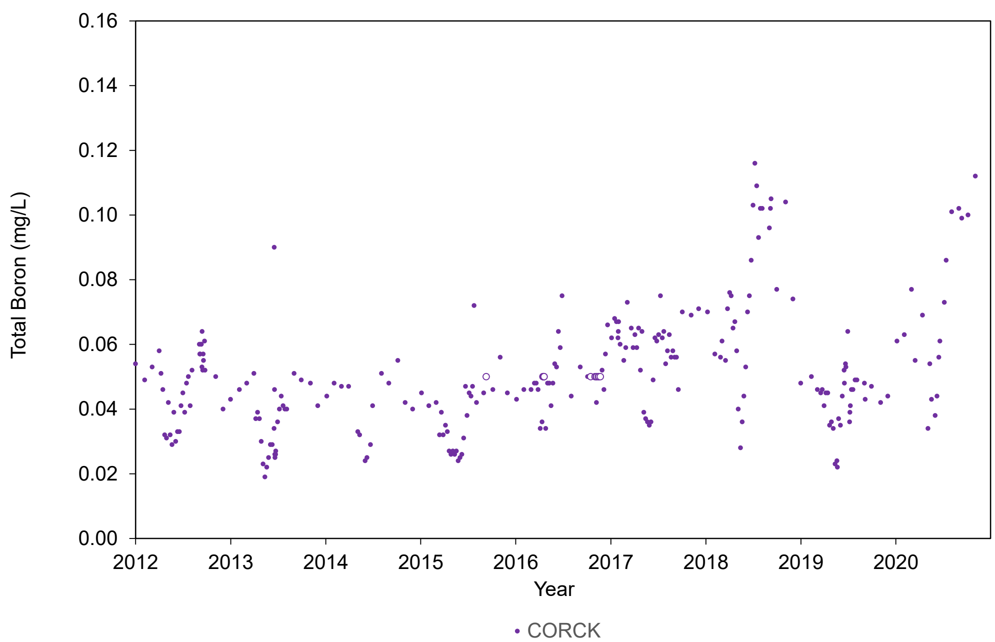




Note: Open symbols represent non-detects. SRK modelled projections for dissolved beryllium are included for comparison (SRK 2019).
One point not shown in the bottom panel (0.0017 mg/L in June 2013).
mg/L = milligrams per litre.

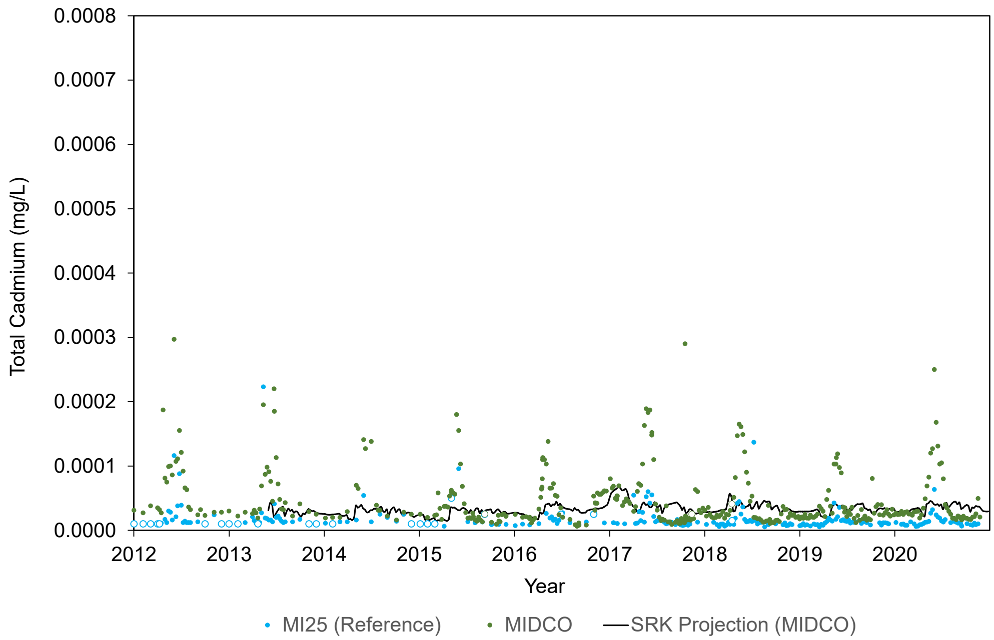
Figure 1.2-6: Temporal Variation in Aqueous Boron Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020

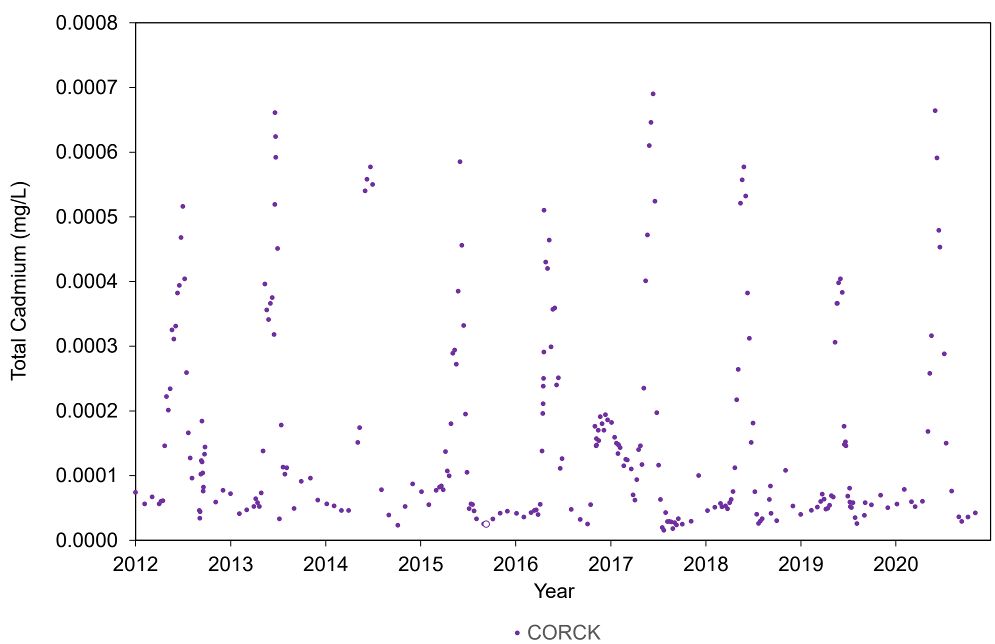




Note: Open symbols represent non-detects. SRK modelled projections for dissolved boron are included for comparison (SRK 2019).
mg/L = milligrams per litre.

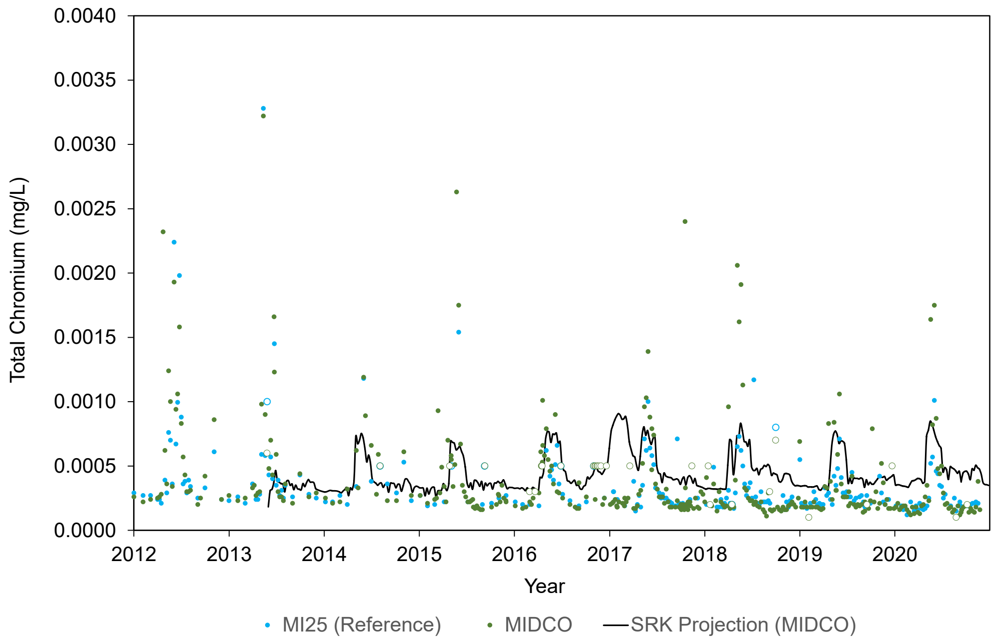
Figure 1.2-7: Temporal Variation in Aqueous Cadmium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020

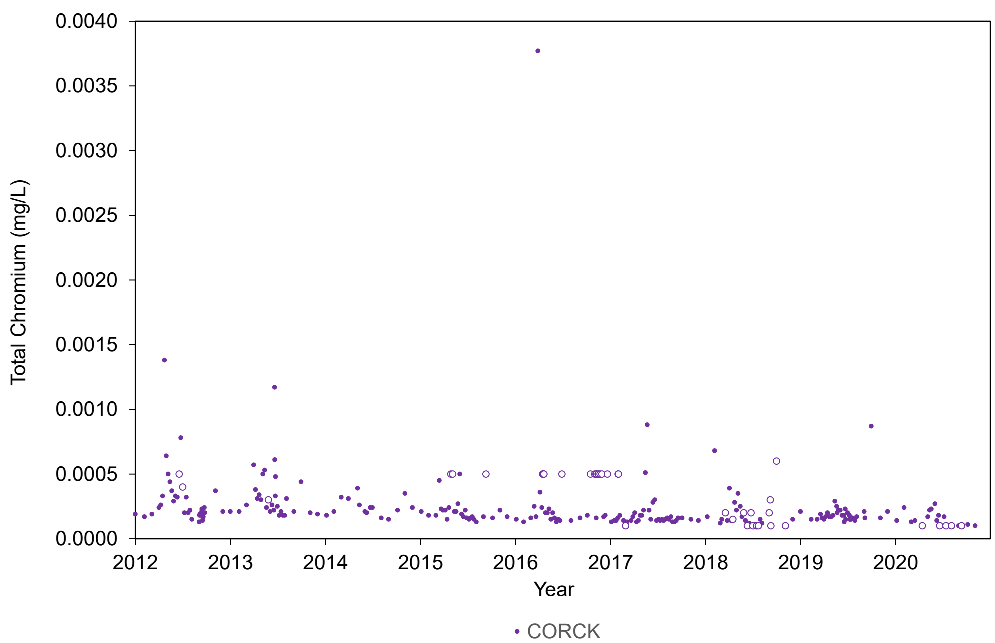




Note: Open symbols represent non-detects. SRK modelled projections for dissolved cadmium are included for comparison (SRK 2019).
Two points not shown in the bottom panel (0.00169 and 0.00219 mg/L in June 2013).
mg/L = milligrams per litre.

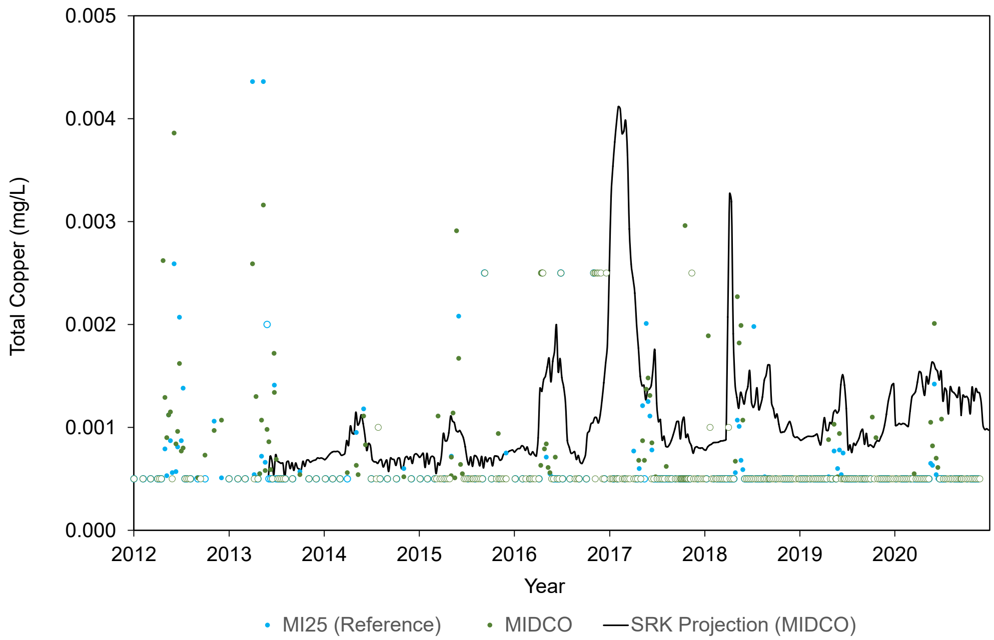
Figure 1.2-8: Temporal Variation in Aqueous Chromium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020

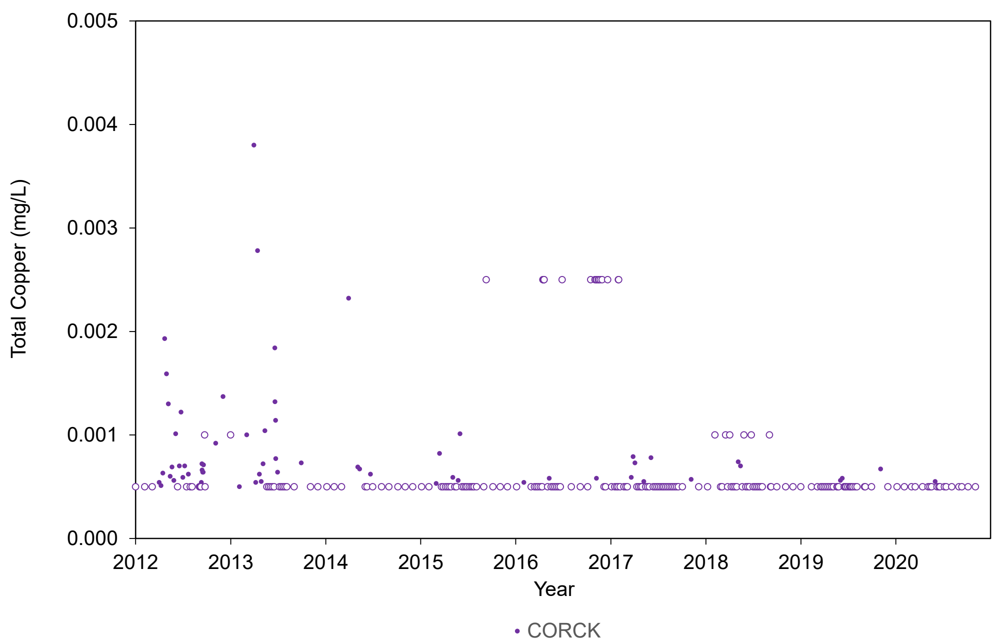




Note: Open symbols represent non-detects. SRK modelled projections for dissolved chromium are included for comparison (SRK 2019).
Two points not shown in the bottom panel (0.0108 and 0.0251 mg/L in June 2013).
mg/L = milligrams per litre.

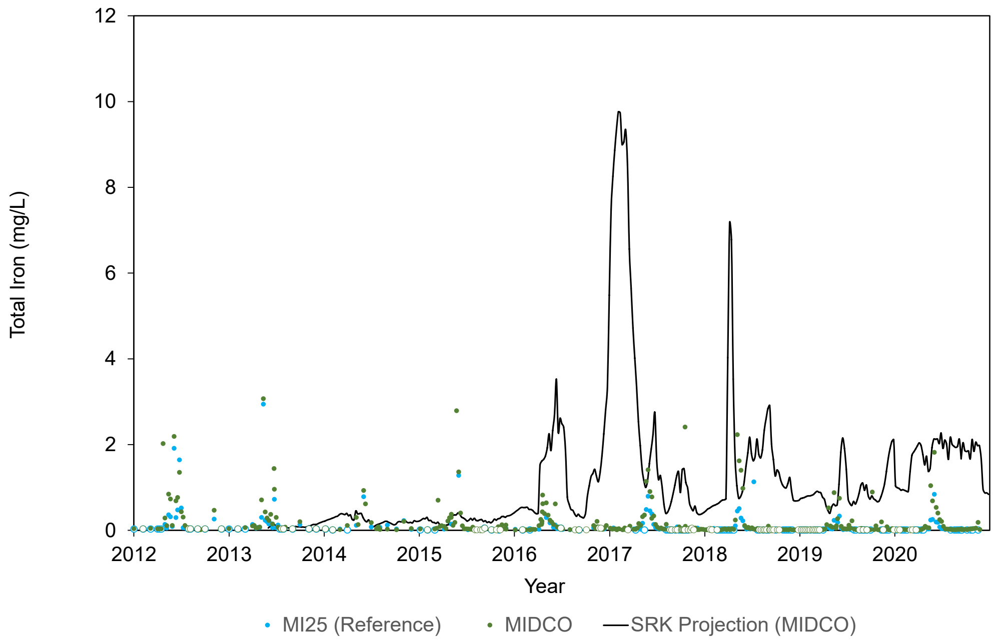
Figure 1.2-9: Temporal Variation in Aqueous Copper Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020

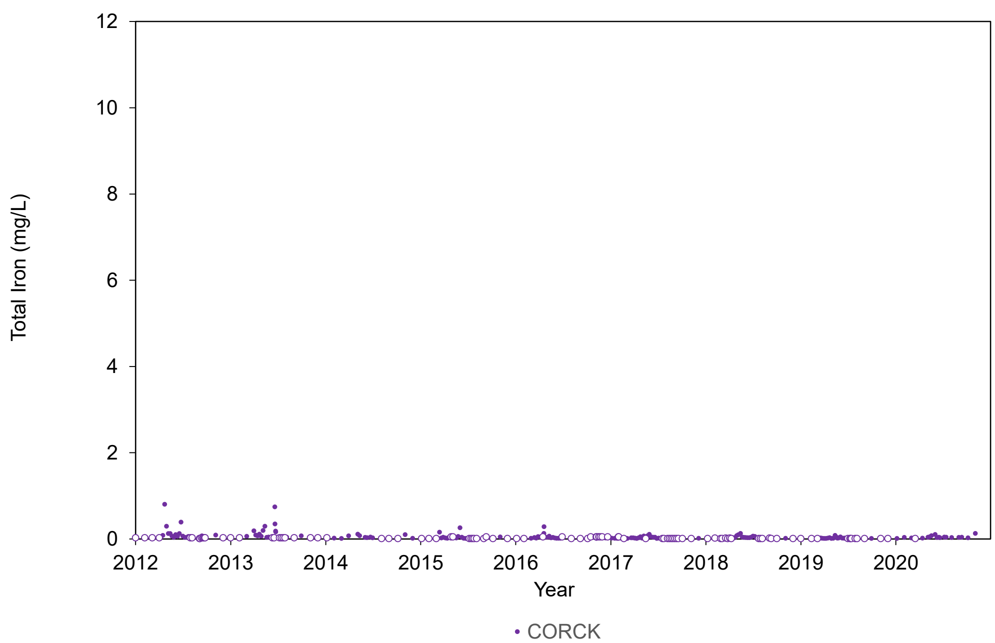




Note: Open symbols represent non-detects. SRK modelled projections for dissolved copper are included for comparison (SRK 2019).
Two points not shown in the bottom panel (0.0255 and 0.0593 mg/L in June 2013).
mg/L = milligrams per litre.

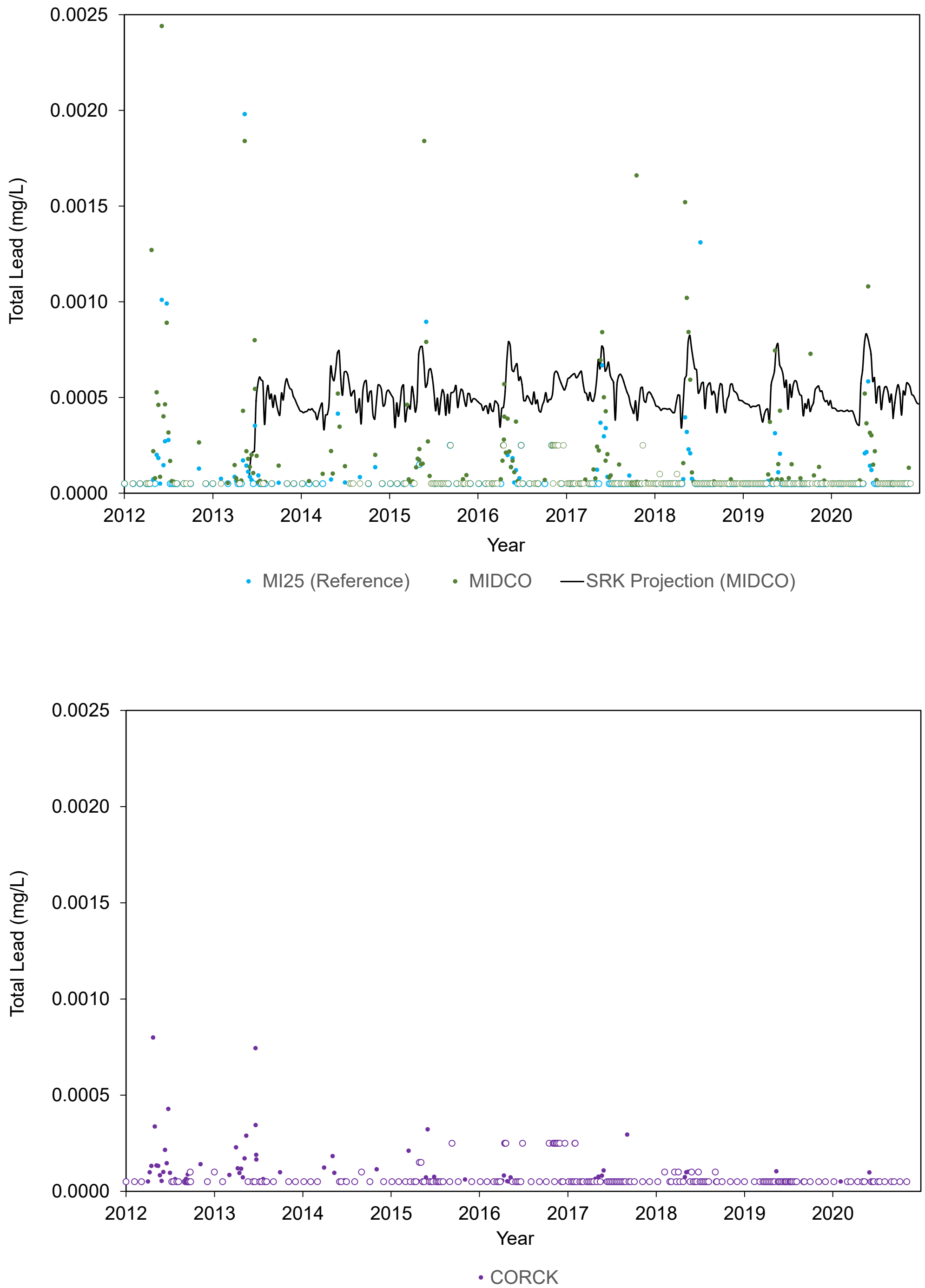
Figure 1.2-10: Temporal Variation in Aqueous Iron Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020





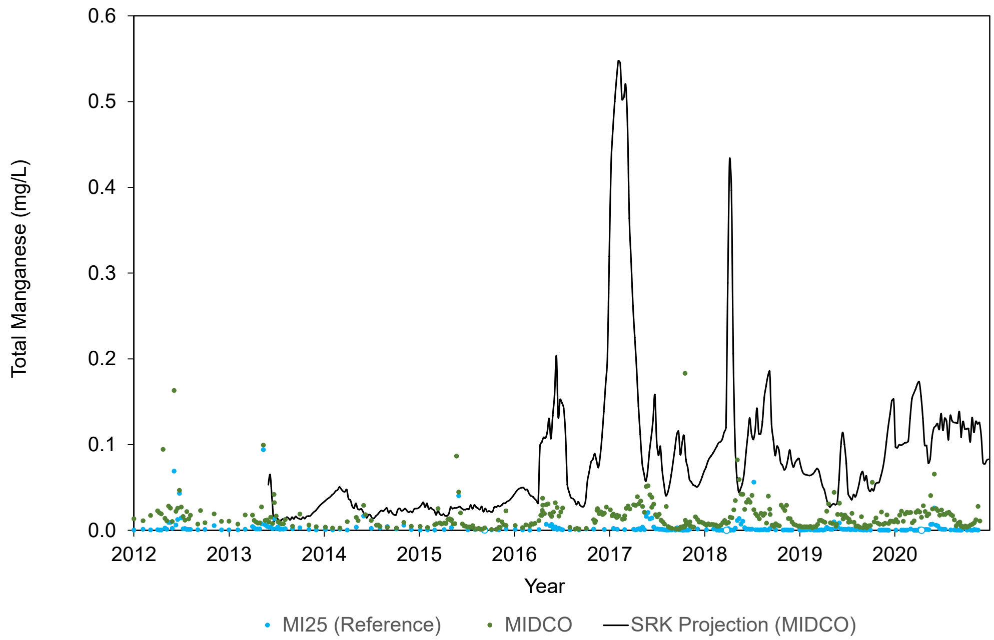
Note: Open symbols represent non-detects. SRK modelled projections for dissolved iron are included for comparison (SRK 2019).
Two points not shown in the bottom panel (12.4 and 25 mg/L in June 2013).
mg/L = milligrams per litre.

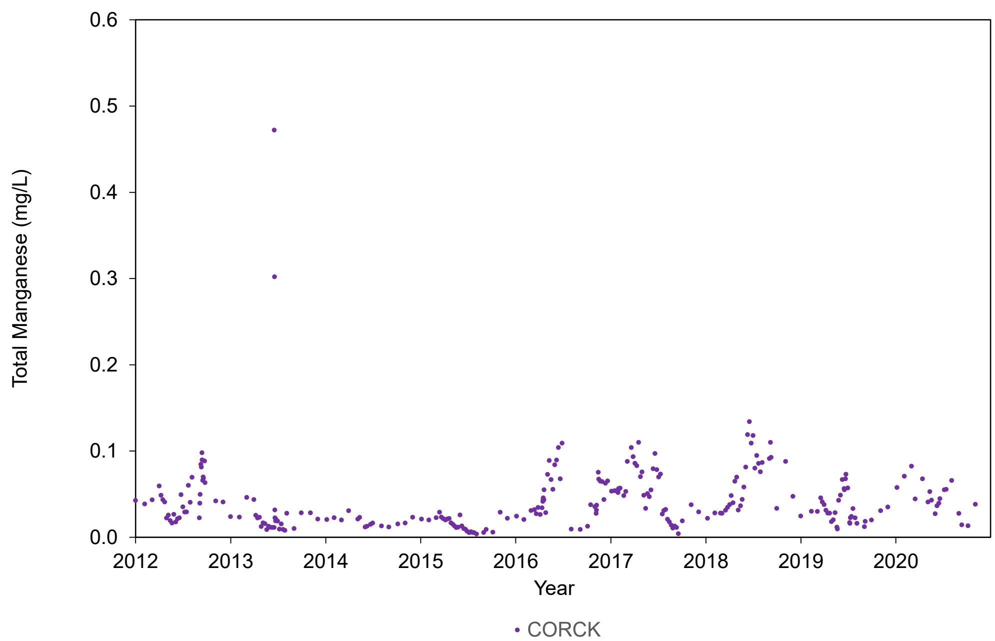
Figure 1.2-11: Temporal Variation in Aqueous Lead Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



Note: Open symbols represent non-detects. SRK modelled projections for dissolved lead are included for comparison (SRK 2019).
Two points not shown in the bottom panel (0.0132 and 0.0284 mg/L in June 2013).
mg/L = milligrams per litre.

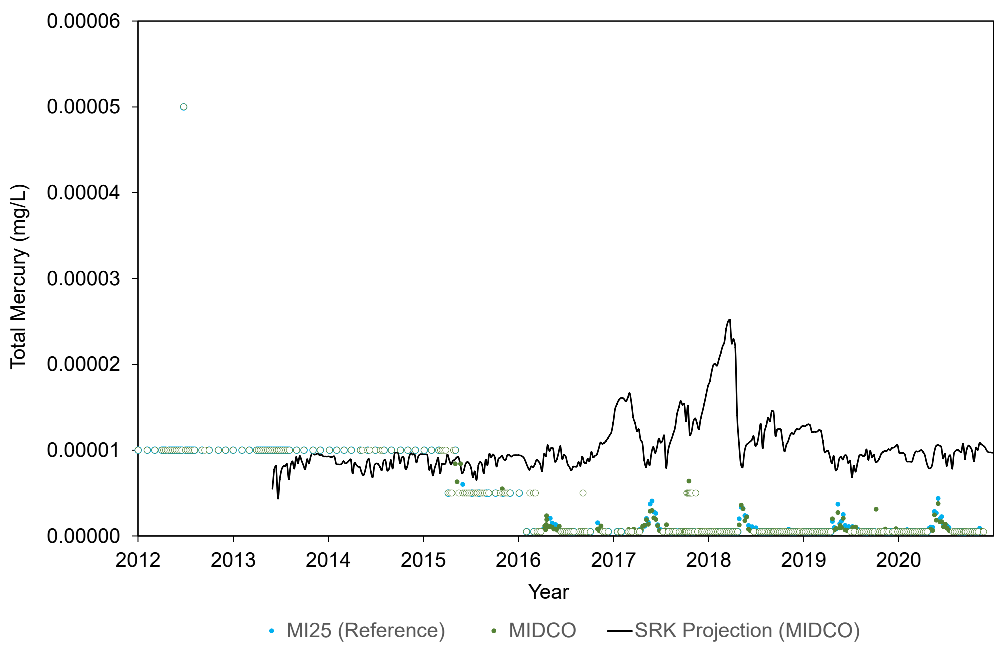
Figure 1.2-12: Temporal Variation in Aqueous Manganese Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020

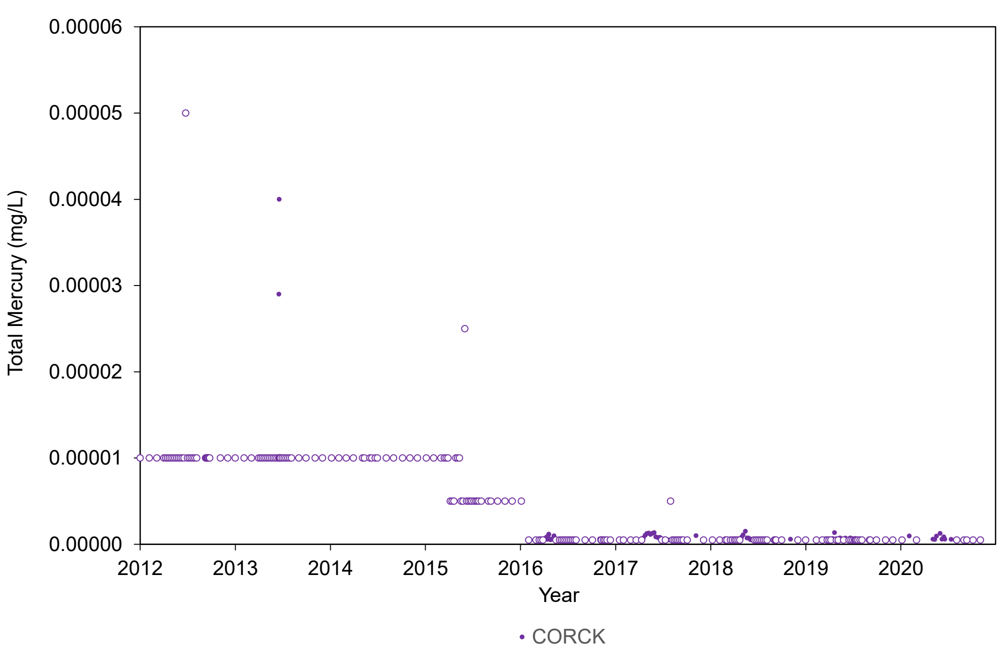




Note: Open symbols represent non-detects. SRK modelled projections for dissolved manganese are included for comparison (SRK 2019).
mg/L = milligrams per litre.

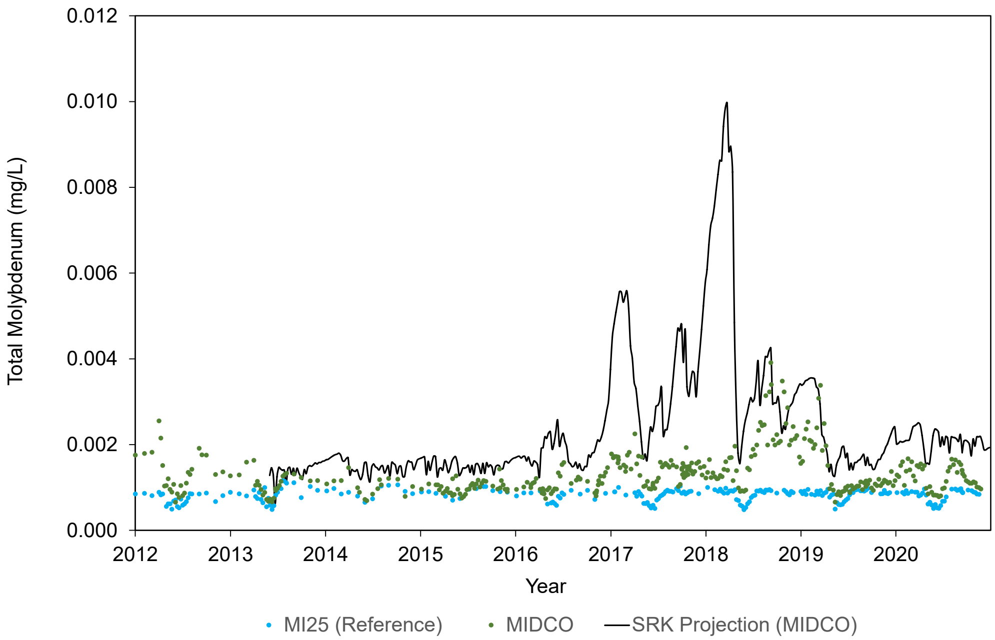
Figure 1.2-13: Temporal Variation in Aqueous Mercury Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020

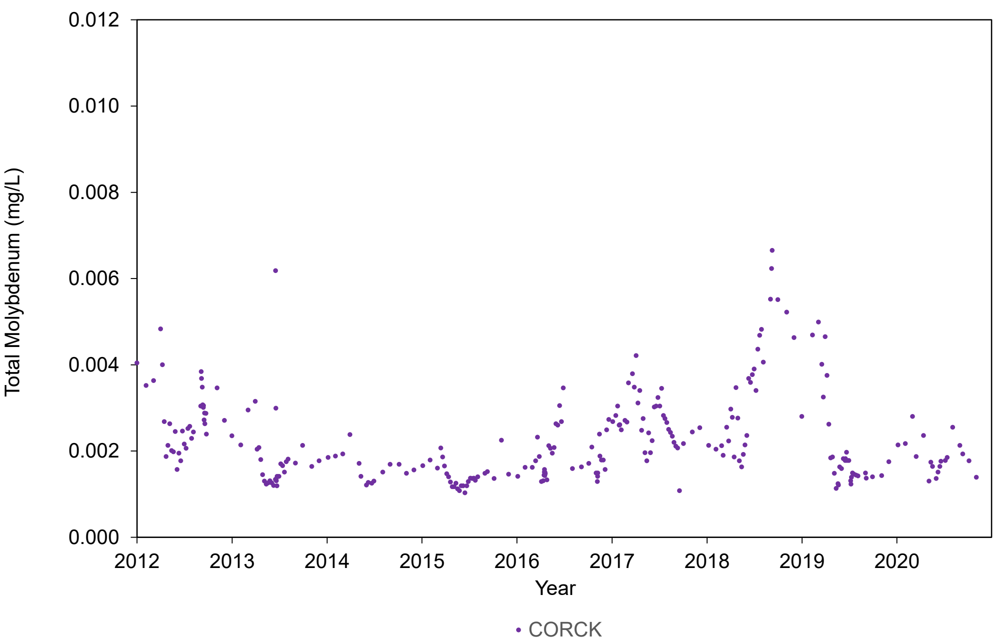




Note: Open symbols represent non-detects. SRK modelled projections for dissolved mercury are included for comparison (SRK 2019).
mg/L = milligrams per litre.

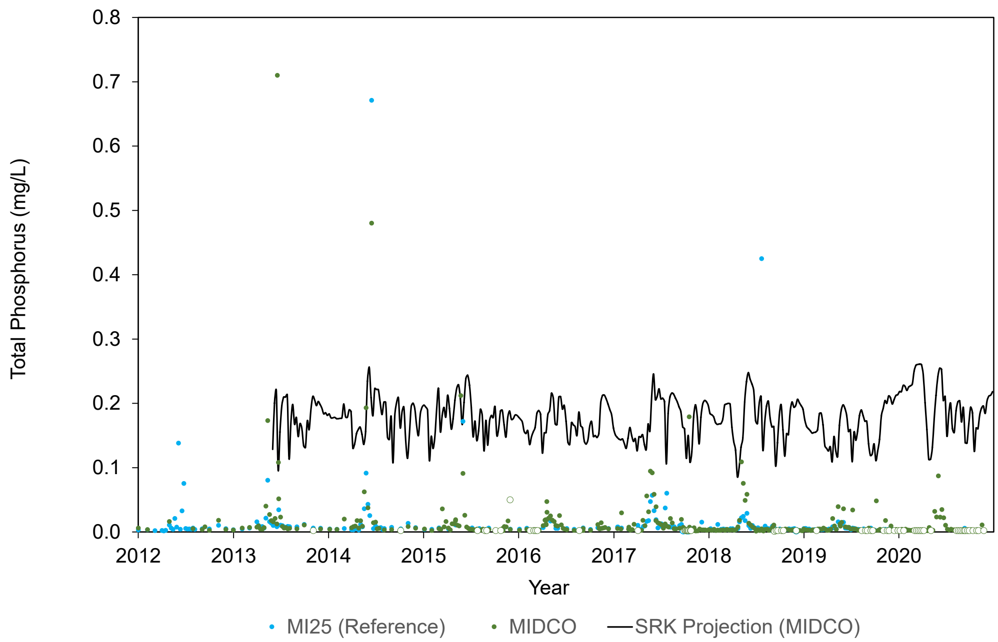
Figure 1.2-14: Temporal Variation in Aqueous Molybdenum Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020

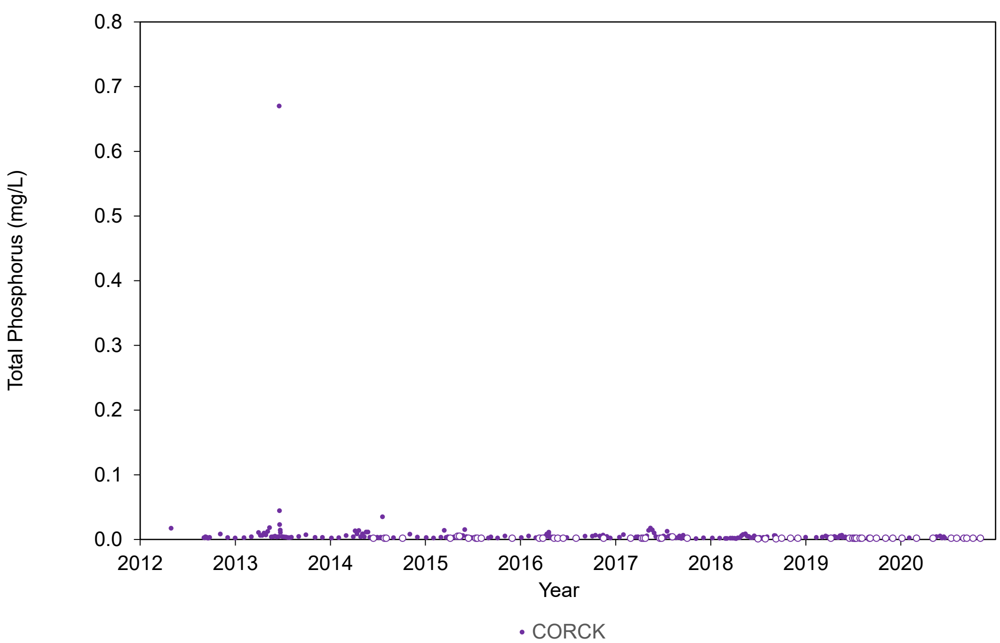




Note: Open symbols represent non-detects. SRK modelled projections for dissolved molybdenum are included for comparison (SRK 2019). mg/L = milligrams per litre.

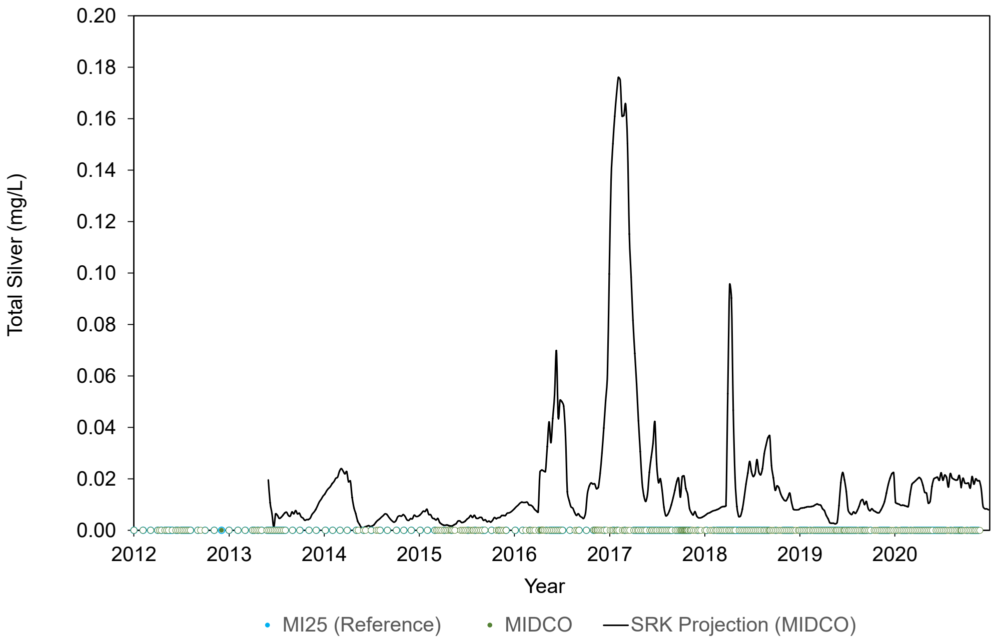
Figure 1.2-15: Temporal Variation in Aqueous Phosphorus Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020

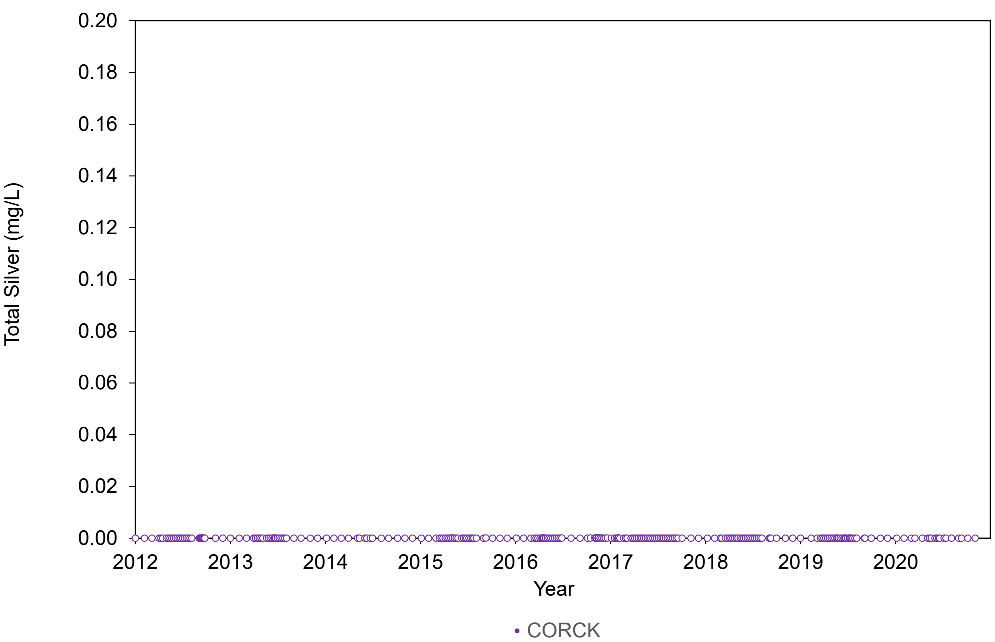




Note: Open symbols represent non-detects. SRK modelled projections for dissolved phosphorus are included for comparison (SRK 2019).
One point not shown in the bottom panel (1.52 mg/L in June 2013).
mg/L = milligrams per litre.

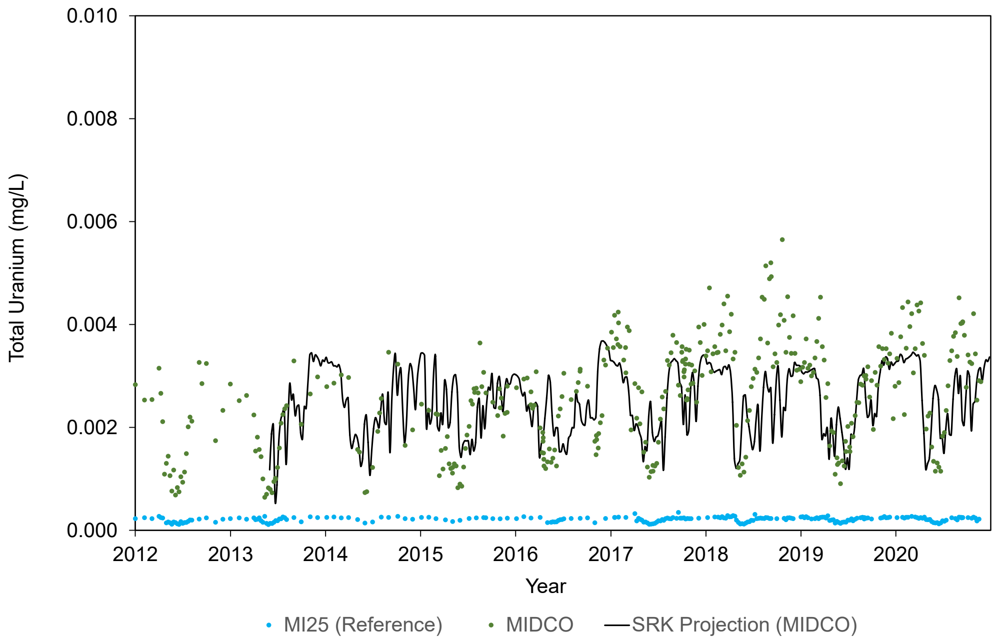
Figure 1.2-16: Temporal Variation in Aqueous Silver Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020

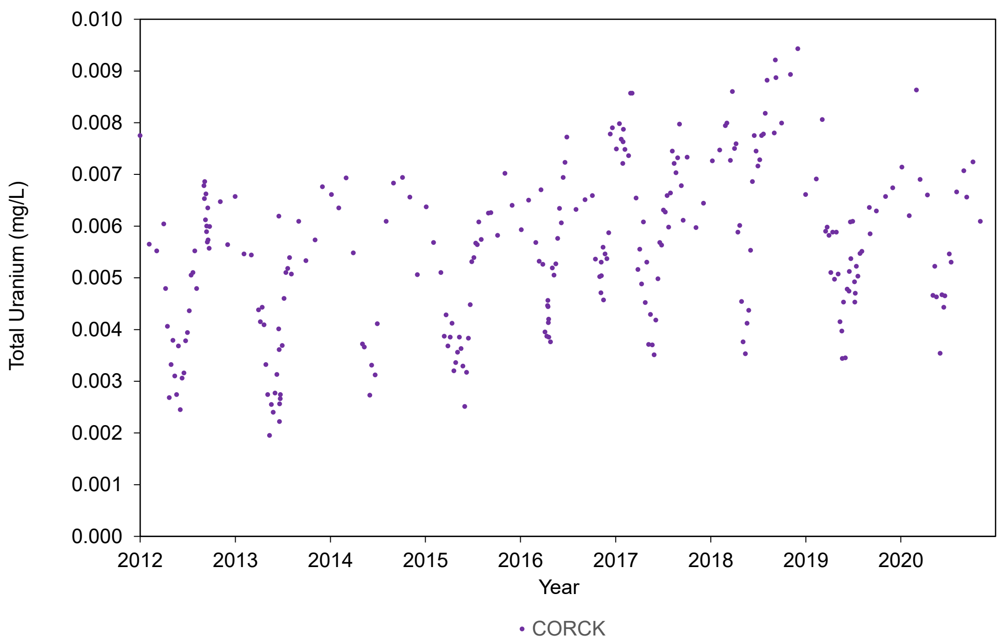




Note: Open symbols represent non-detects. SRK modelled projections for dissolved silver are included for comparison (SRK 2019).
mg/L = milligrams per litre.

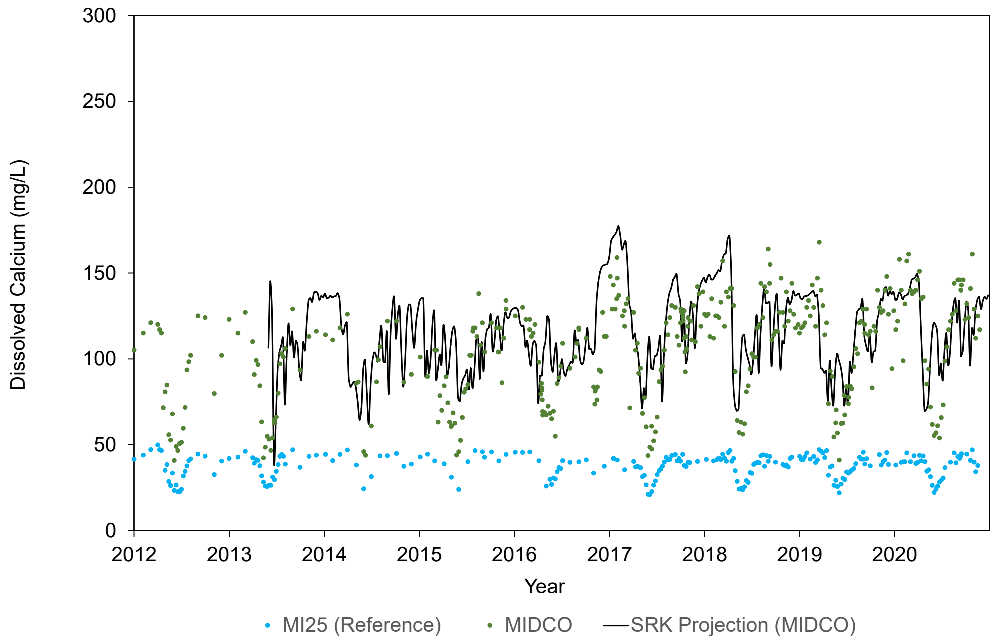
Figure 1.2-17: Temporal Variation in Aqueous Uranium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020

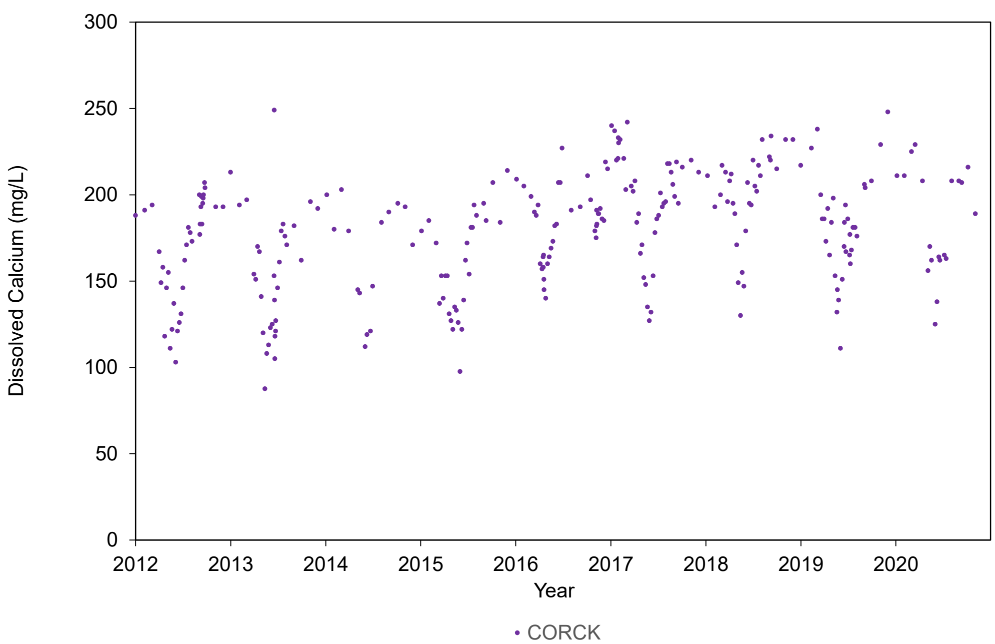




Note: Open symbols represent non-detects. SRK modelled projections for dissolved uranium are included for comparison (SRK 2019).
mg/L = milligrams per litre.

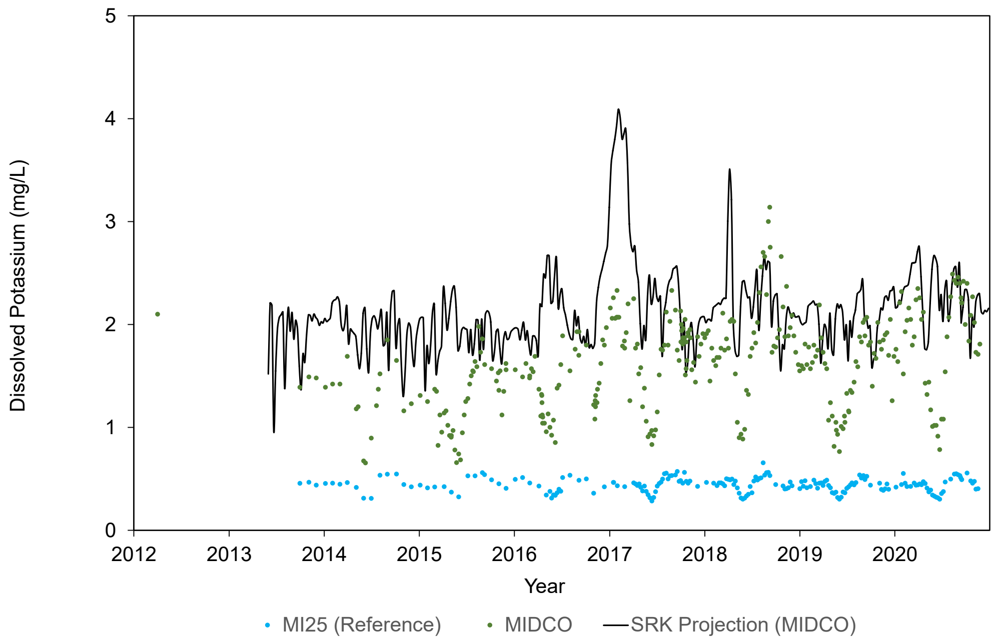
Figure 1.2-18: Temporal Variation in Aqueous Calcium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020

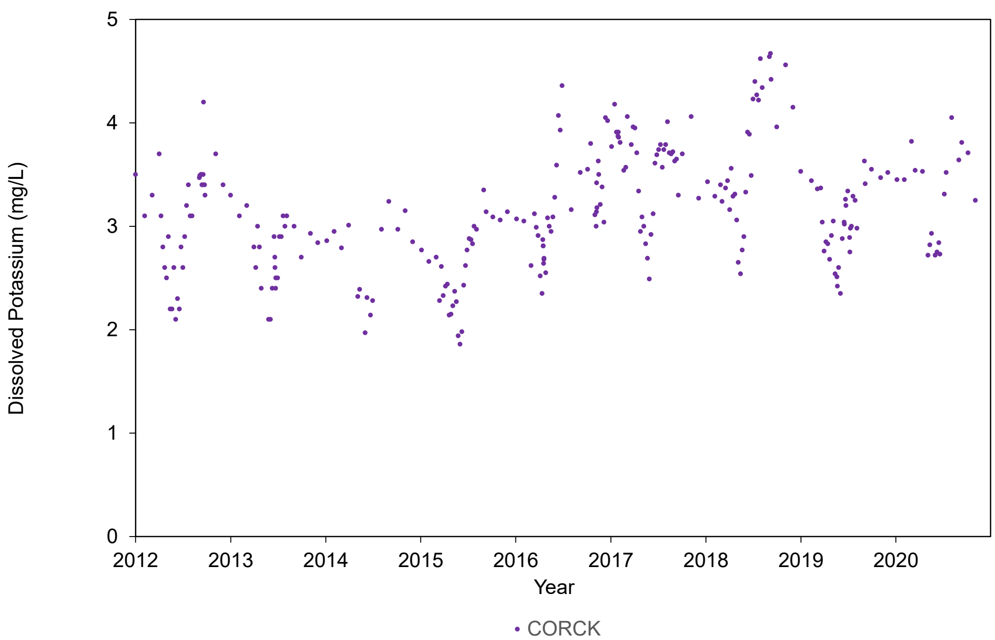




Note: Open symbols represent non-detects. SRK modelled projections for dissolved calcium are included for comparison (SRK 2019).
mg/L = milligrams per litre.

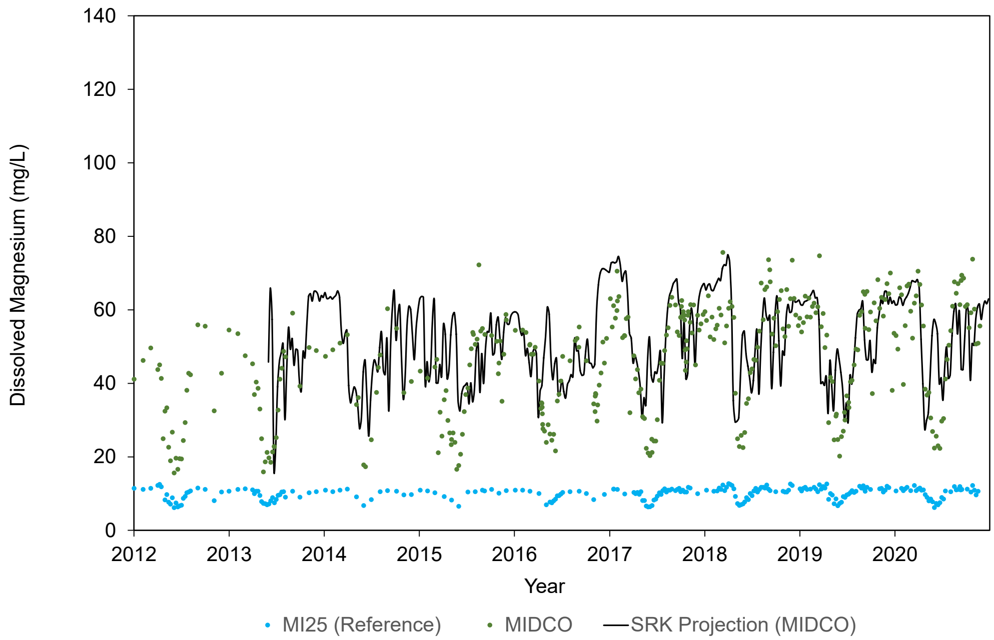
Figure 1.2-19: Temporal Variation in Aqueous Potassium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020

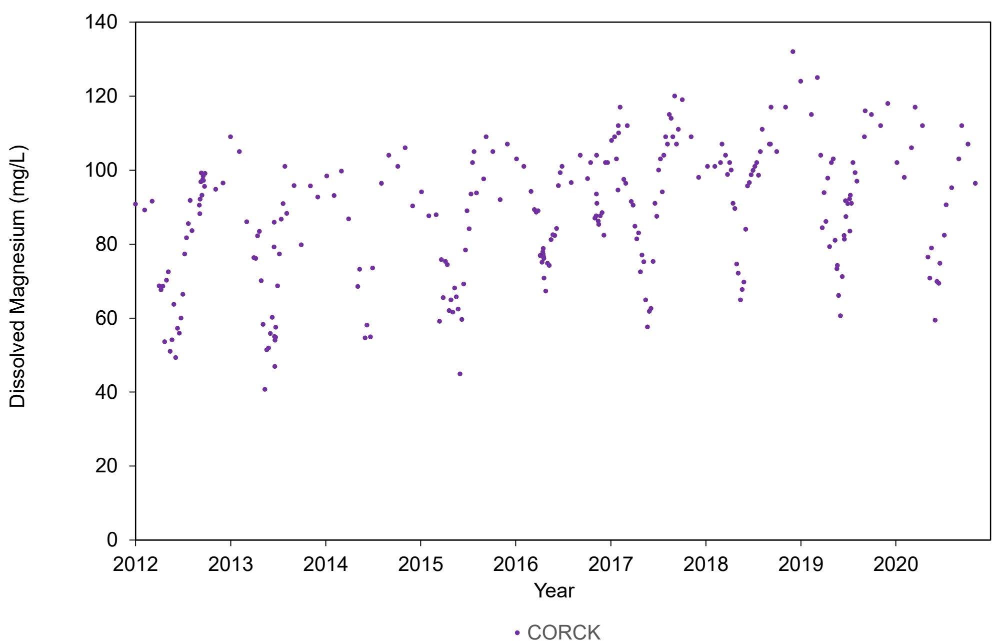




Note: Open symbols represent non-detects. SRK modelled projections for dissolved potassium are included for comparison (SRK 2019). Two points not shown in the bottom panel (5.7 and 8.1 mg/L in June 2013).
mg/L = milligrams per litre.

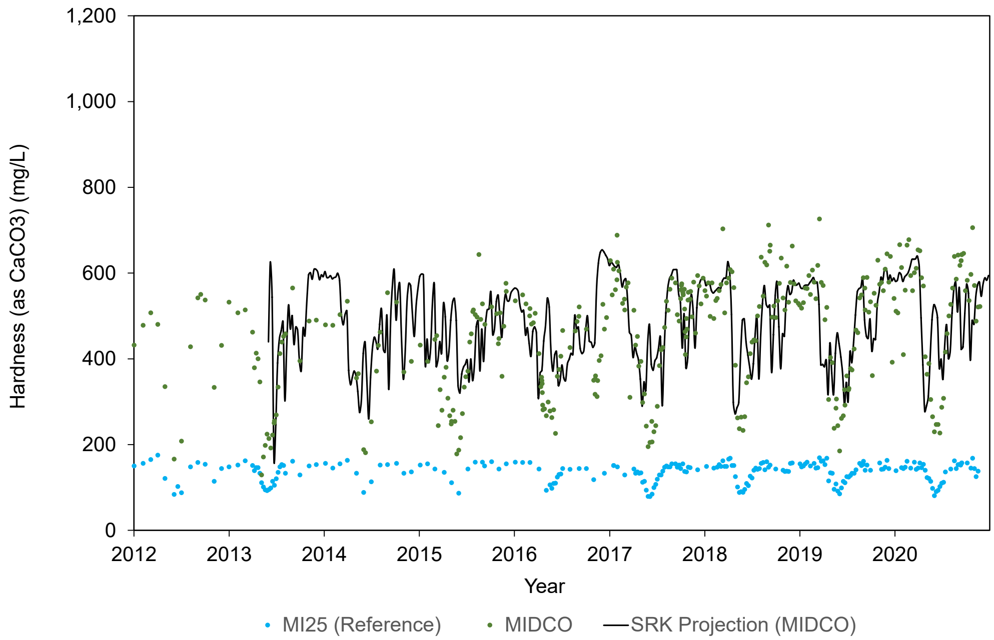
Figure 1.2-20: Temporal Variation in Aqueous Magnesium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020

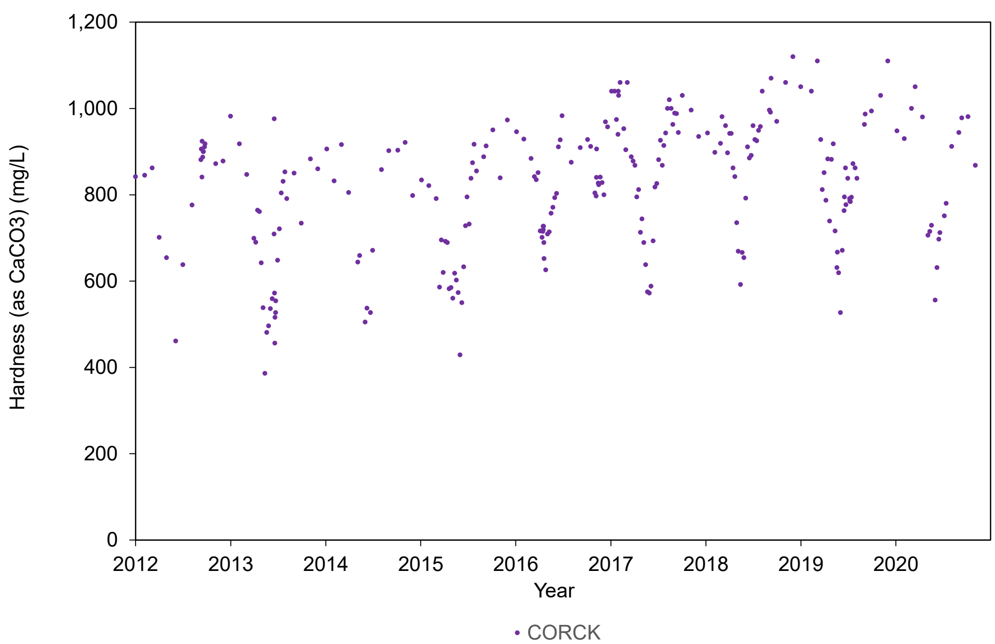




Note: Open symbols represent non-detects. SRK modelled projections for dissolved magnesium are included for comparison (SRK 2019).
mg/L = milligrams per litre.

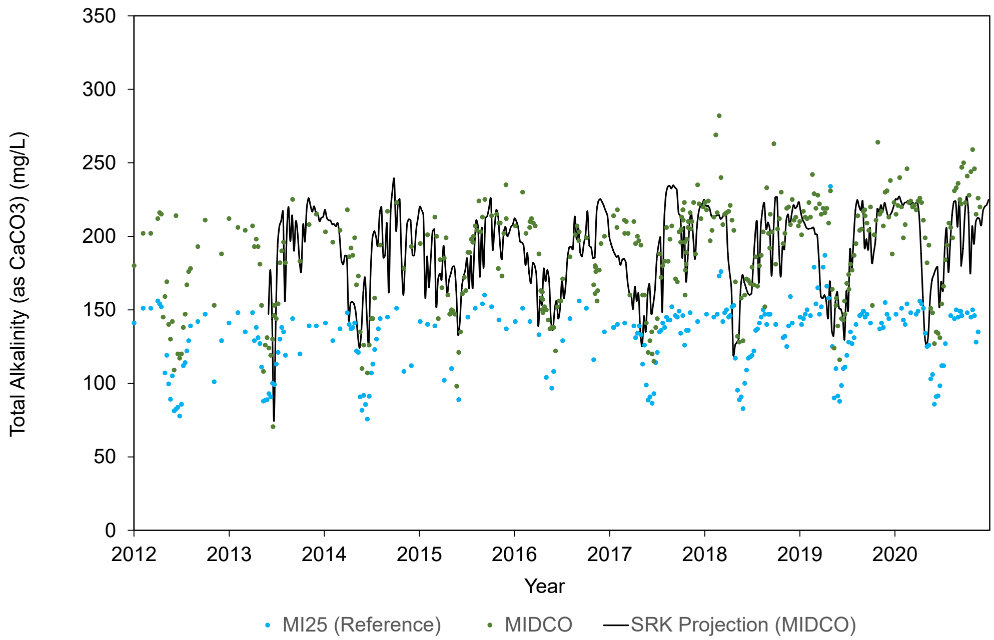
Figure 1.2-21: Temporal Variation in Hardness in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020

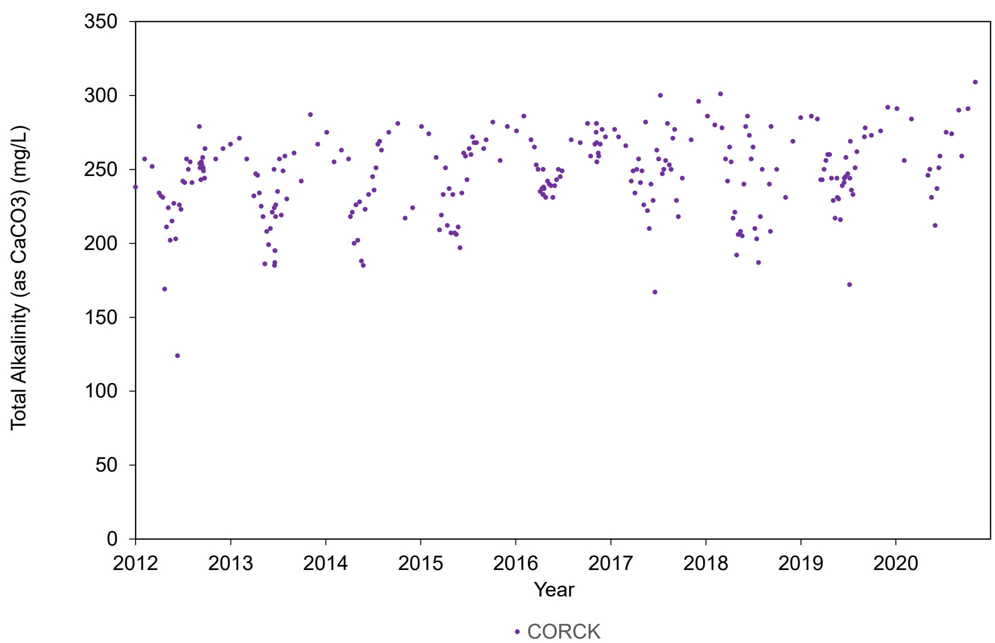




Note: Open symbols represent non-detects. SRK modelled projections for hardness are included for comparison (SRK 2019).
mg/L = milligrams per litre.

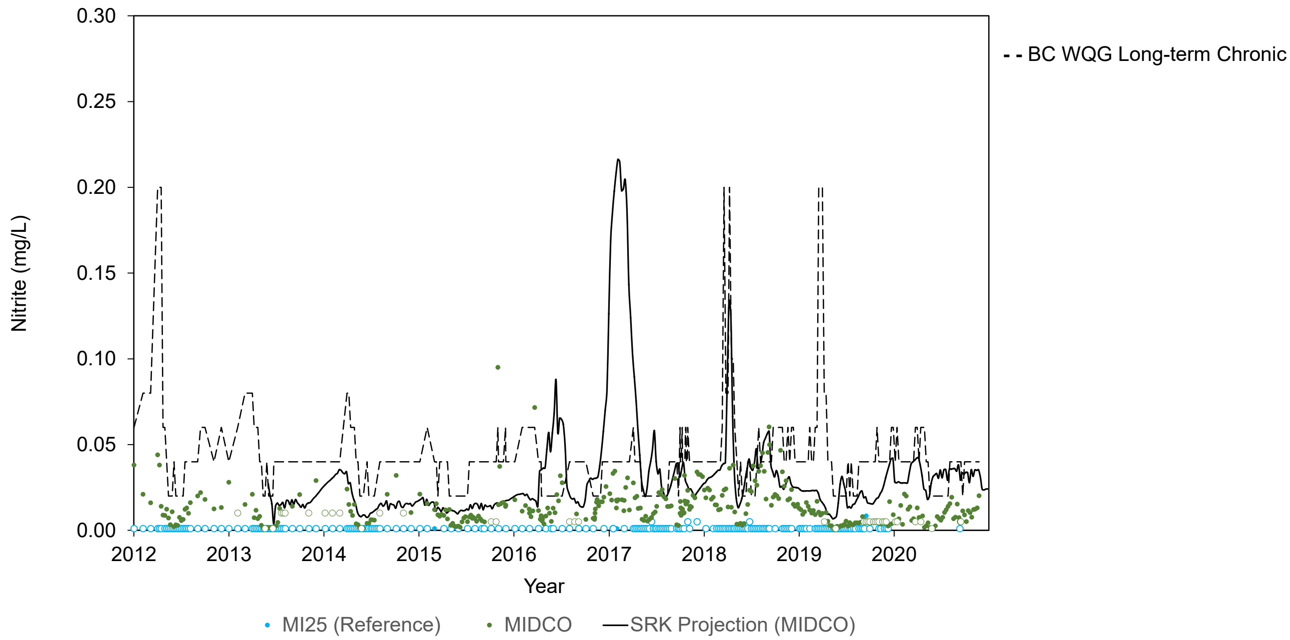
Figure 1.2-22: Temporal Variation in Alkalinity in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020

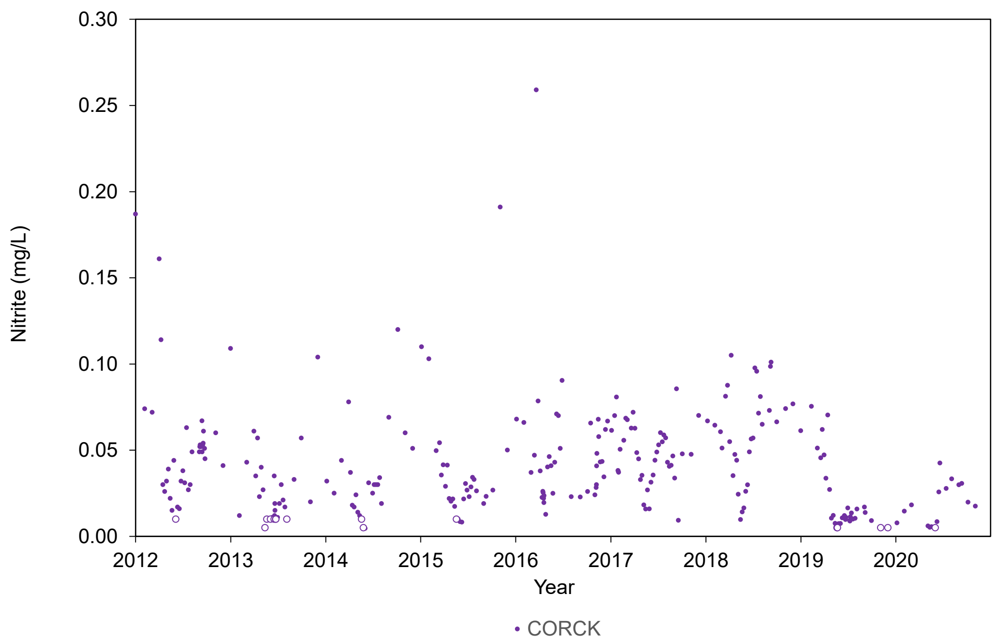




Note: Open symbols represent non-detects. SRK modelled projections for total alkalinity are included for comparison (SRK 2019).
mg/L = milligrams per litre.

Figure 1.2-23: Temporal Variation in Nitrite in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020

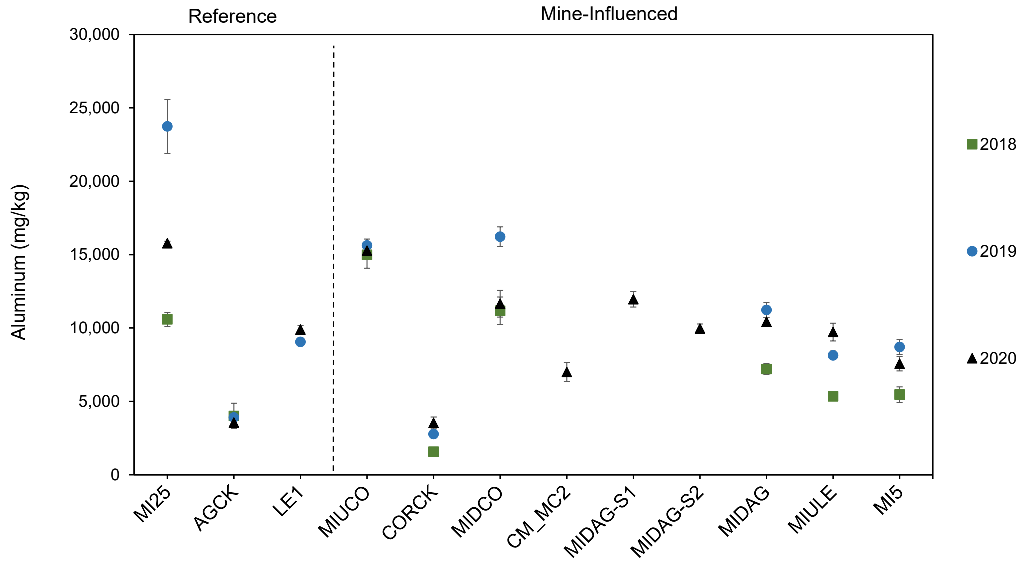




Note: Open symbols represent non-detects. SRK modelled projections for nitrite are included for comparison (SRK 2019).
mg/L = milligrams per litre; WQG = water quality guideline.

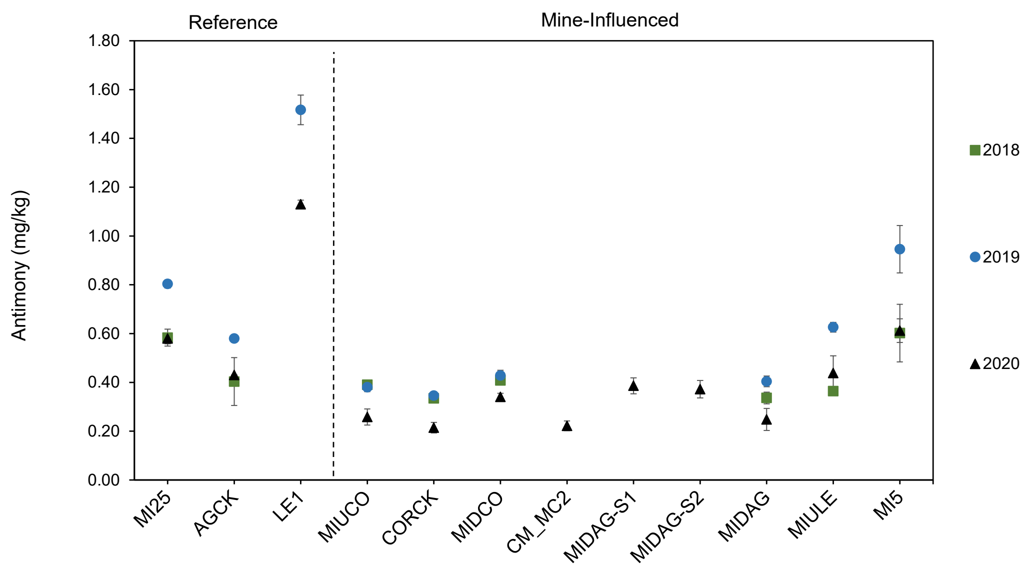
F.2 SEDIMENT QUALITY

Figure 2.0-1: Spatial Variation in Sediment Aluminum Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



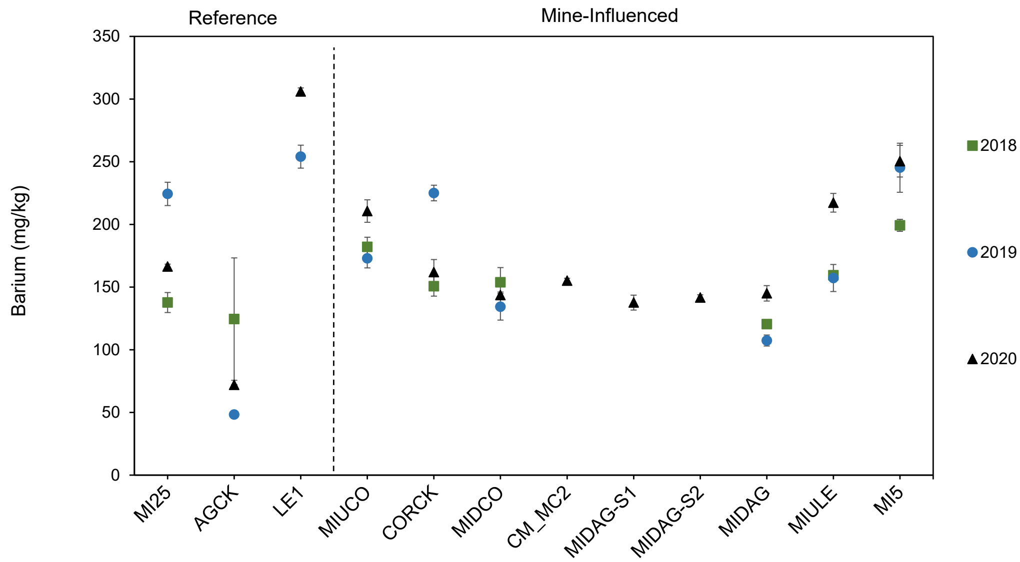
mg/kg = milligrams per kilogram.

Figure 2.0-2: Spatial Variation in Sediment Antimony Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



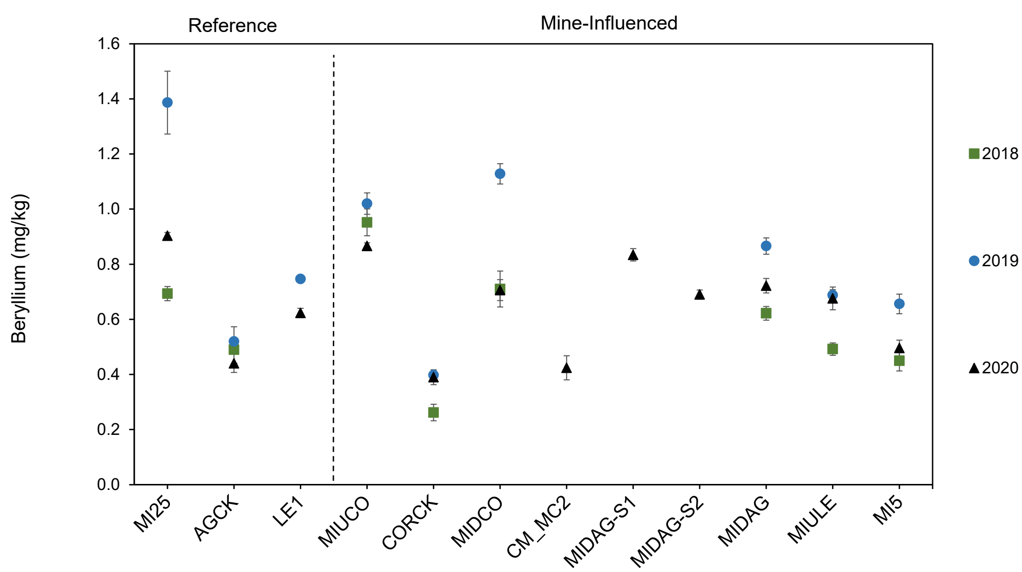
mg/kg = milligrams per kilogram.

Figure 2.0-3: Spatial Variation in Sediment Barium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



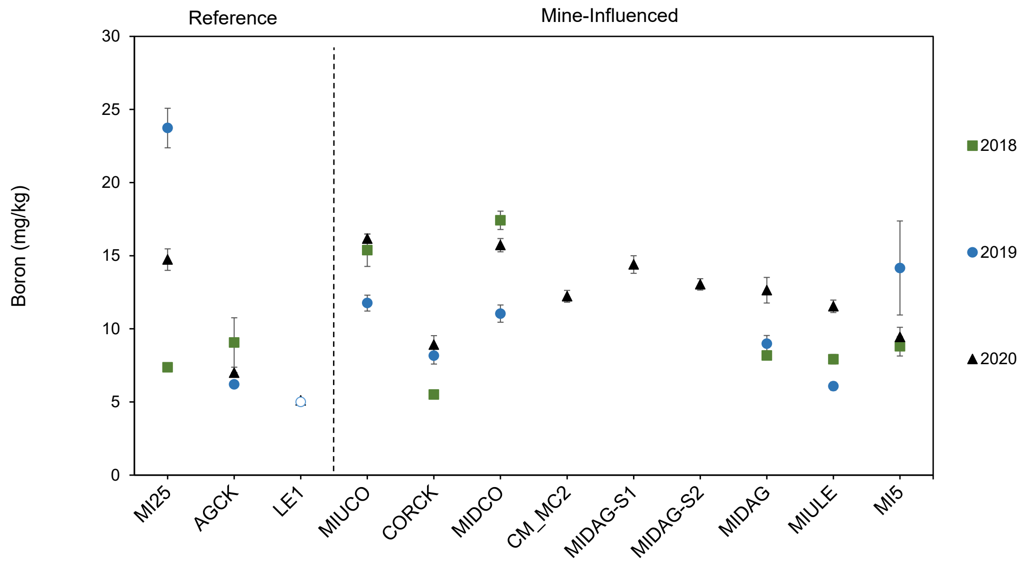
mg/kg = milligrams per kilogram.

Figure 2.0-4: Spatial Variation in Sediment Beryllium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



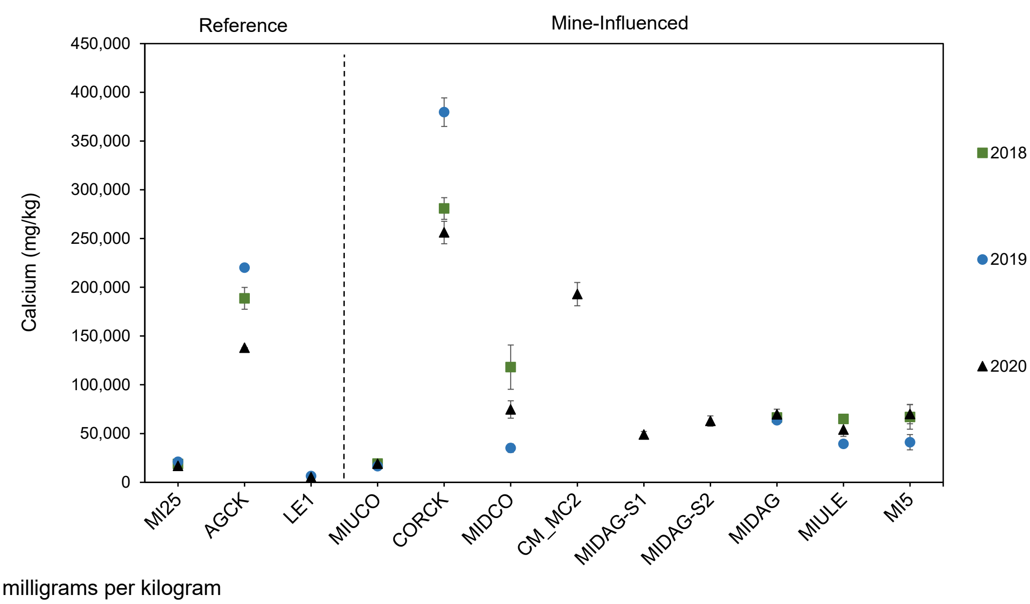
mg/kg = milligrams per kilogram.

Figure 2.0-5: Spatial Variation in Sediment Boron Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



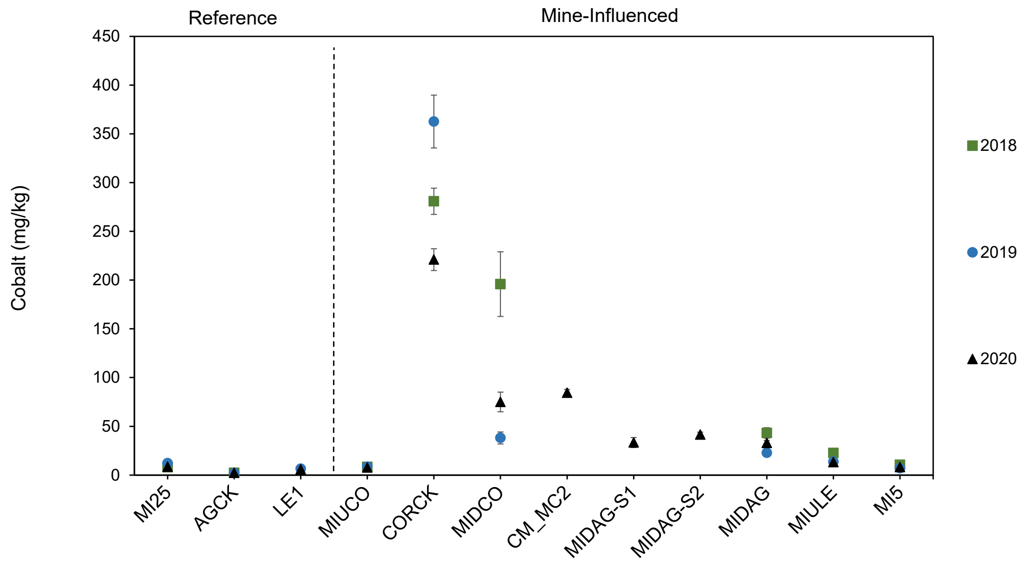
Note: Open symbols represent non-detects.
mg/kg = milligrams per kilogram.

Figure 2.0-6: Spatial Variation in Sediment Calcium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



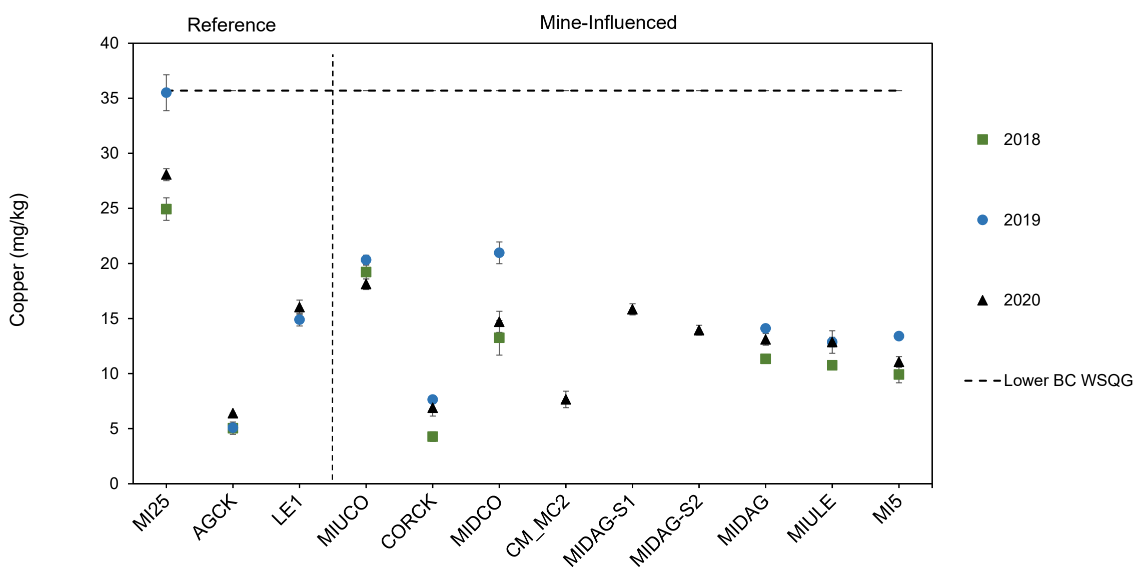
mg/kg = milligrams per kilogram

Figure 2.0-7: Spatial Variation in Sediment Cobalt Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



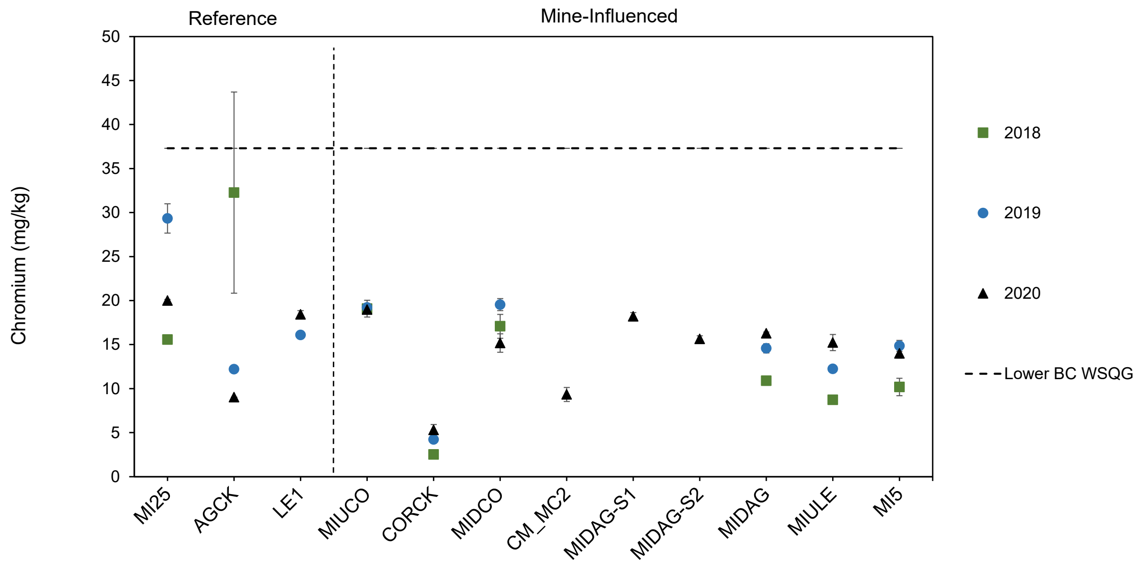
mg/kg = milligrams per kilogram

Figure 2.0-8: Spatial Variation in Sediment Copper Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



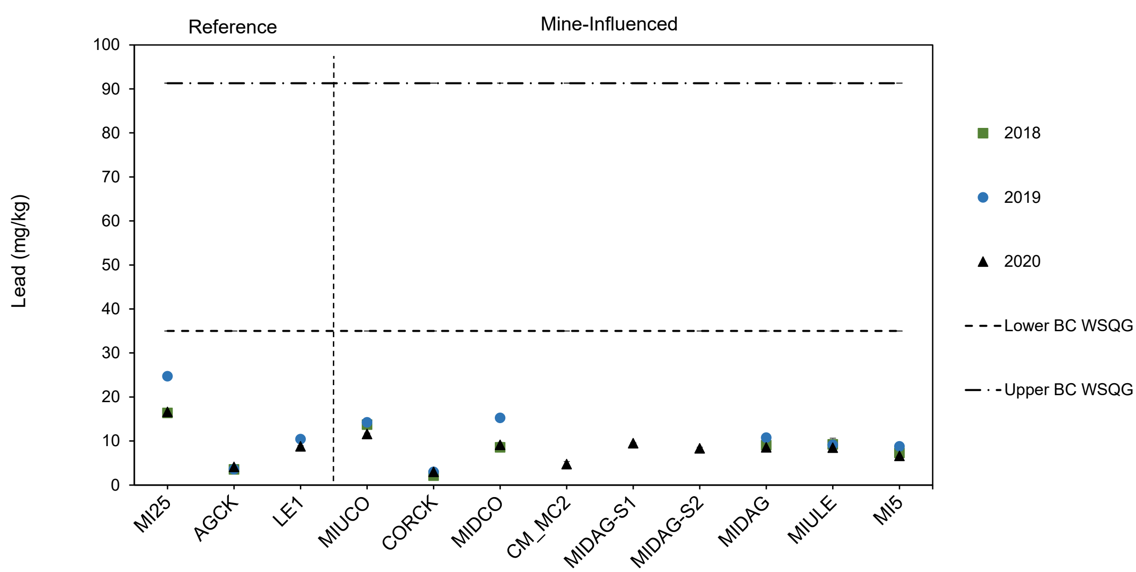
mg/kg = milligrams per kilogram; BC WSQG = British Columbia working sediment quality guideline.

Figure 2.0-9: Spatial Variation in Sediment Chromium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



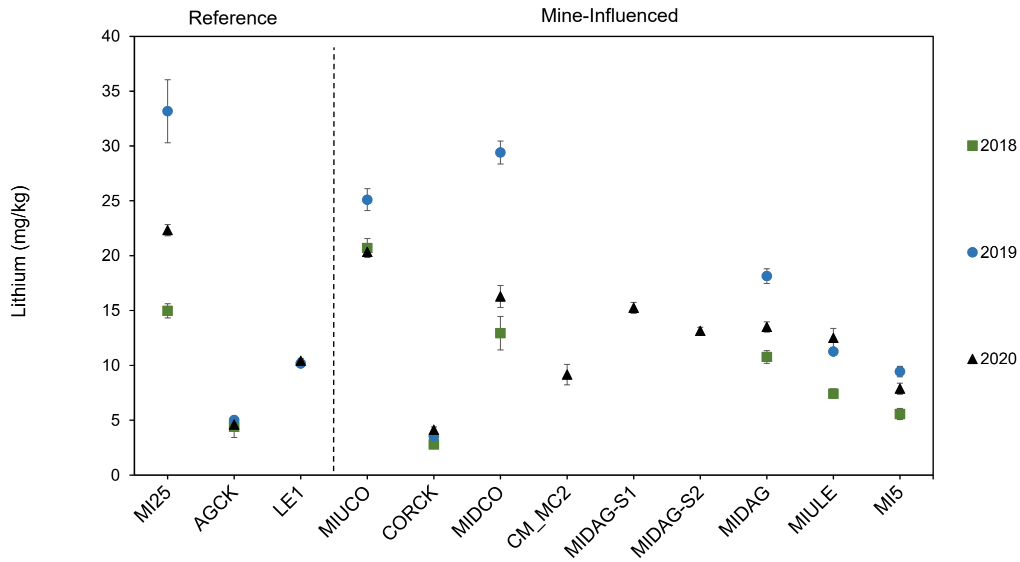
mg/kg = milligrams per kilogram; BC WSQG = British Columbia working sediment quality guideline.

Figure 2.0-10: Spatial Variation in Sediment Lead Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



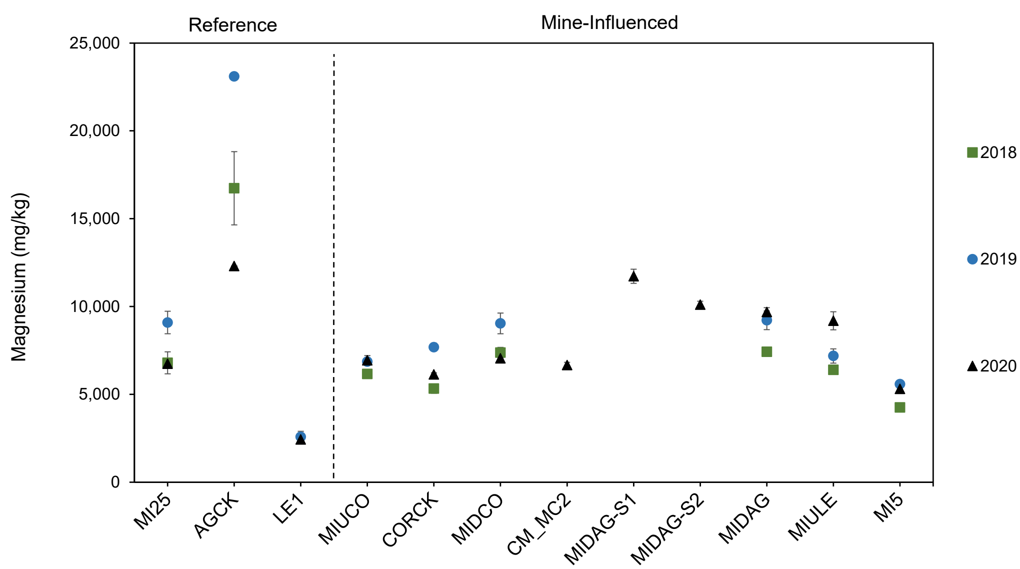
mg/kg = milligrams per kilogram; BC WSQG = British Columbia working sediment quality guideline.

Figure 2.0-11: Spatial Variation in Sediment Lithium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



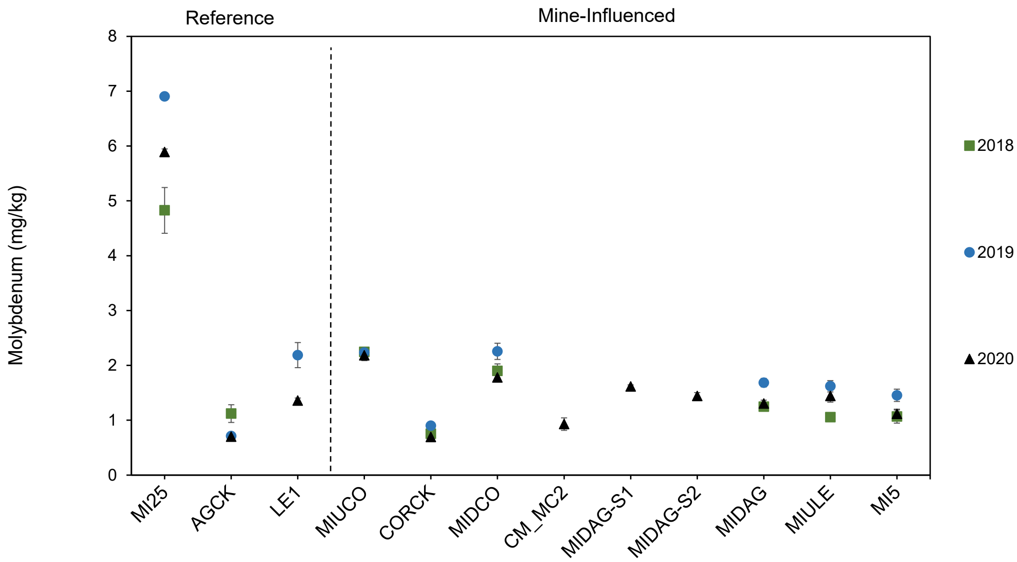
mg/kg = milligrams per kilogram.

Figure 2.0-12: Spatial Variation in Sediment Magnesium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



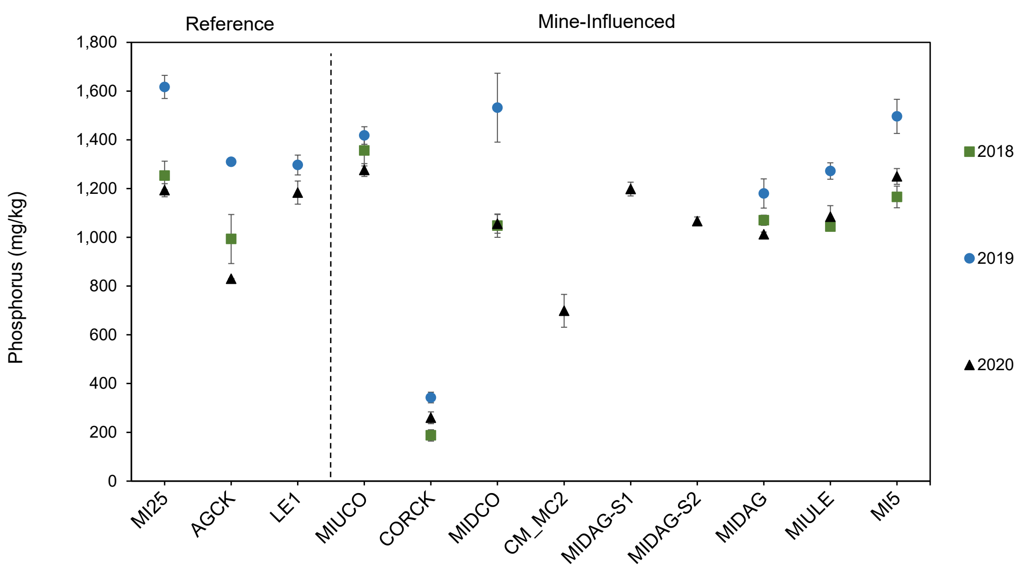
mg/kg = milligrams per kilogram.

Figure 2.0-13: Spatial Variation in Sediment Molybdenum Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



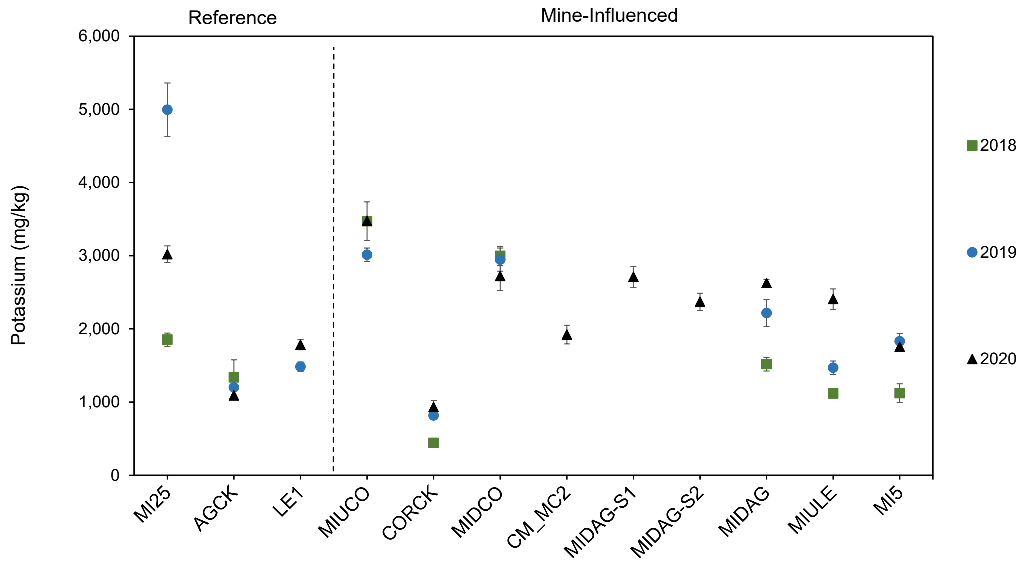
mg/kg = milligrams per kilogram.

Figure 2.0-14: Spatial Variation in Sediment Phosphorus Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



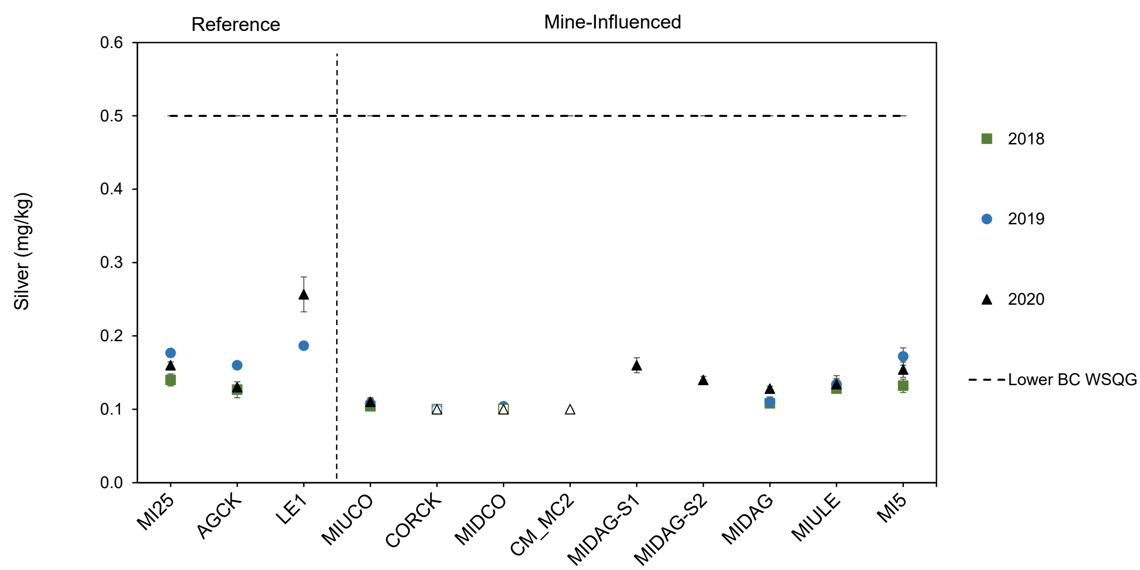
mg/kg = milligrams per kilogram.

Figure 2.0-15: Spatial Variation in Sediment Potassium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



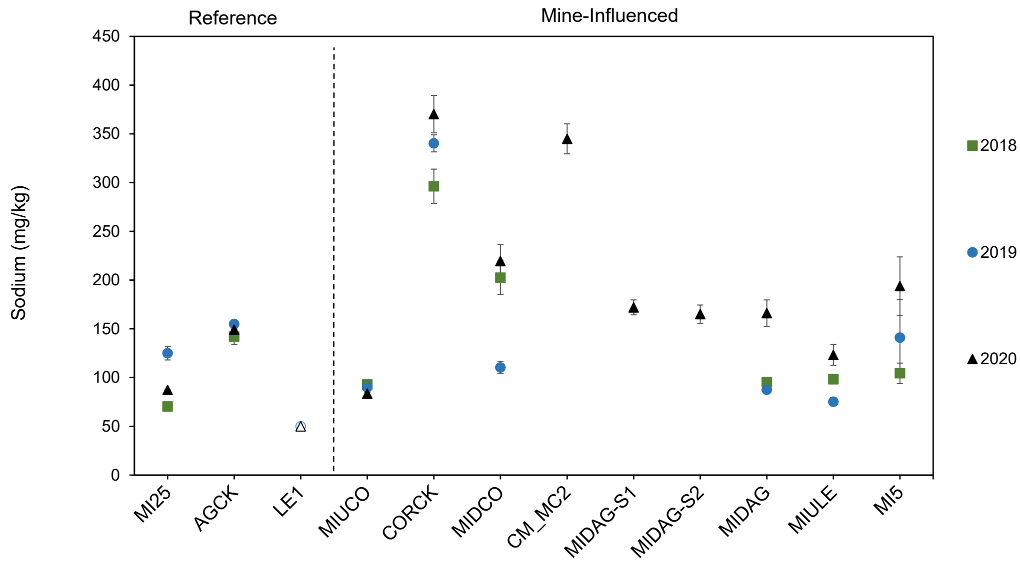
mg/kg = milligrams per kilogram.

Figure 2.0-16: Spatial Variation in Sediment Silver Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



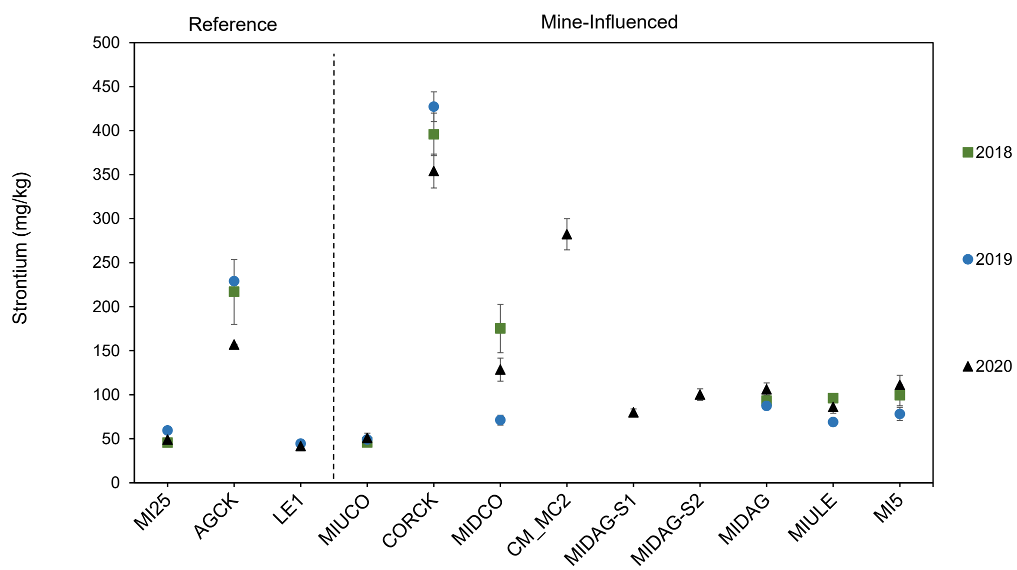
Note: Open symbols represent non-detects.
mg/kg = milligrams per kilogram; BC WSQG = British Columbia working sediment quality guideline.

Figure 2.0-17: Spatial Variation in Sediment Sodium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



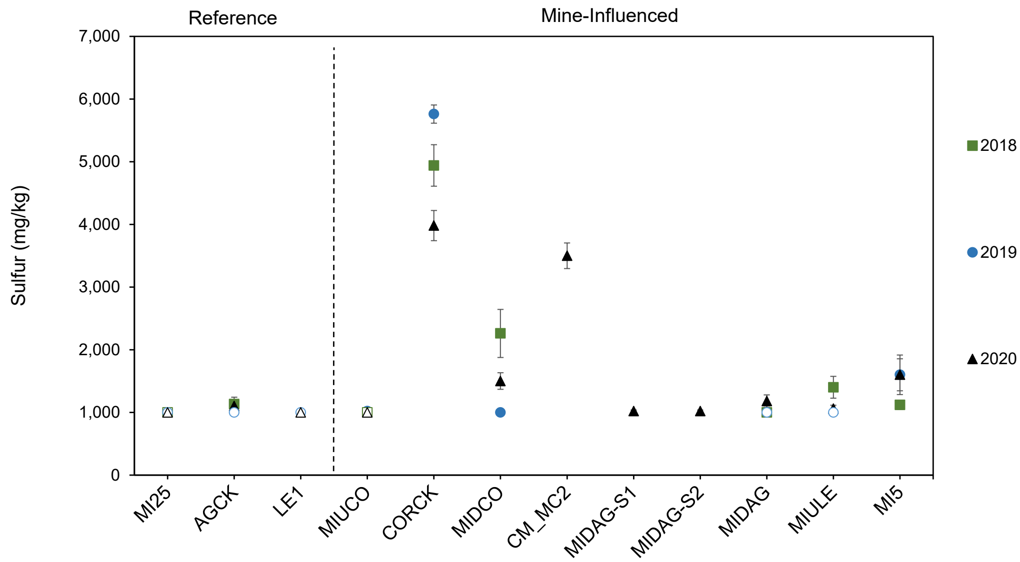
Note: Open symbols represent non-detects.
mg/kg = milligrams per kilogram

Figure 2.0-18: Spatial Variation in Sediment Strontium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



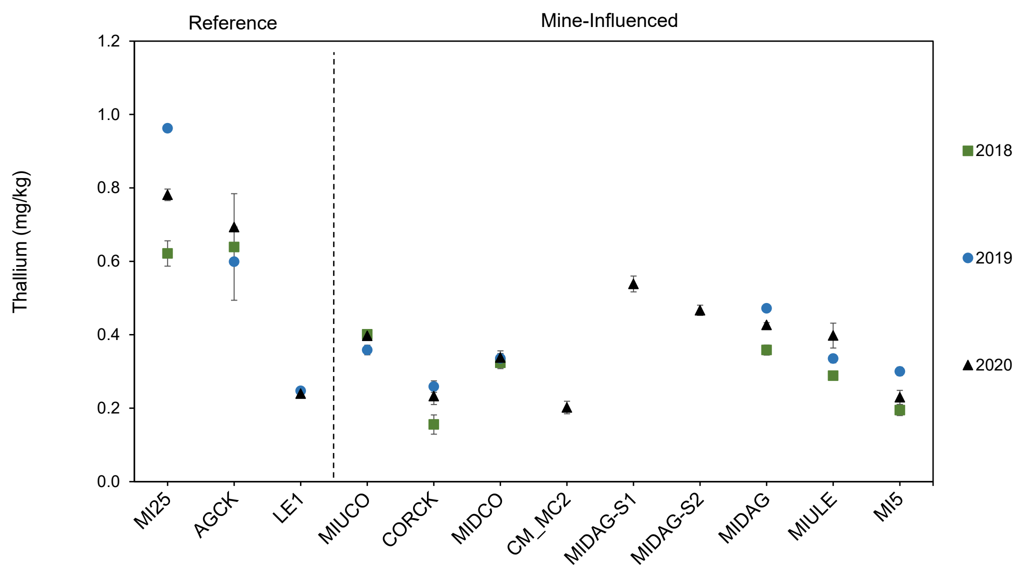
mg/kg = milligrams per kilogram

Figure 2.0-19: Spatial Variation in Sediment Sulfur Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



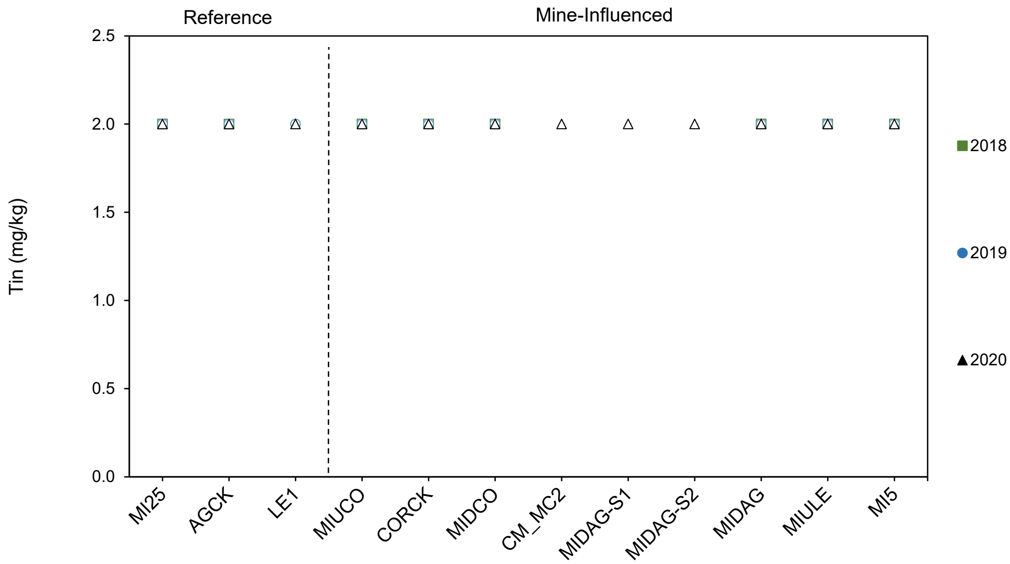
Note: Open symbols represent non-detects.
mg/kg = milligrams per kilogram

Figure 2.0-20: Spatial Variation in Sediment Thallium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



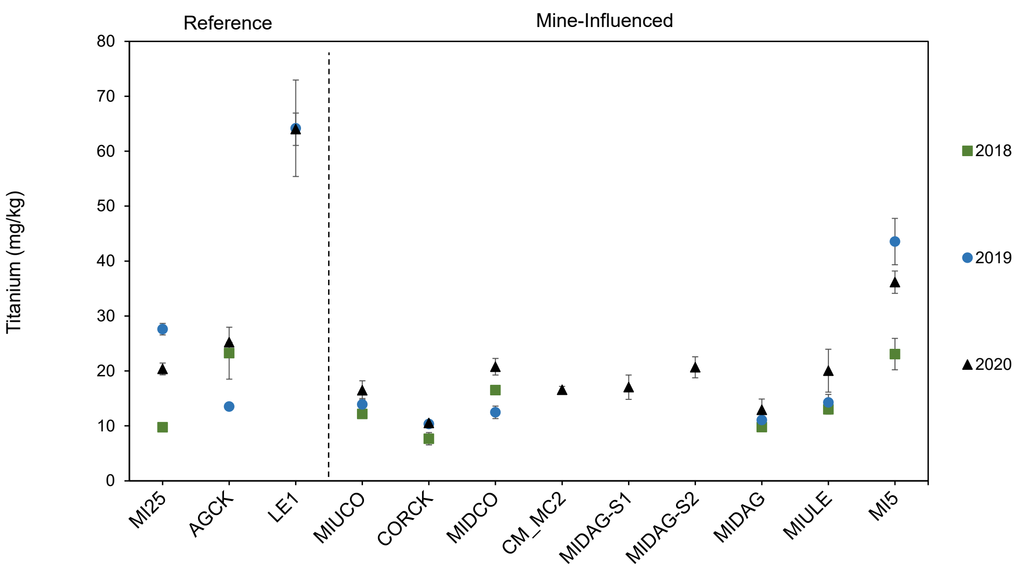
mg/kg = milligrams per kilogram.

Figure 2.0-21: Spatial Variation in Sediment Tin Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



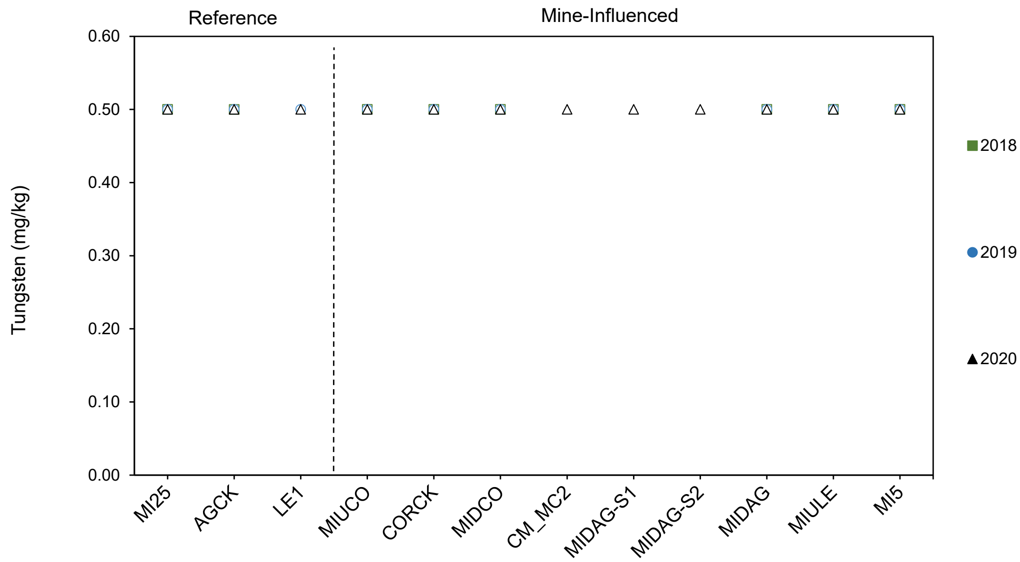
Note: Open symbols represent non-detects.
mg/kg = milligrams per kilogram.

Figure 2.0-22: Spatial Variation in Sediment Titanium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



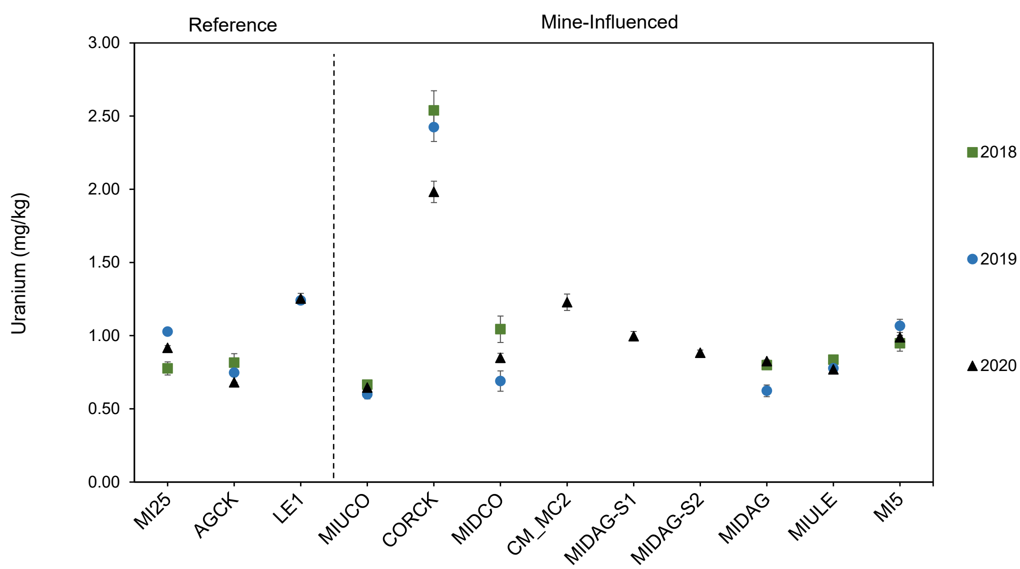
mg/kg = milligrams per kilogram.

Figure 2.0-23: Spatial Variation in Sediment Tungsten Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



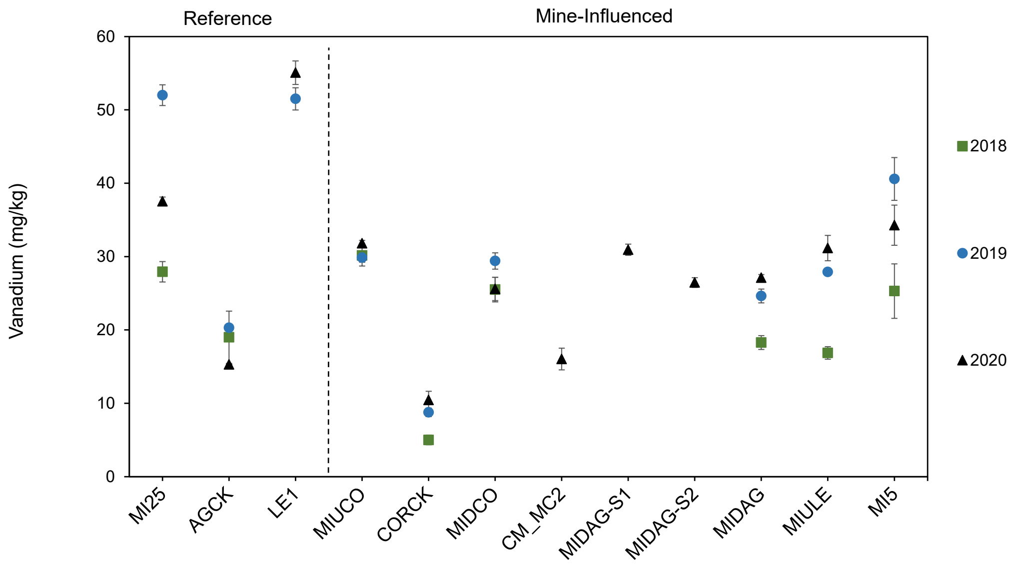
Note: Open symbols represent non-detects.
mg/kg = milligrams per kilogram.

Figure 2.0-24: Spatial Variation in Sediment Uranium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



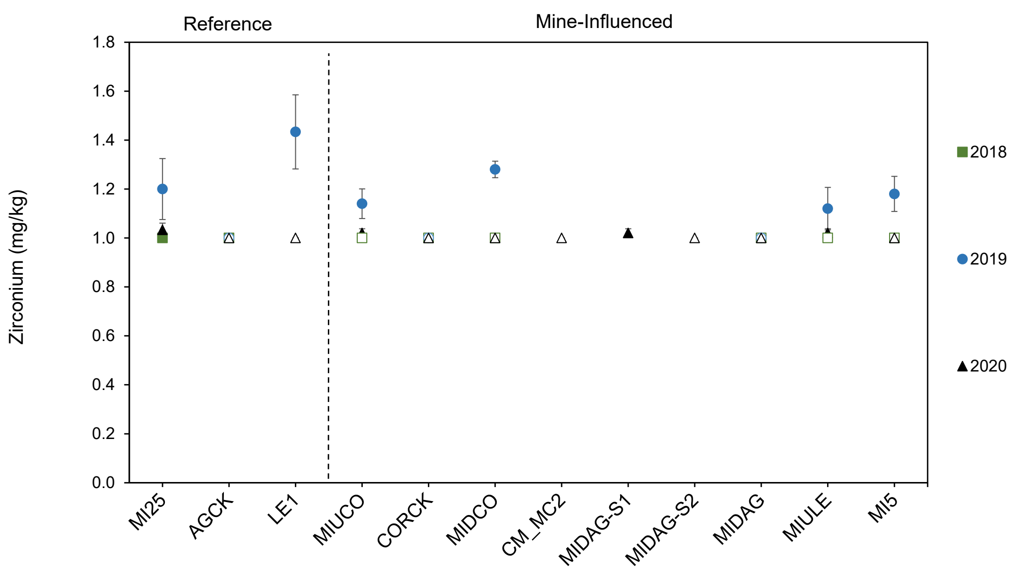
mg/kg = milligrams per kilogram

Figure 2.0-25: Spatial Variation in Sediment Vanadium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



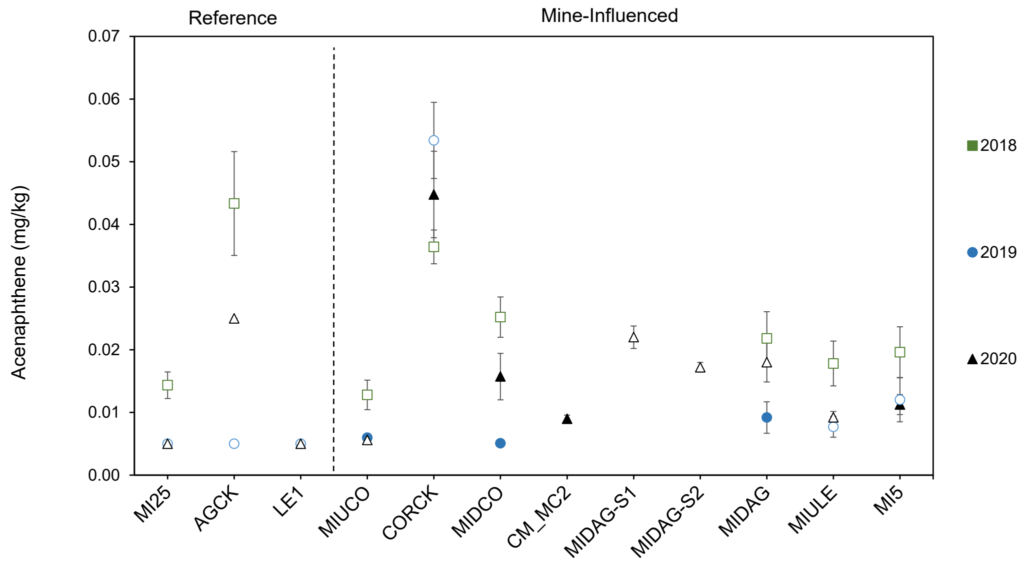
mg/kg = milligrams per kilogram.

Figure 2.0-26: Spatial Variation in Sediment Zirconium Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



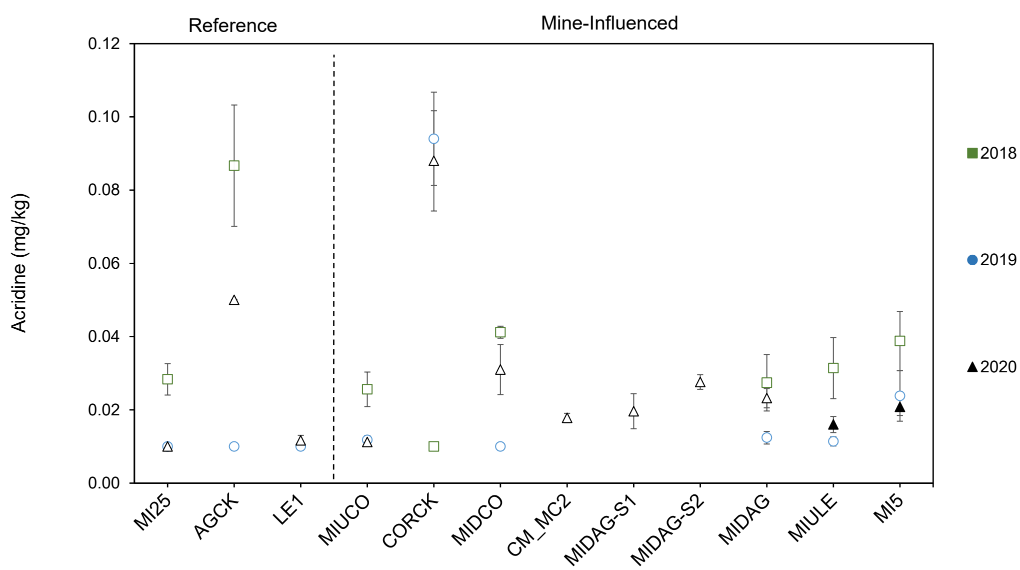
Note: Open symbols represent non-detects.
mg/kg = milligrams per kilogram.

Figure 2.0-27: Spatial Variation in Sediment Acenaphthene Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



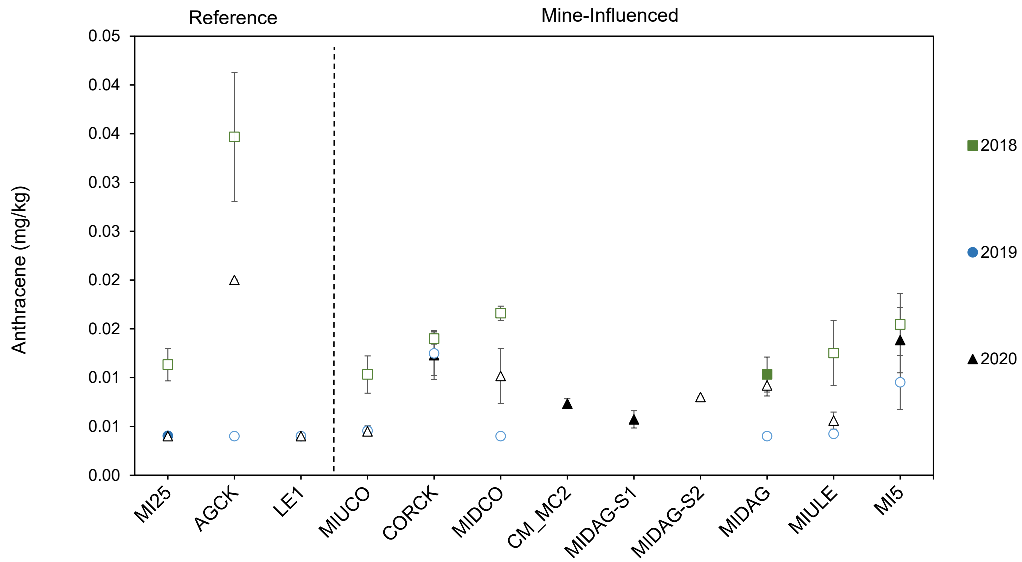
Note: Open symbols represent non-detects. Lower BC WSQG (0.0067) and Upper BC WSQG (0.089) not shown.
mg/kg = milligrams per kilogram; BC WSQG = British Columbia working sediment quality guideline.

Figure 2.0-28: Spatial Variation in Sediment Acridine Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



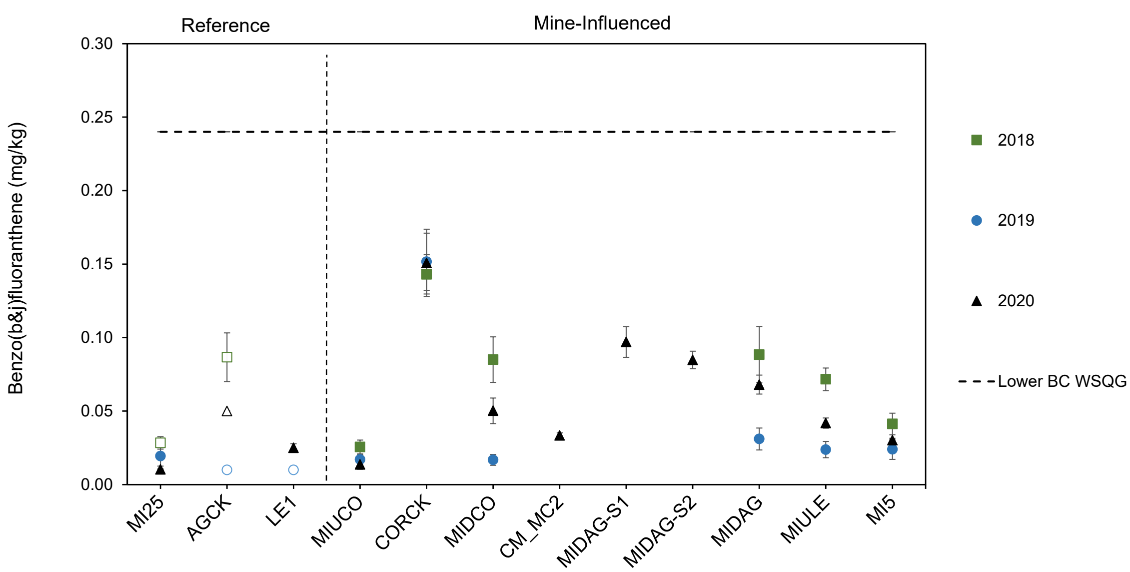
Note: Open symbols represent non-detects.
mg/kg = milligrams per kilogram.

Figure 2.0-29: Spatial Variation in Sediment Anthracene Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



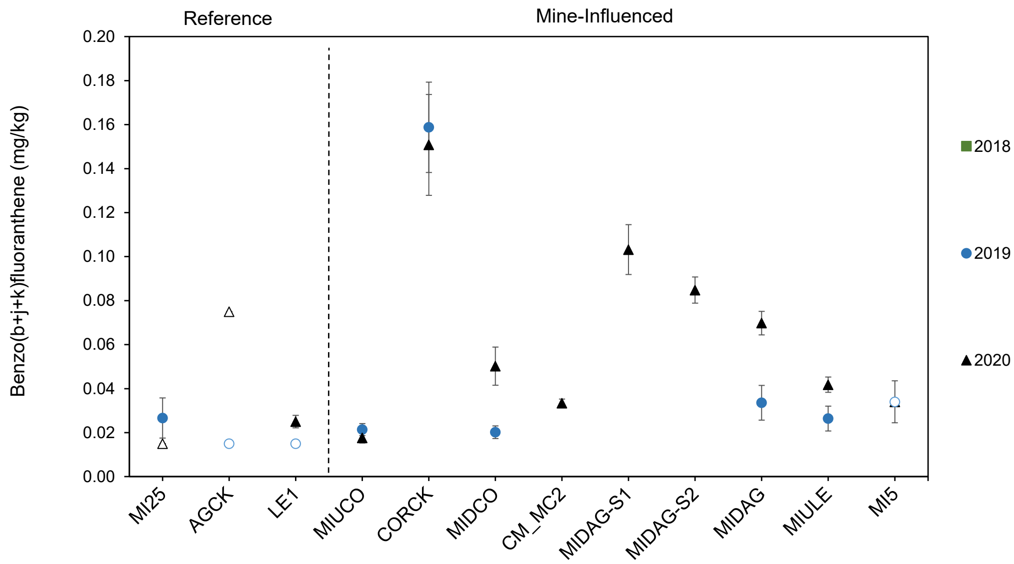
Note: Open symbols represent non-detects. Lower BC WSQG (0.0469 mg/kg) and Upper BC WSQG (0.245 mg/kg) not shown.
mg/kg = milligrams per kilogram; BC WSQG = British Columbia working sediment quality guideline.

Figure 2.0-30: Spatial Variation in Sediment Benzo(b,j)fluoranthene Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



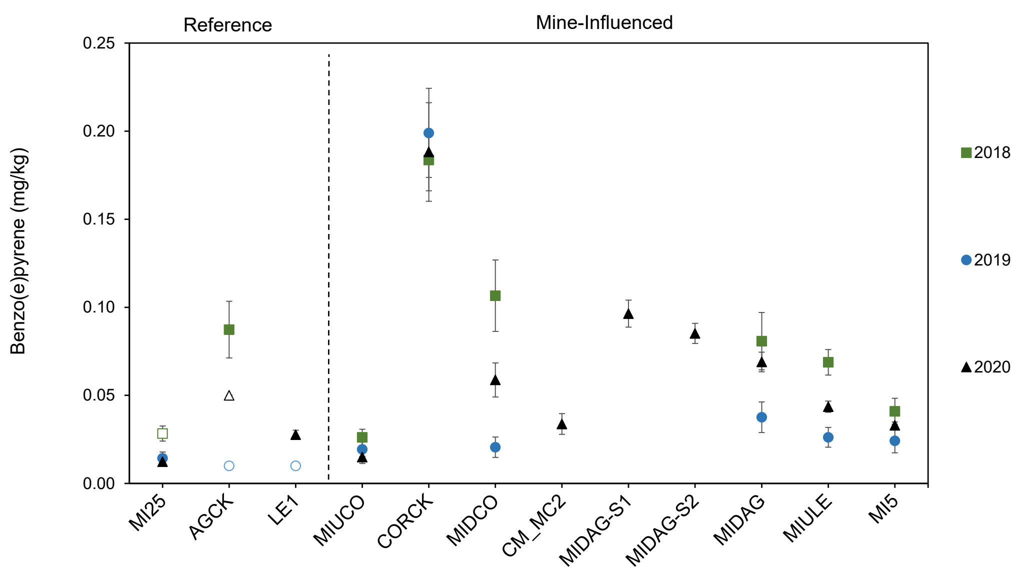
Note: Open symbols represent non-detects. Upper BC WSQG (13 mg/kg) not shown.
mg/kg = milligrams per kilogram; BC WSQG = British Columbia working sediment quality guideline.

Figure 2.0-31: Spatial Variation in Sediment Benzo(b,j,k)fluoranthene Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



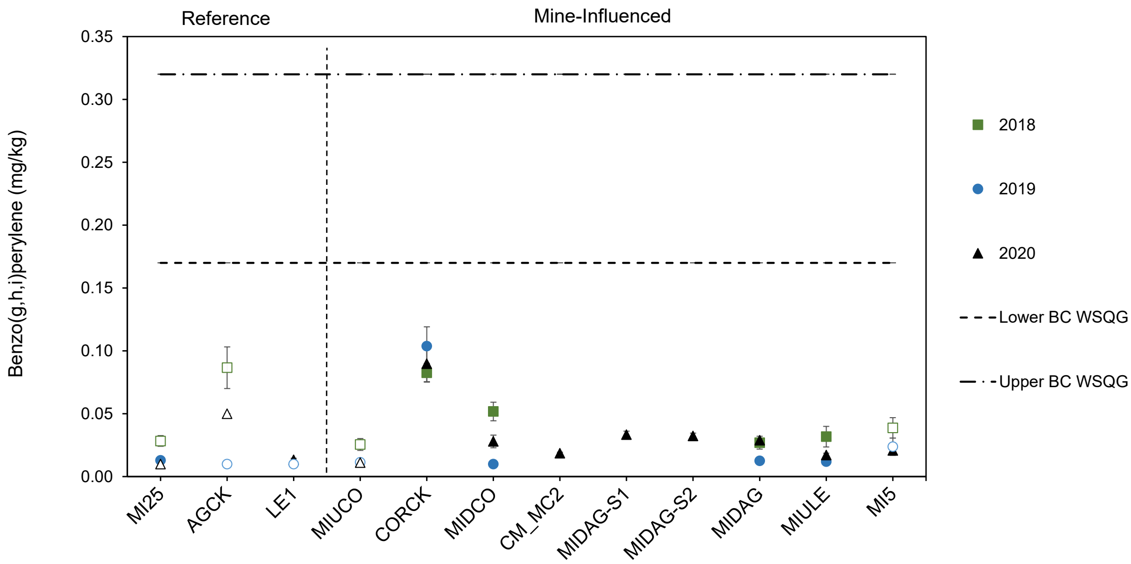
Note: Open symbols represent non-detects.
mg/kg = milligrams per kilogram.

Figure 2.0-32: Spatial Variation in Sediment Benzo(e)pyrene Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



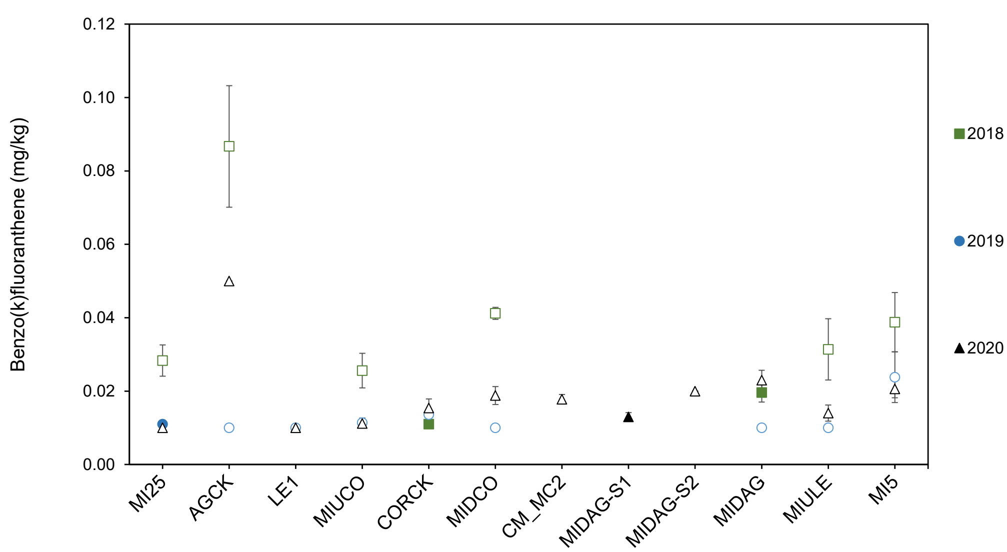
Note: Open symbols represent non-detects.
mg/kg = milligrams per kilogram.

Figure 2.0-33: Spatial Variation in Sediment Benzo(g,h,i)perylene Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



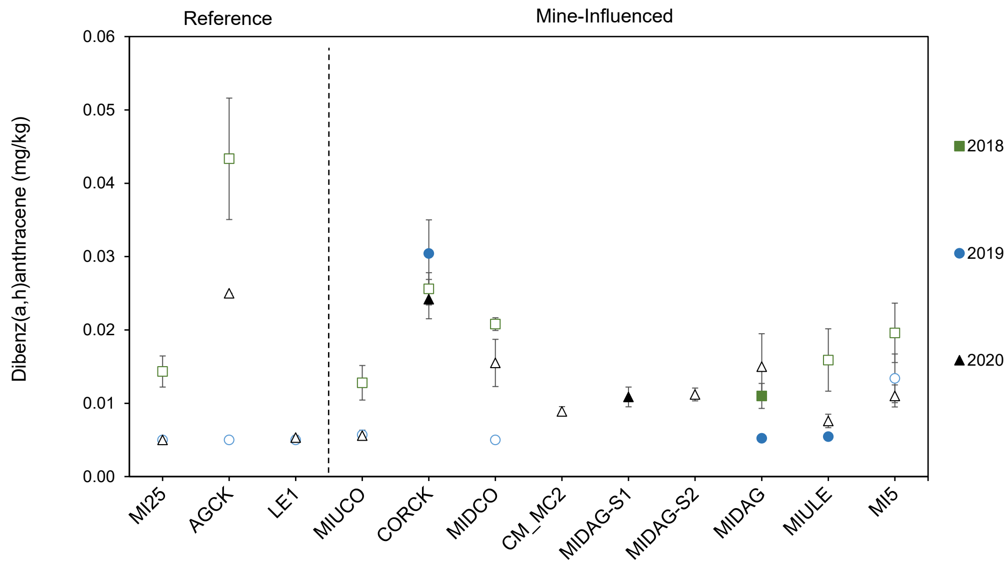
Note: Open symbols represent non-detects.
mg/kg = milligrams per kilogram; BC WSQG = British Columbia working sediment quality guideline.

Figure 2.0-34: Spatial Variation in Sediment Benzo(k)fluoranthene Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



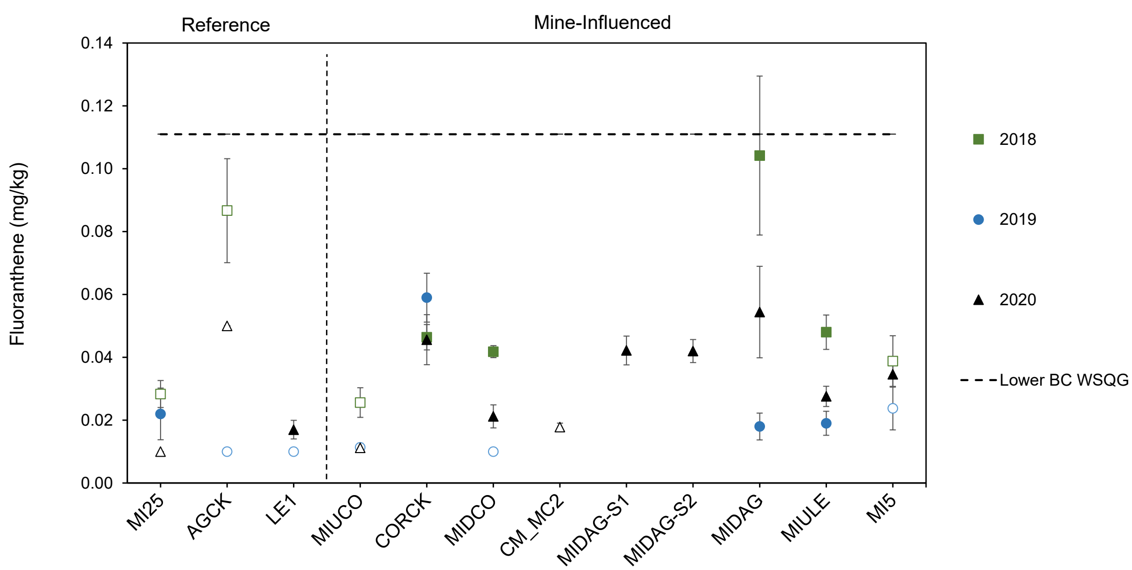
Note: Open symbols represent non-detects. Lower BC WSQG (0.3 mg/kg).
mg/kg = milligrams per kilogram; BC WSQG = British Columbia working sediment quality guideline.

Figure 2.0-35: Spatial Variation in Sediment Dibenzo(a,h)anthracene Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



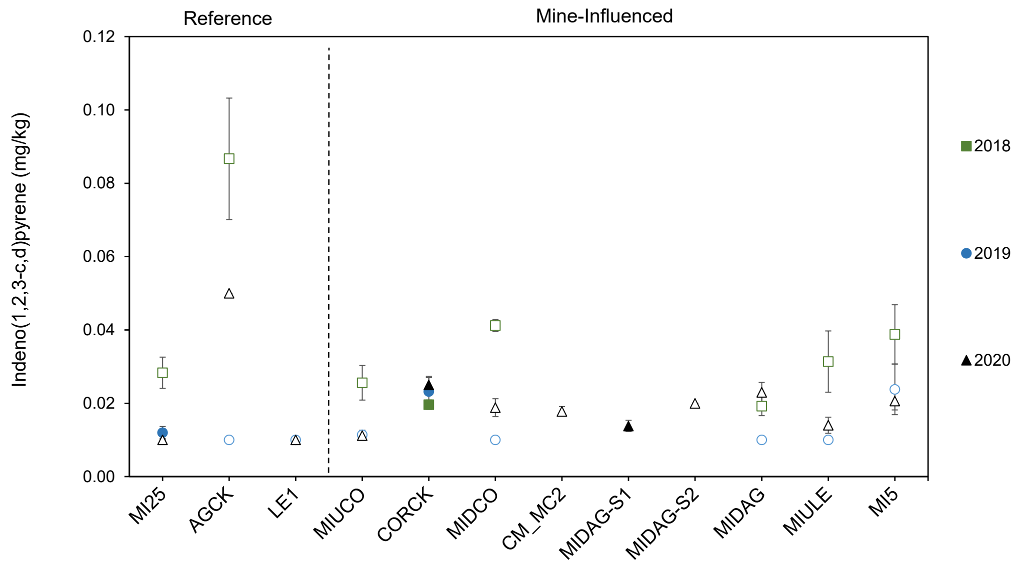
Note: Open symbols represent non-detects.
mg/kg = milligrams per kilogram.

Figure 2.0-36: Spatial Variation in Sediment Fluoranthene Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



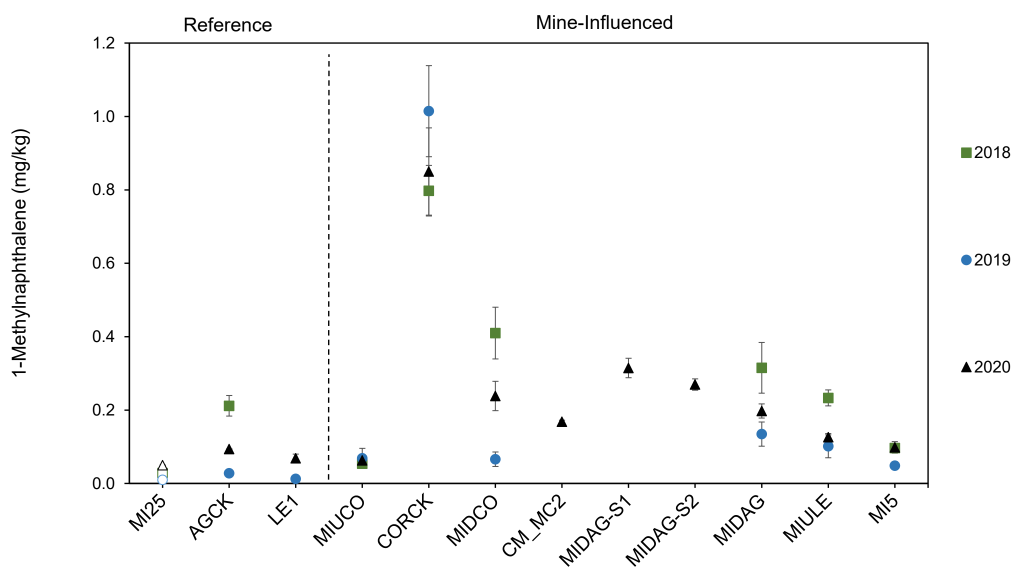
Note: Open symbols represent non-detects. Upper BC WSQG (2.355 mg/L) not shown.
mg/kg = milligrams per kilogram; BC WSQG = British Columbia working sediment quality guideline.

Figure 2.0-37: Spatial Variation in Sediment Ideno(1,2,3-c,d)pyrene Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



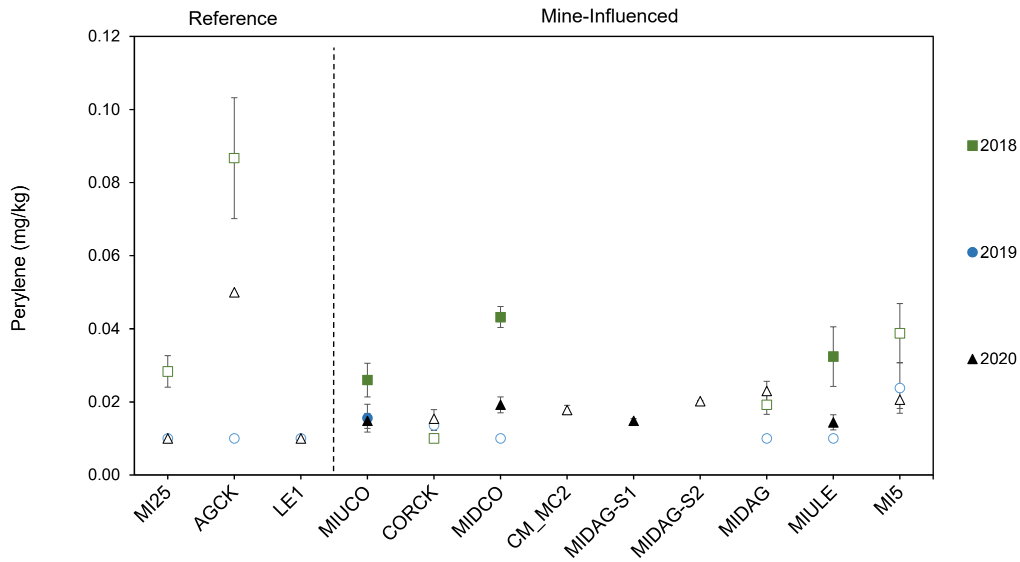
Note: Open symbols represent non-detects. Lower BC WSQG (0.2 mg/kg) and Upper BC WSQG (3.2 mg/kg) not shown.
mg/kg = milligrams per kilogram; BC WSQG = British Columbia working sediment quality guideline.

Figure 2.0-38: Spatial Variation in Sediment 1-Methylnaphthalene Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



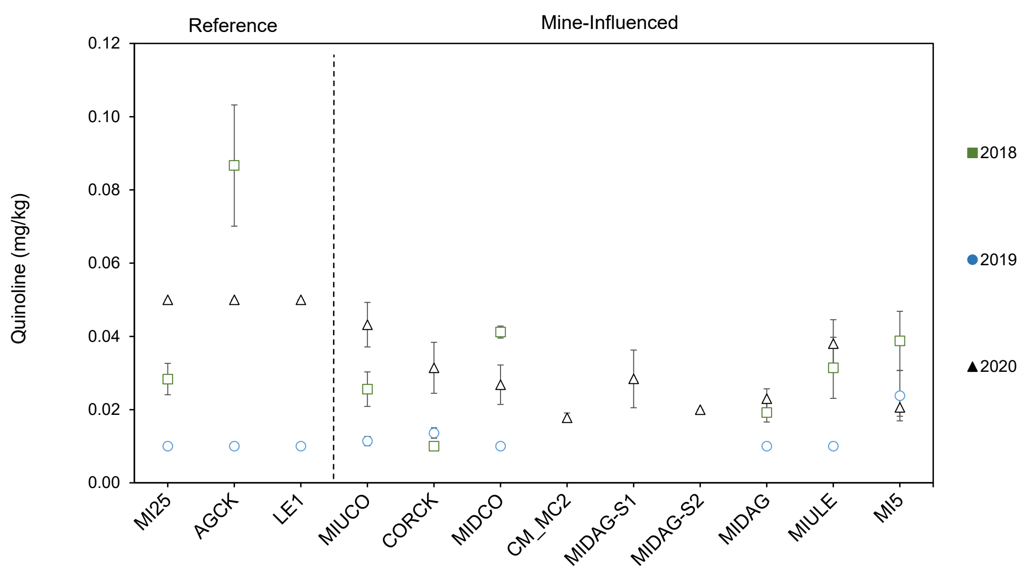
Note: Open symbols represent non-detects.
mg/kg = milligrams per kilogram.

Figure 2.0-39: Spatial Variation in Sediment Perylene Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



Note: Open symbols represent non-detects.
mg/kg = milligrams per kilogram.

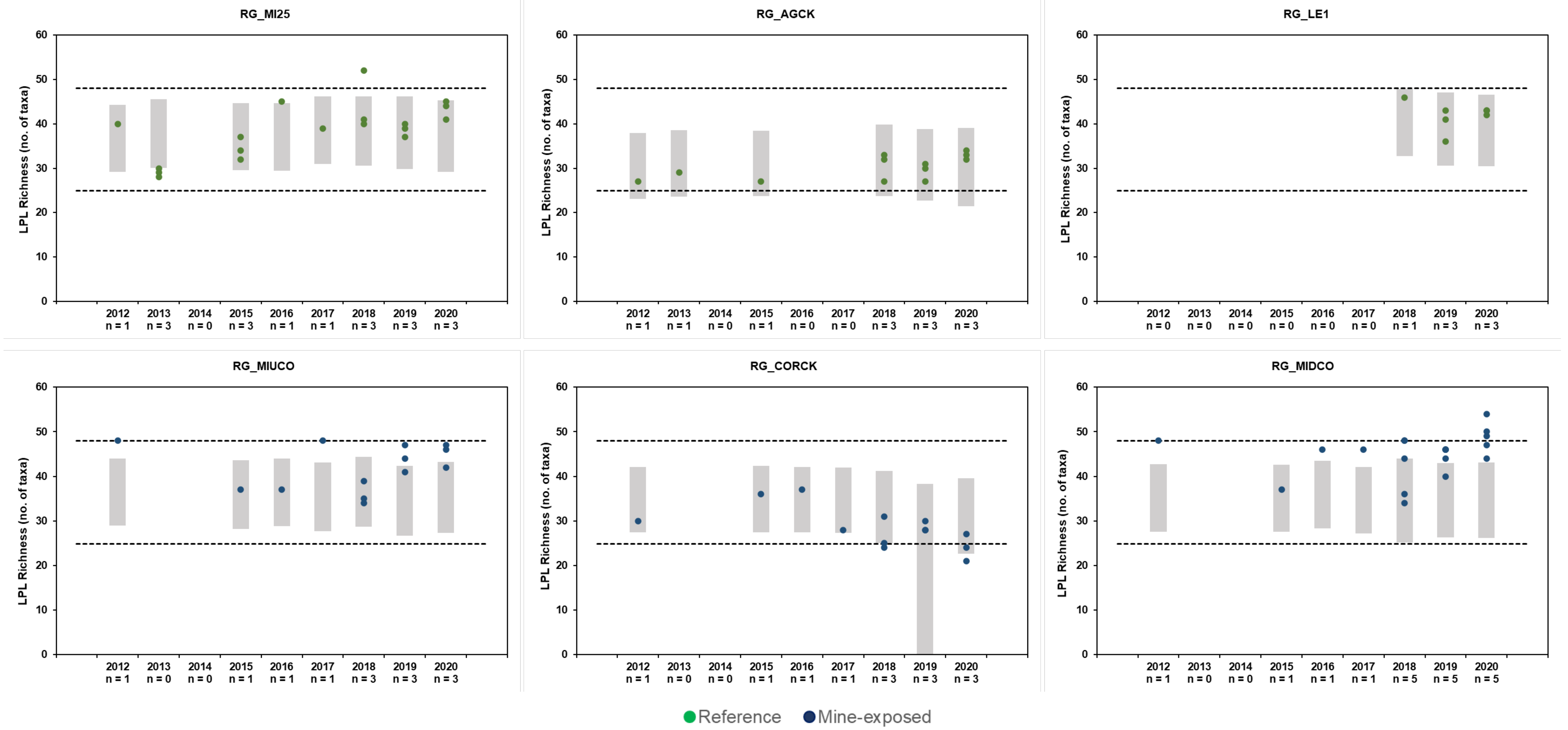
Figure 2.0-40: Spatial Variation in Sediment Quinoline Concentrations in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



Note: Open symbols represent non-detects.
mg/kg = milligrams per kilogram.

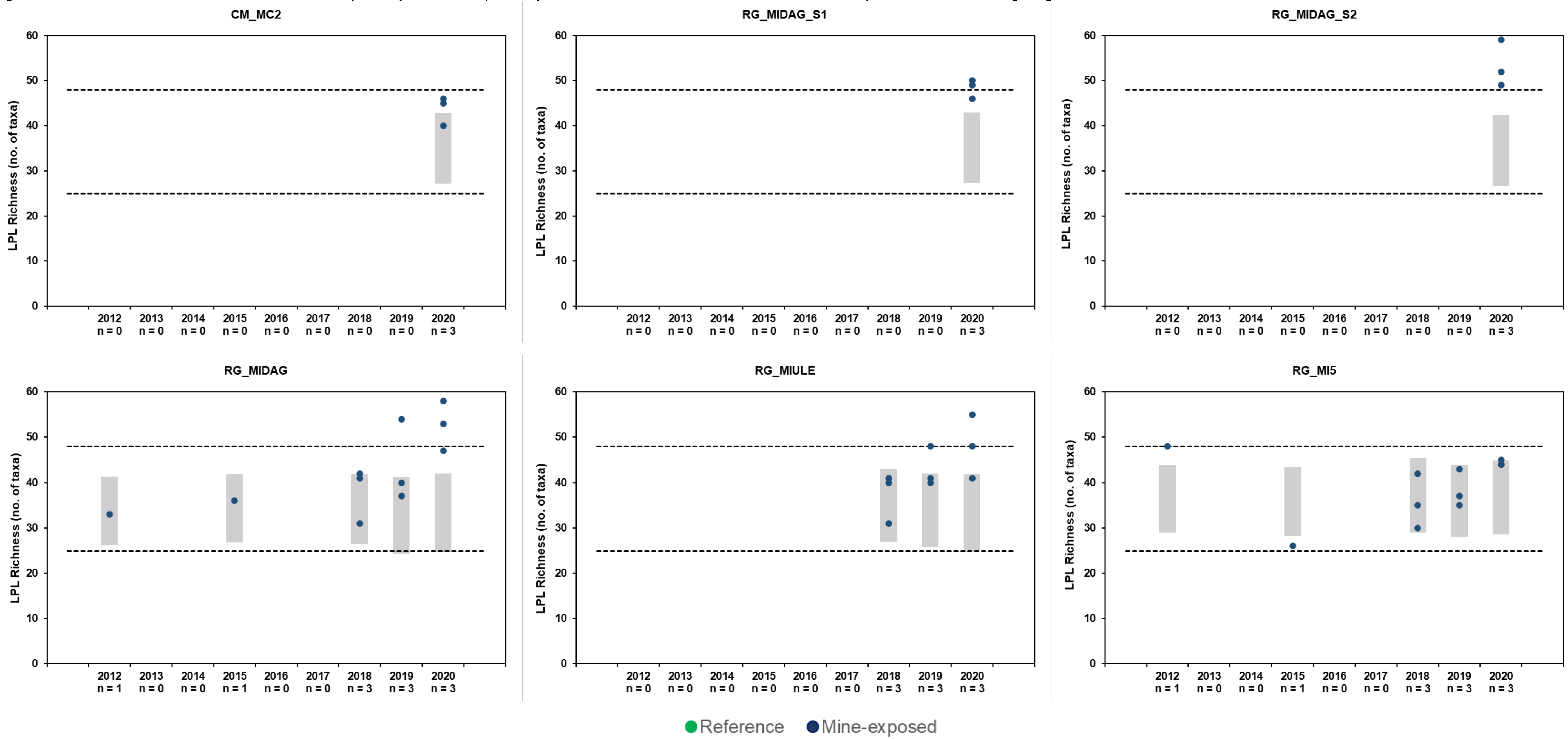
F.3 BENTHIC INVERTEBRATE COMMUNITY

Figure 3.0-1a: Benthic Invertebrate Taxonomic Richness (Lowest Possible Level, LPL) in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



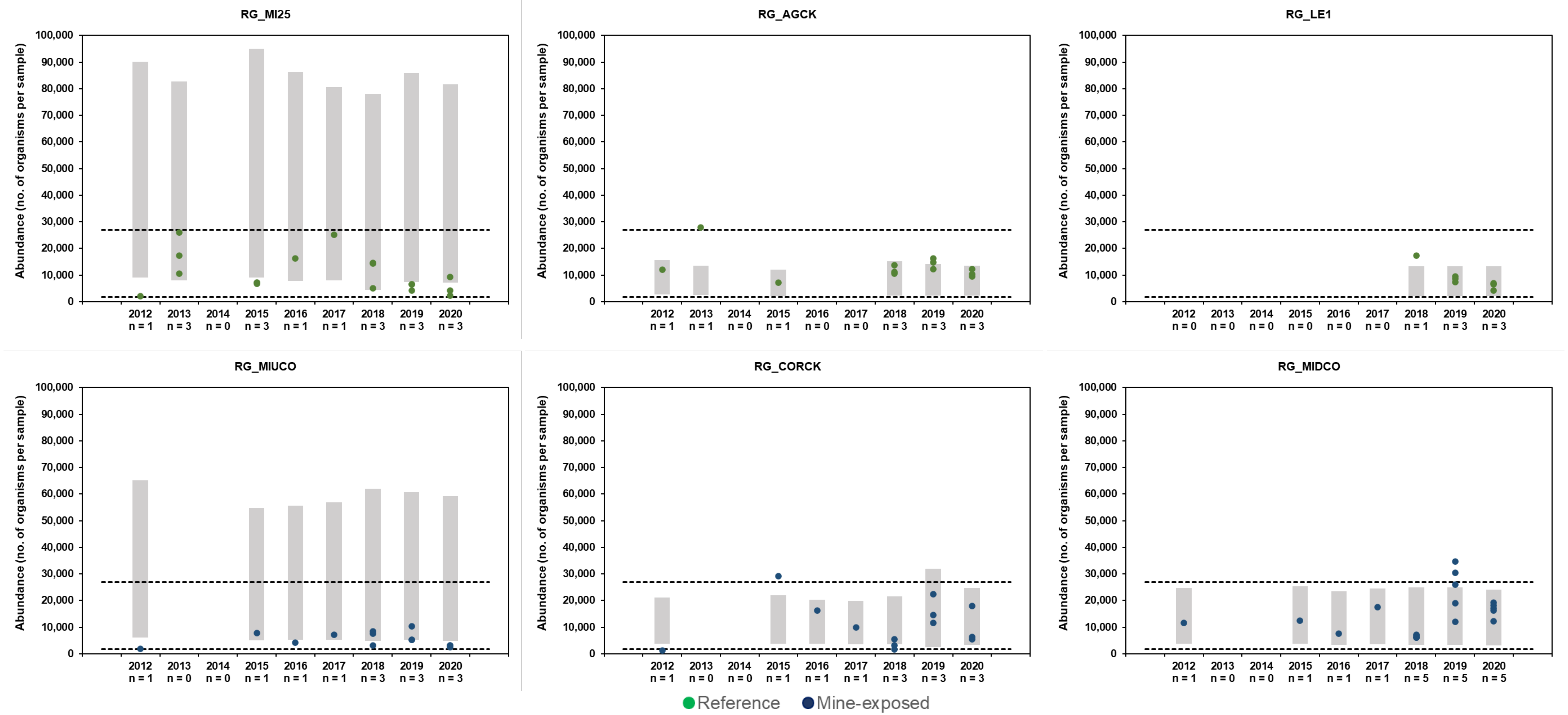
Note: Grey shading represents the site-specific normal ranges (i.e., best attainable endpoints given local landscape predictors) and the dotted line represents the regional normal range defined as the 2.5th and 97.5th percentiles of the 2012 to 2019 reference area data from the RAEMP (Minnow 2020).
LPL = lowest possible level (i.e., species or genus); n = sample size.

Figure 3.0-1b: Benthic Invertebrate Taxonomic Richness (lowest possible level) in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



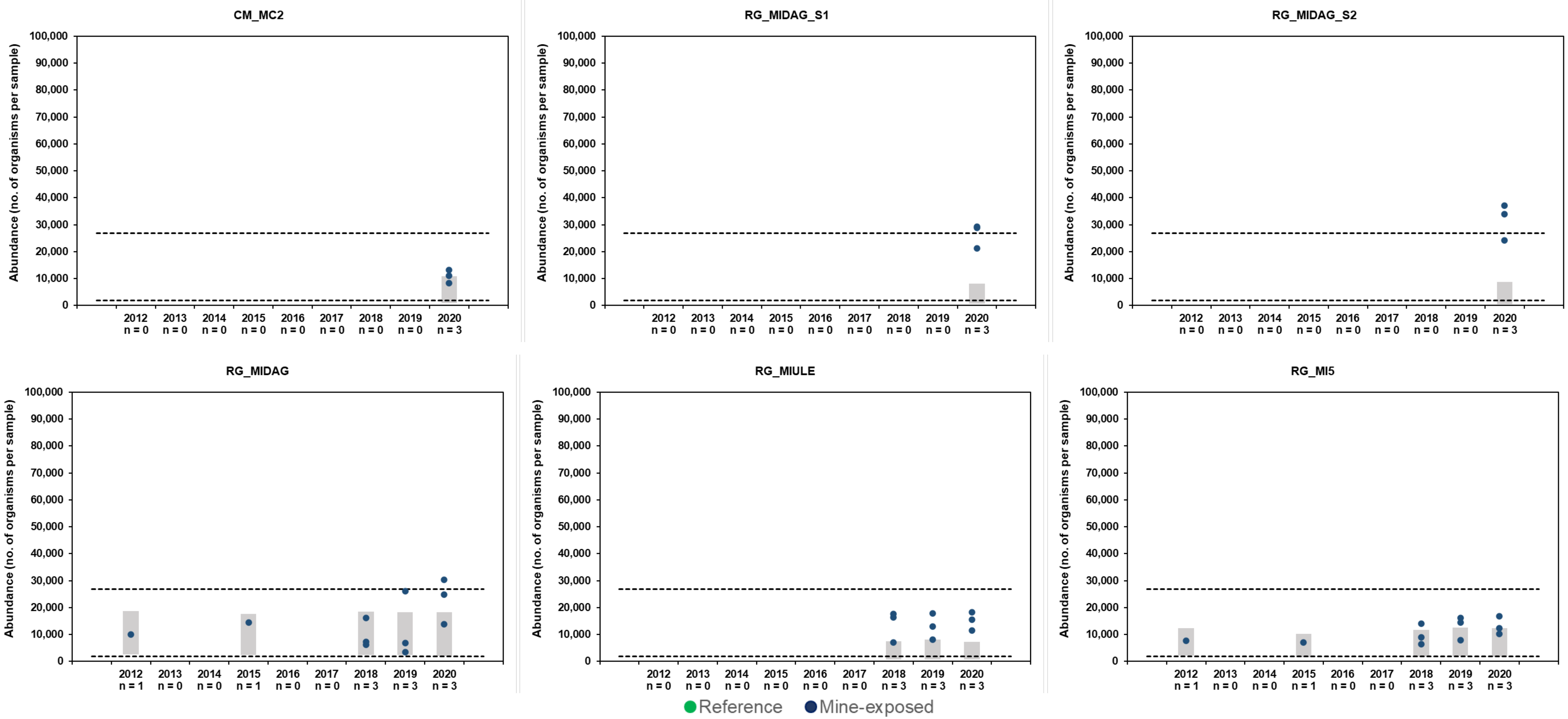
Note: Grey shading represents the site-specific normal ranges (i.e., best attainable endpoints given local landscape predictors) and the dotted line represents the regional normal range defined as the 2.5th and 97.5th percentiles of the 2012 to 2019 reference area data from the RAEMP (Minnow 2020).
LPL = lowest possible level (i.e., species or genus); n = sample size.

Figure 3.0-2a: Benthic Invertebrate Abundance in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



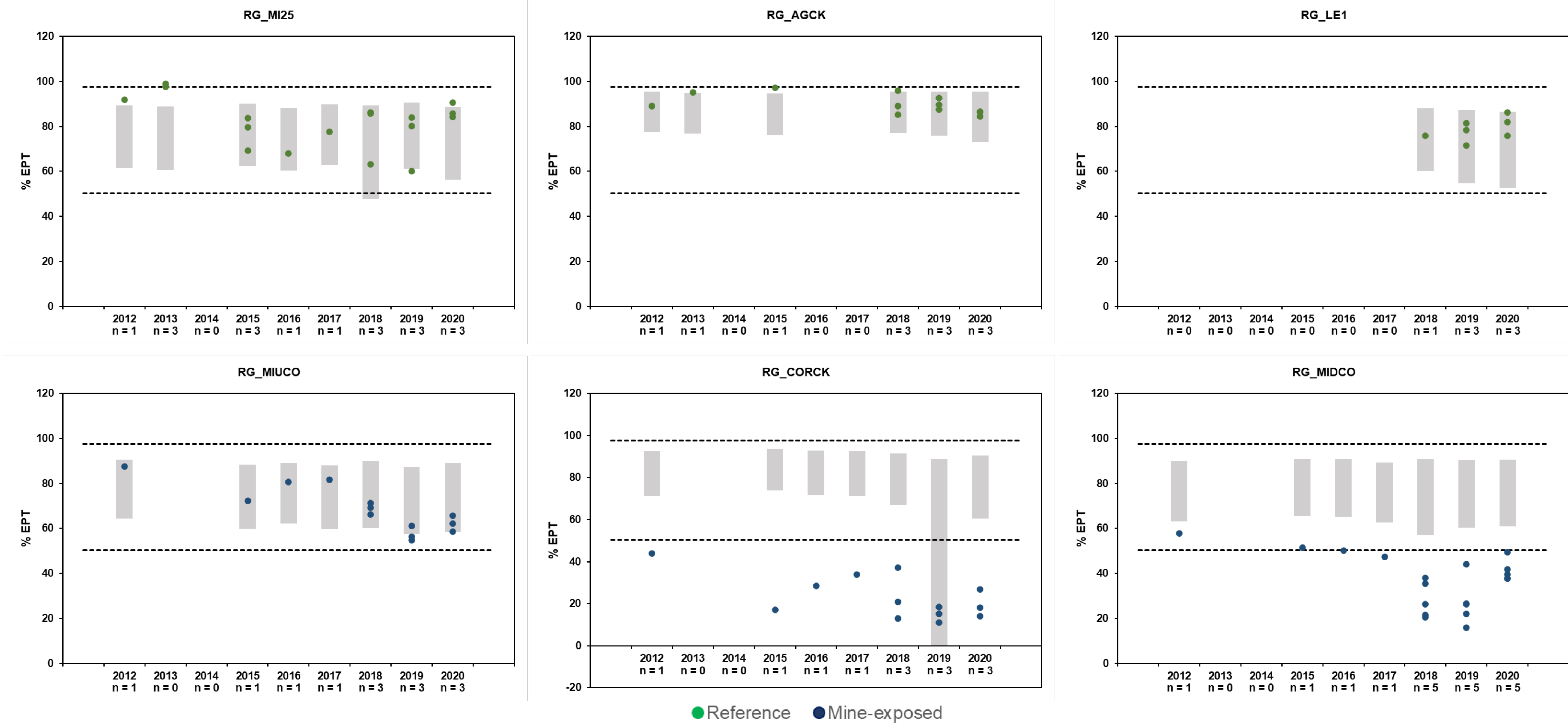
Note: Grey shading represents the site-specific normal ranges (i.e., best attainable endpoints given local landscape predictors) and the dotted line represents the regional normal range defined as the 2.5th and 97.5th percentiles of the 2012 to 2019 reference area data from the RAEMP (Minnow 2020).
n = sample size, no. = number.

Figure 3.0-2b: Benthic Invertebrate Abundance in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



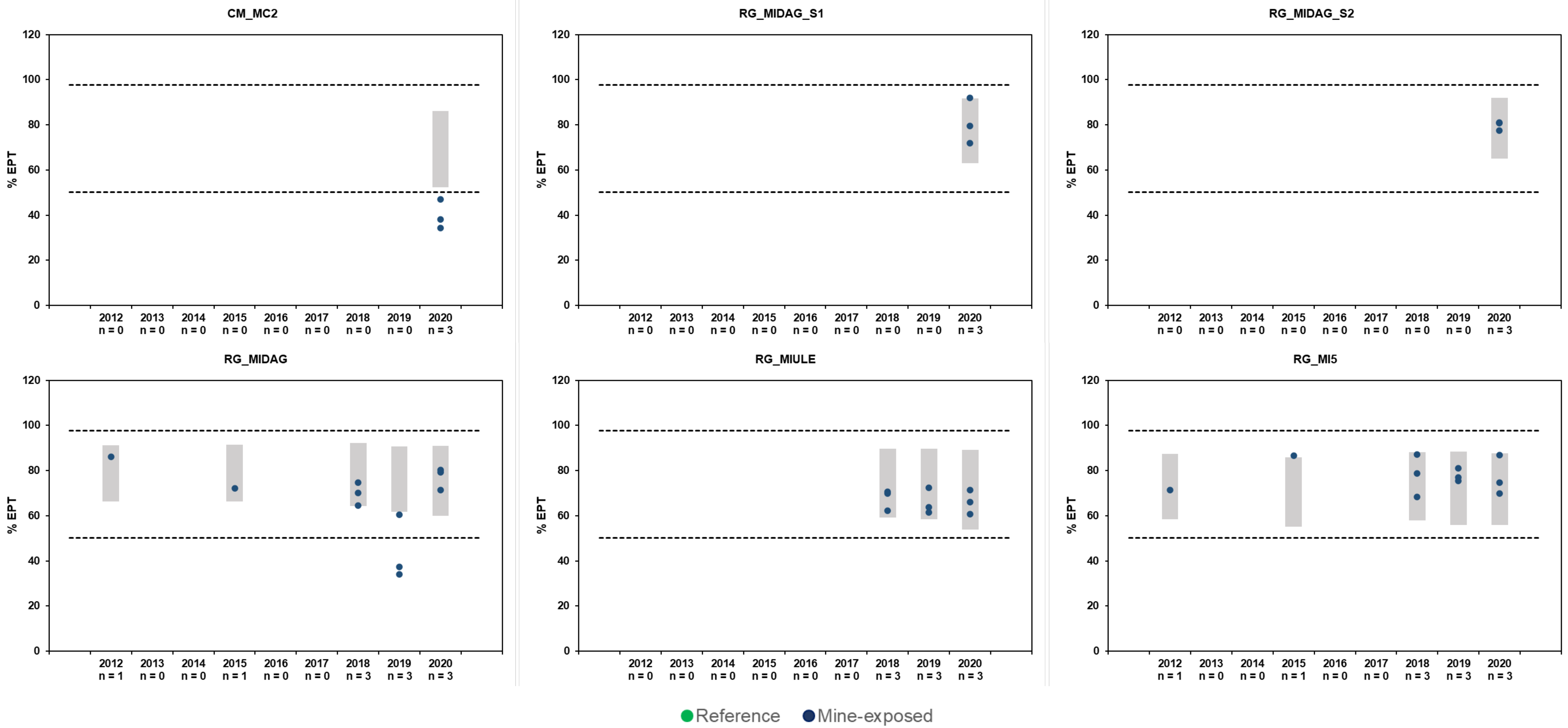
Note: Grey shading represents the site-specific normal ranges (i.e., best attainable endpoints given local landscape predictors) and the dotted line represents the regional normal range defined as the 2.5th and 97.5th percentiles of the 2012 to 2019 reference area data from the RAEMP (Minnow 2020).
n = sample size, no. = number.

Figure 3.0-3a: Percent Ephemeroptera, Plecoptera, Trichoptera in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



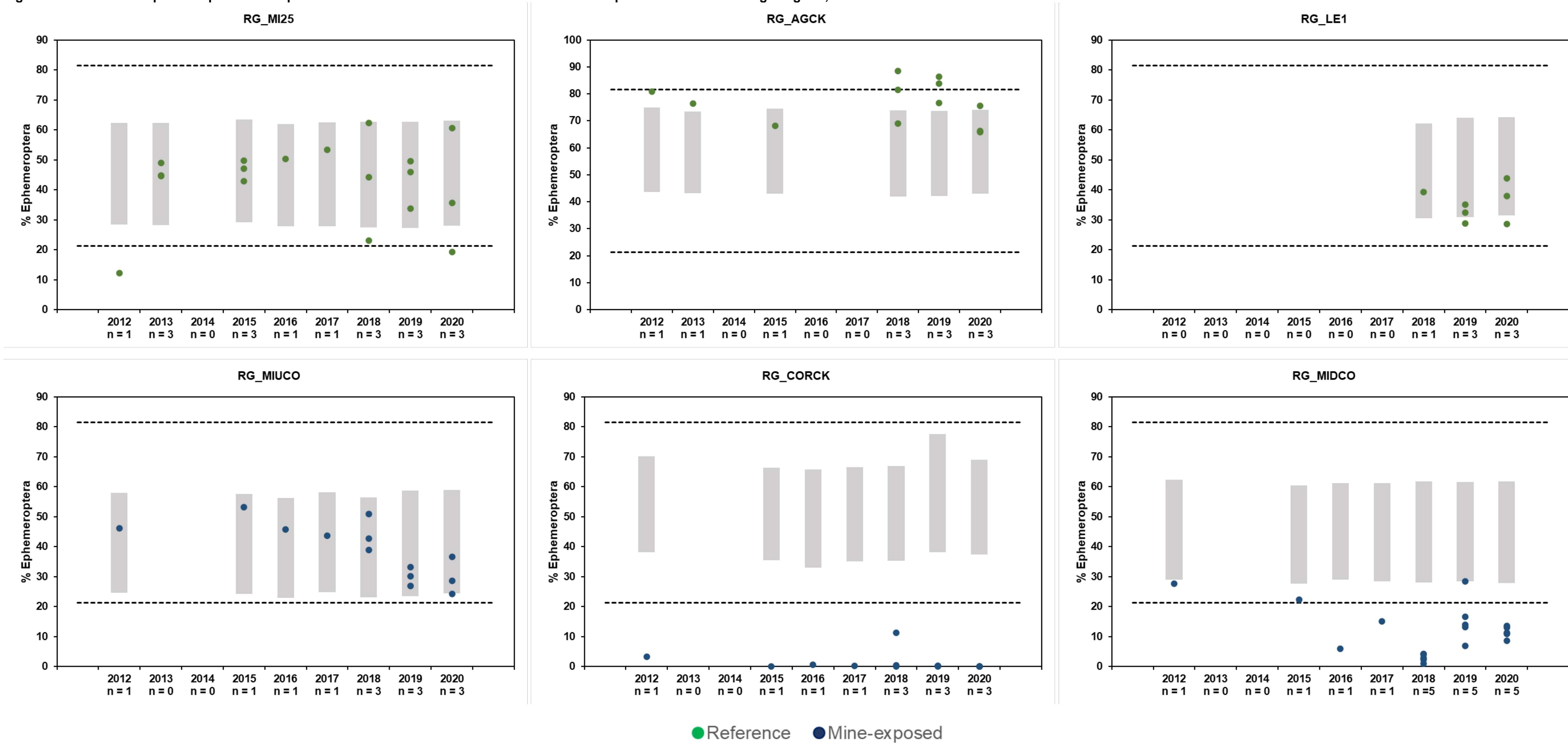
Note: Grey shading represents the site-specific normal ranges (i.e., best attainable endpoints given local landscape predictors) and the dotted line represents the regional normal range defined as the 2.5th and 97.5th percentiles of the 2012 to 2019 reference area data from the RAEMP (Minnow 2020).
% = percent, EPT = Ephemeroptera, Plecoptera, Trichoptera, n = sample size.

Figure 3.0-3b: Percent Ephemeroptera, Plecoptera, Trichoptera in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



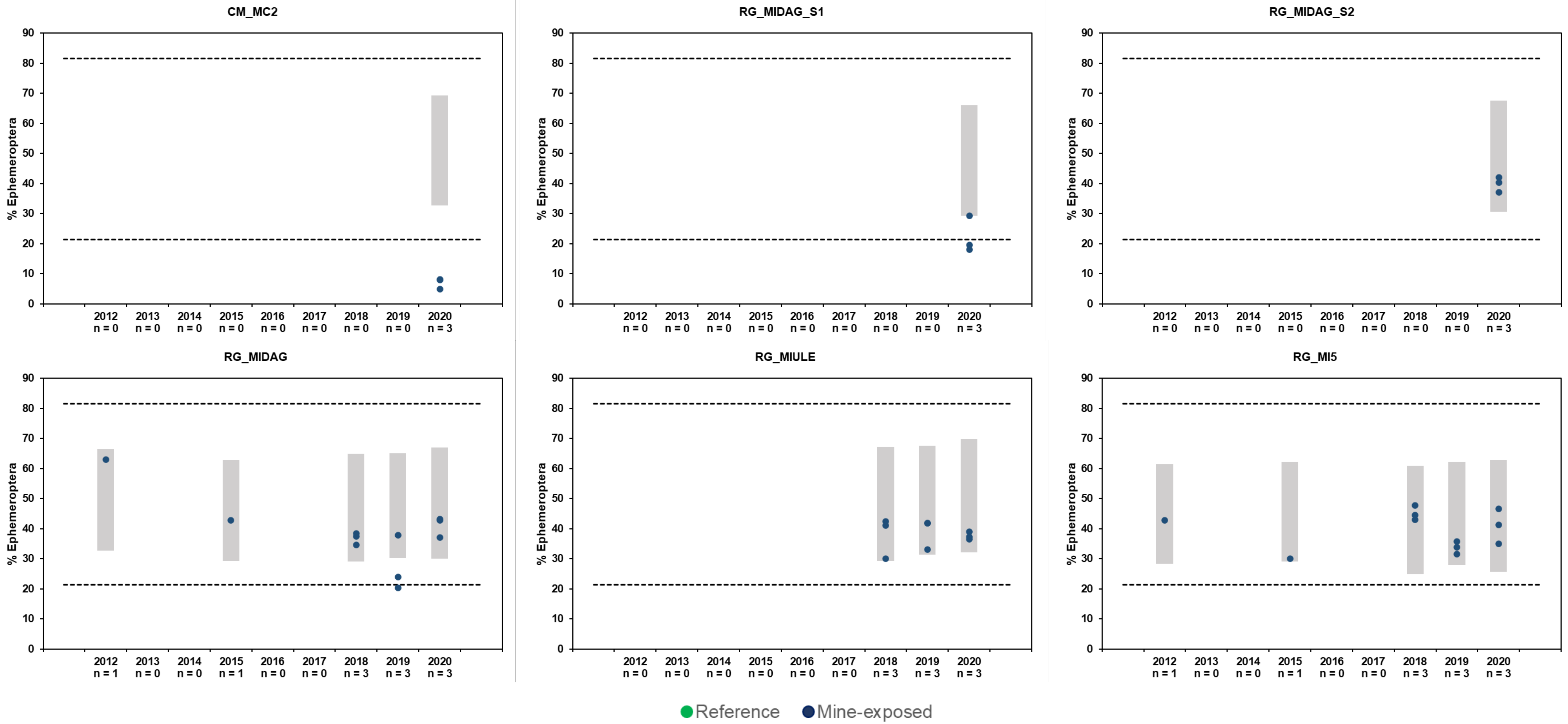
Notes: Grey shading represents the site-specific normal ranges (i.e., best attainable endpoints given local landscape predictors) and the dotted line represents the regional normal range defined as the 2.5th and 97.5th percentiles of the 2012 to 2019 reference area data from the RAEMP (Minnow 2020).
% = percent, EPT = Ephemeroptera, Plecoptera, Trichoptera, n = sample size.

Figure 3.0-4a: Percent Ephemeroptera in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



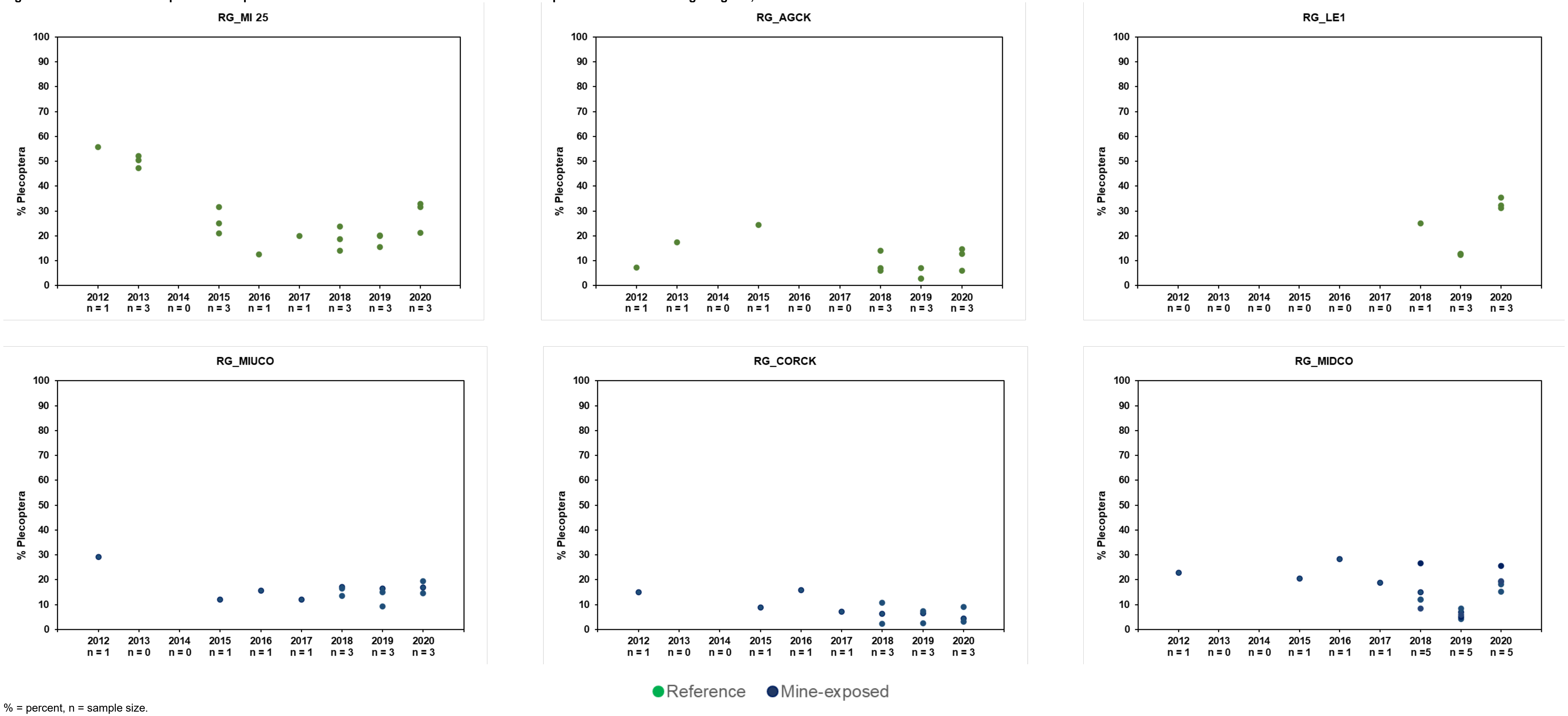
Note: Grey shading represents the site-specific normal ranges (i.e., best attainable endpoints given local landscape predictors) and the dotted line represents the regional normal range defined as the 2.5th and 97.5th percentiles of the 2012 to 2019 reference area data from the RAEMP (Minnow 2020).
% = percent, n = sample size.

Figure 3.0-4b: Percent Ephemeroptera in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



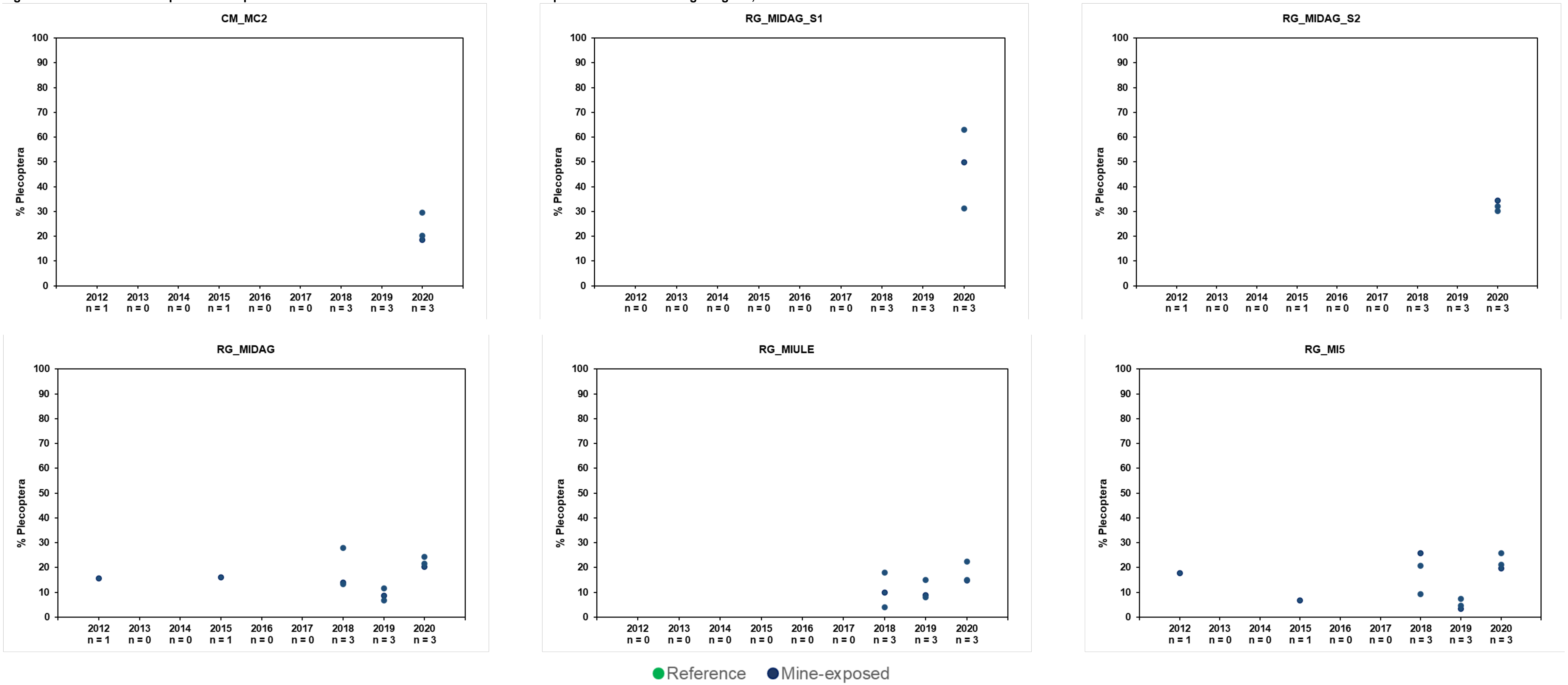
Note: Grey shading represents the site-specific normal ranges (i.e., best attainable endpoints given local landscape predictors) and the dotted line represents the regional normal range defined as the 2.5th and 97.5th percentiles of the 2012 to 2019 reference area data from the RAEMP (Minnow 2020).
% = percent, n = sample size.

Figure 3.0-5a: Percent Plecoptera in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



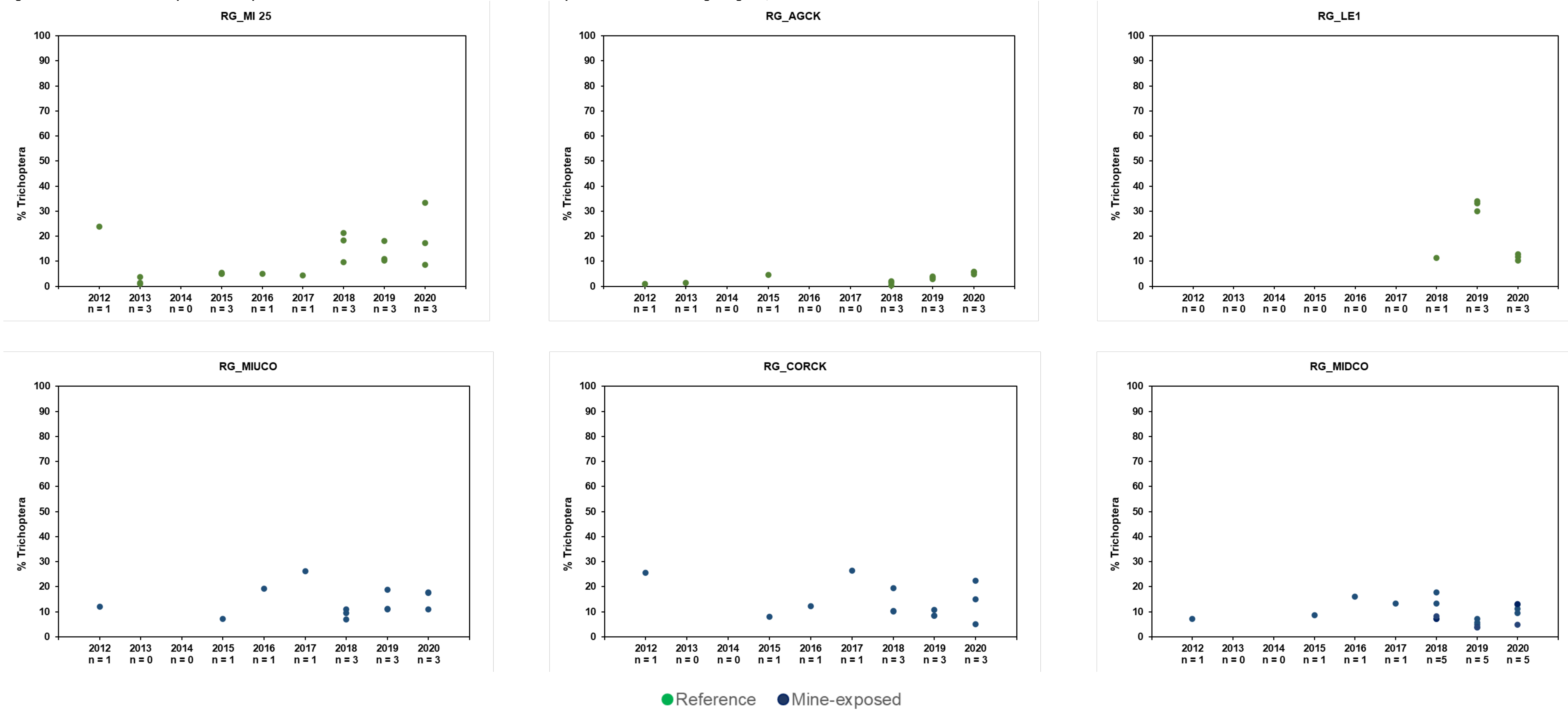
% = percent, n = sample size.

Figure 3.0-5b: Percent Plecoptera in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



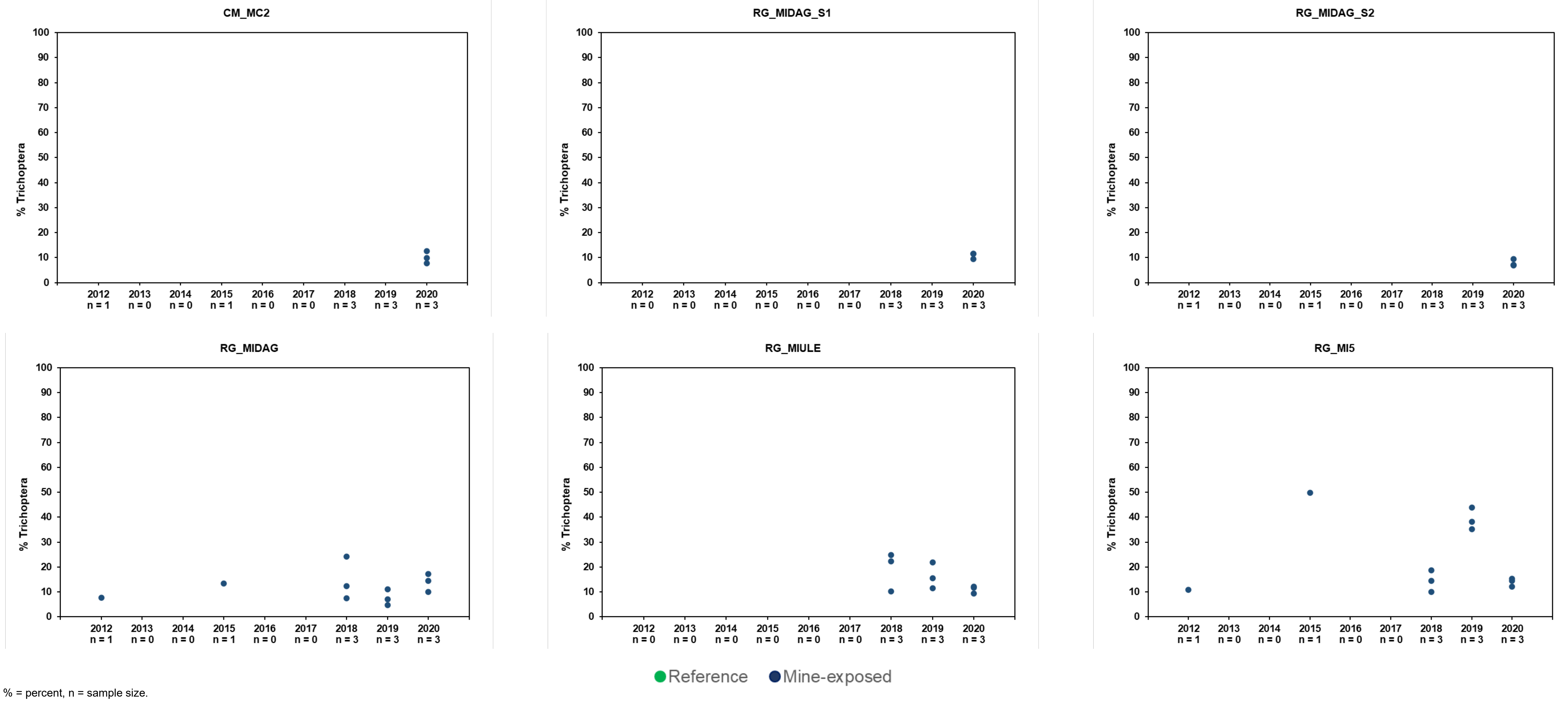
% = percent, n = sample size.

Figure 3.0-6a: Percent Trichoptera in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



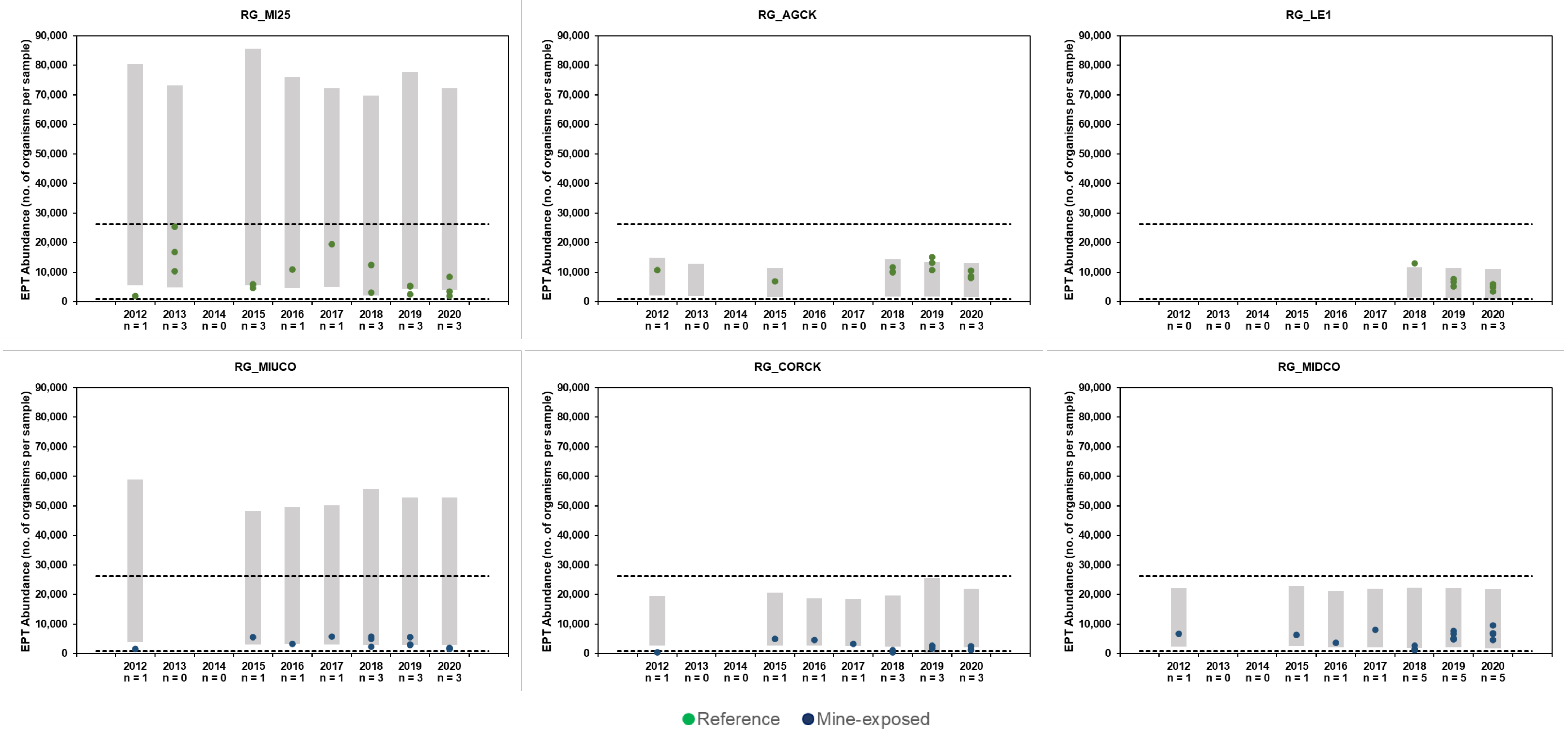
% = percent, n = sample size.

Figure 3.0-6b: Percent Trichoptera in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



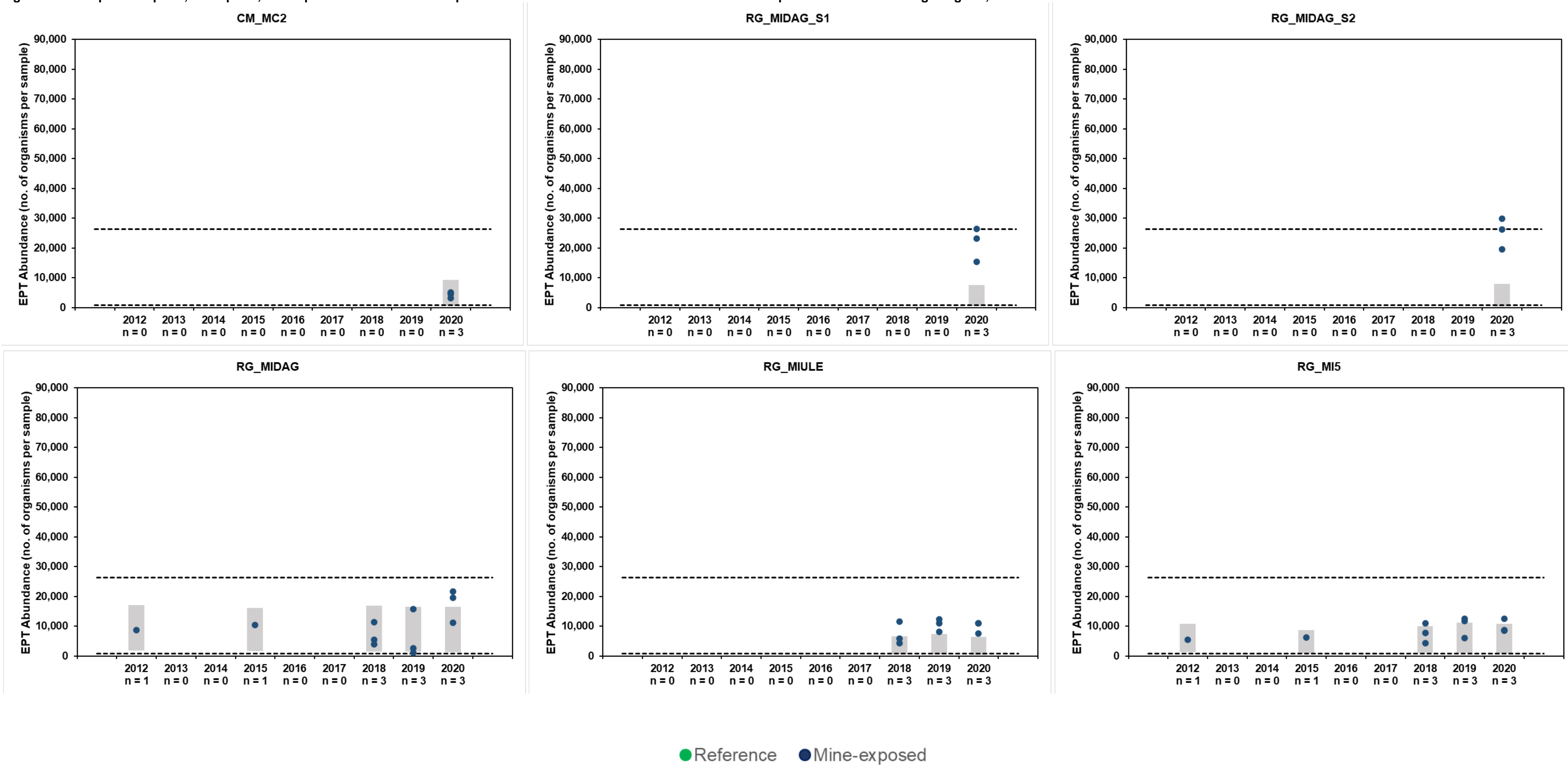
% = percent, n = sample size.

Figure 3.0-7a: Ephemeroptera, Plecoptera, Trichoptera Abundance in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



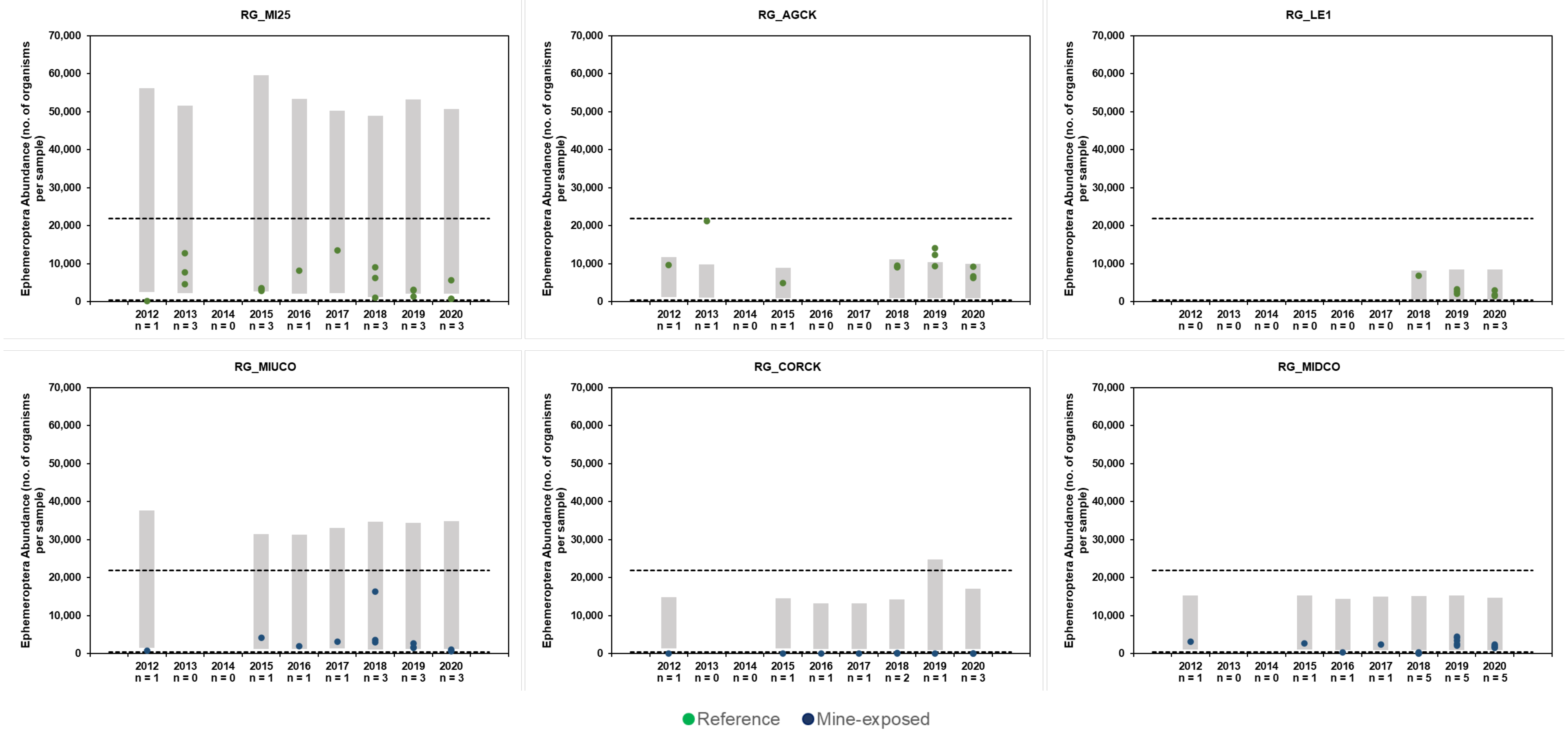
Note: Grey shading represents the site-specific normal ranges (i.e., best attainable endpoints given local landscape predictors) and the dotted line represents the regional normal range defined as the 2.5th and 97.5th percentiles of the 2012 to 2019 reference area data from the RAEMP (Minnow 2020).
EPT = Ephemeroptera, Plecoptera, Trichoptera, No. = number, n = sample size.

Figure 3.0-7b: Ephemeroptera, Plecoptera, Trichoptera Abundance in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



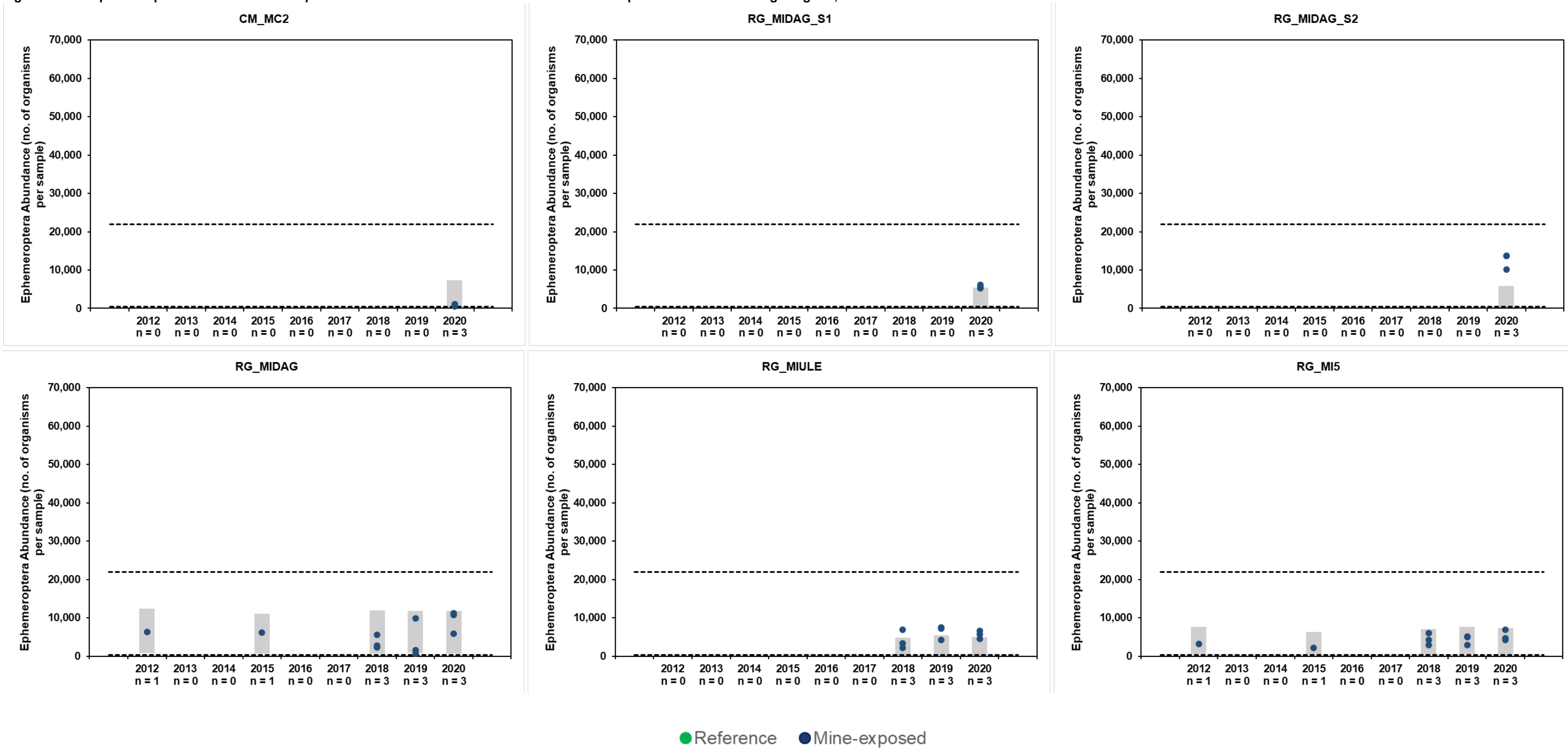
Note: Grey shading represents the site-specific normal ranges (i.e., best attainable endpoints given local landscape predictors) and the dotted line represents the regional normal range defined as the 2.5th and 97.5th percentiles of the 2012 to 2019 reference area data from the RAEMP (Minnow 2020).
EPT = Ephemeroptera, Plecoptera, Trichoptera, No. = number, n = sample size.

Figure 3.0-8a: Ephemeroptera Abundance in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



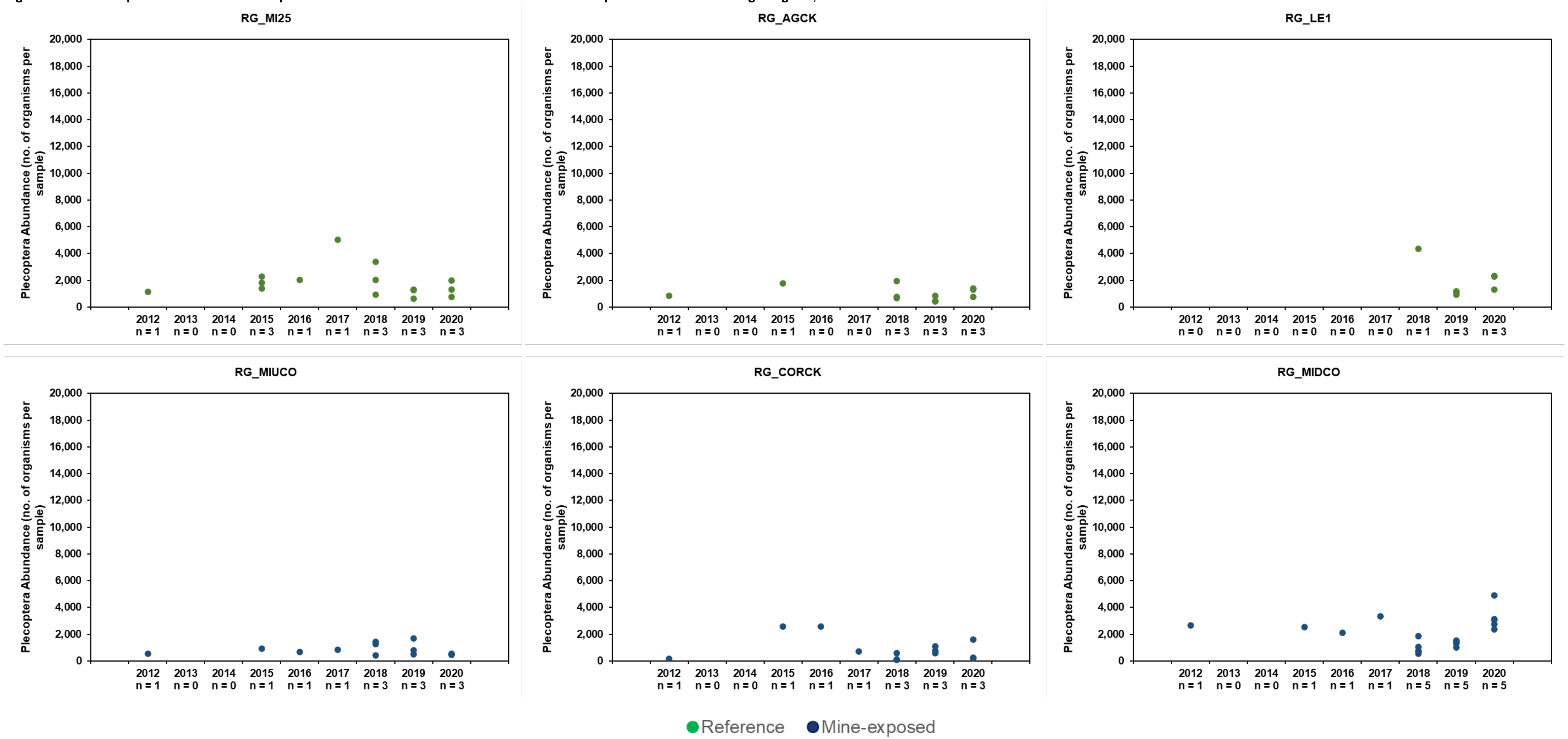
Note: Grey shading represents the site-specific normal ranges (i.e., best attainable endpoints given local landscape predictors) and the dotted line represents the regional normal range defined as the 2.5th and 97.5th percentiles of the 2012 to 2019 reference area data from the RAEMP (Minnow 2020).
No. = number, n = sample size.

Figure 3.0-8b: Ephemeroptera Abundance in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



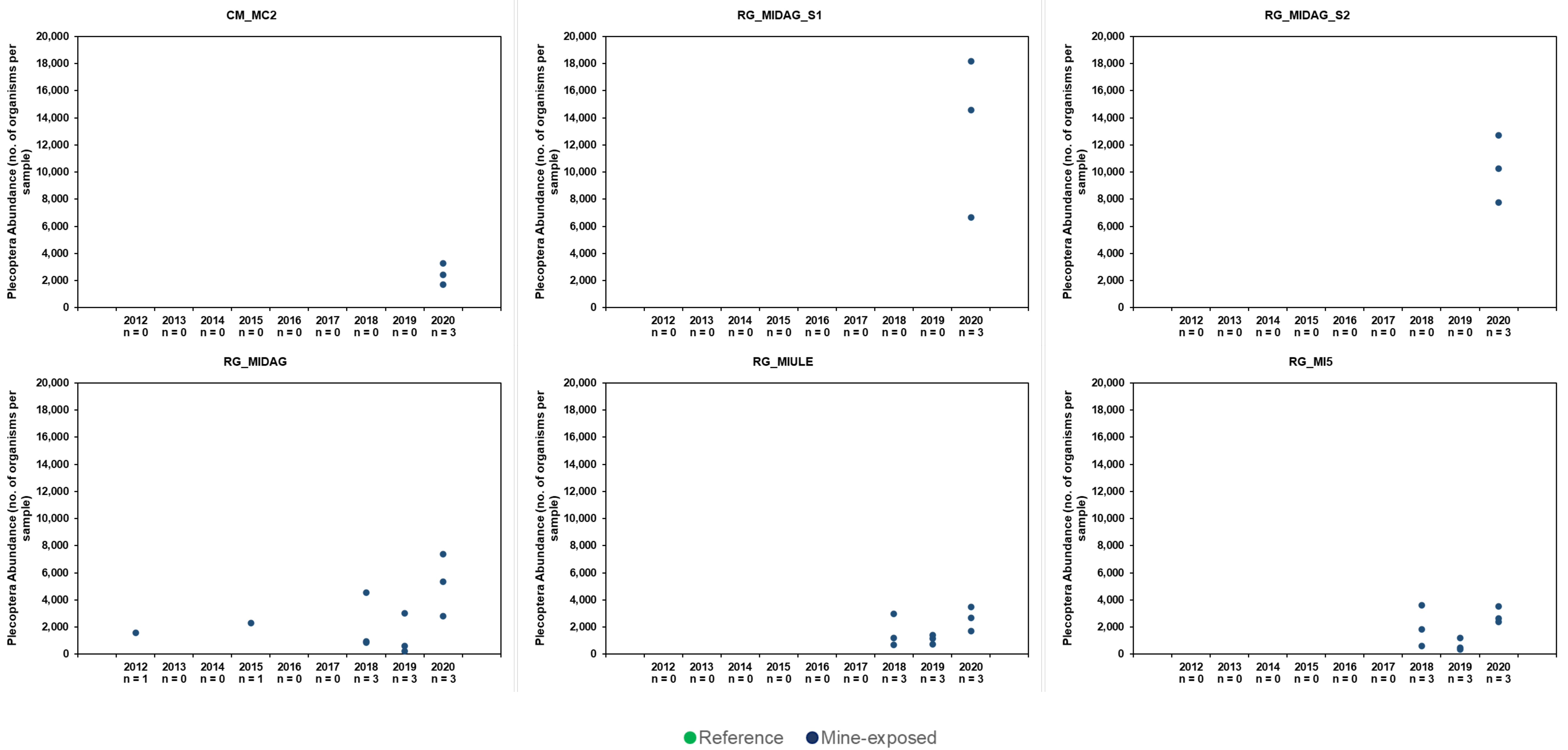
Note: Grey shading represents the site-specific normal ranges (i.e., best attainable endpoints given local landscape predictors) and the dotted line represents the regional normal range defined as the 2.5th and 97.5th percentiles of the 2012 to 2019 reference area data from the RAEMP (Minnow 2020).
No. = number, n = sample size.

Figure 3.0-9a: Plecoptera Abundance in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



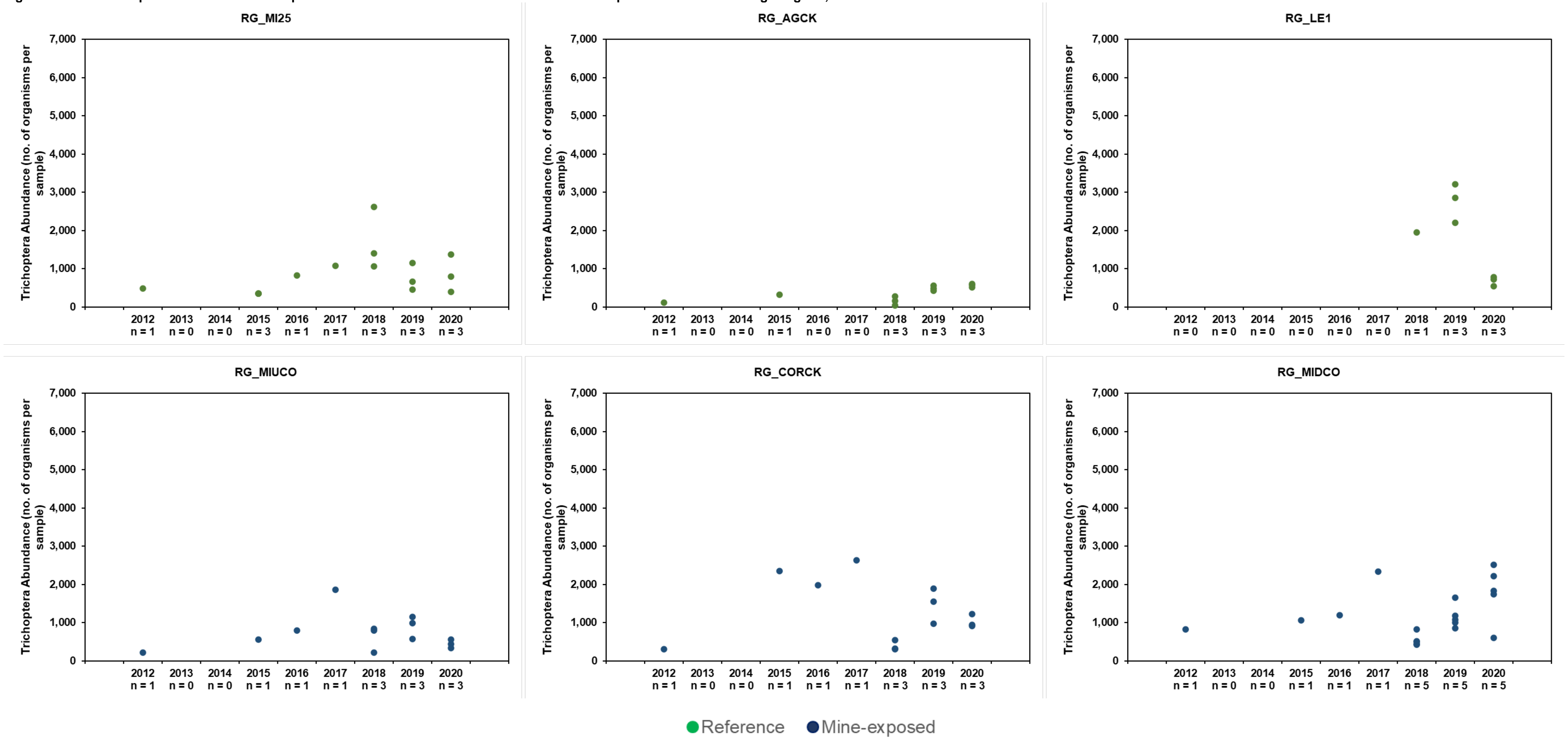
No. = number, n = sample size.

Figure 3.0-9b: Plecoptera Abundance in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



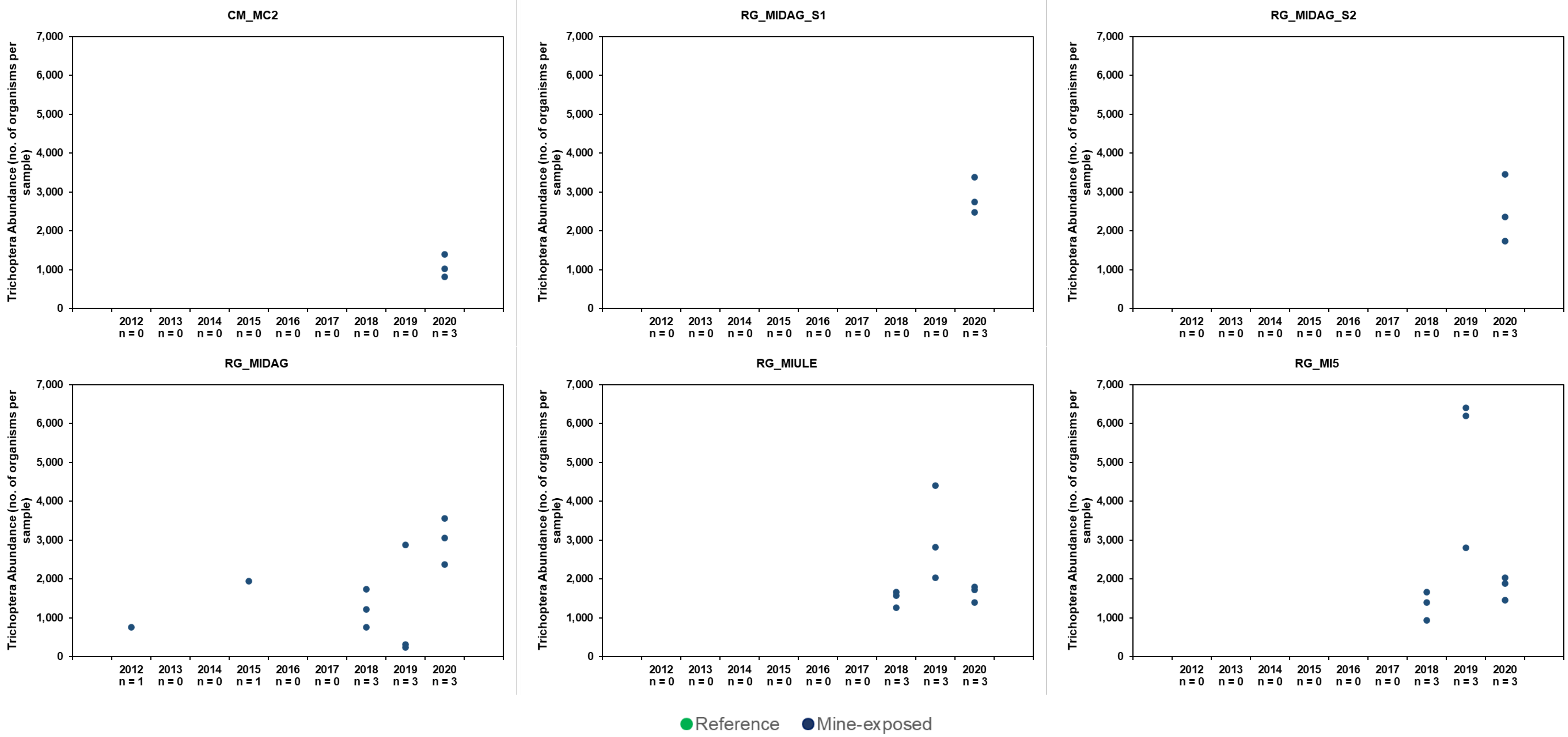
No. = number, n = sample size.

Figure 3.0-10a: Trichoptera Abundance in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



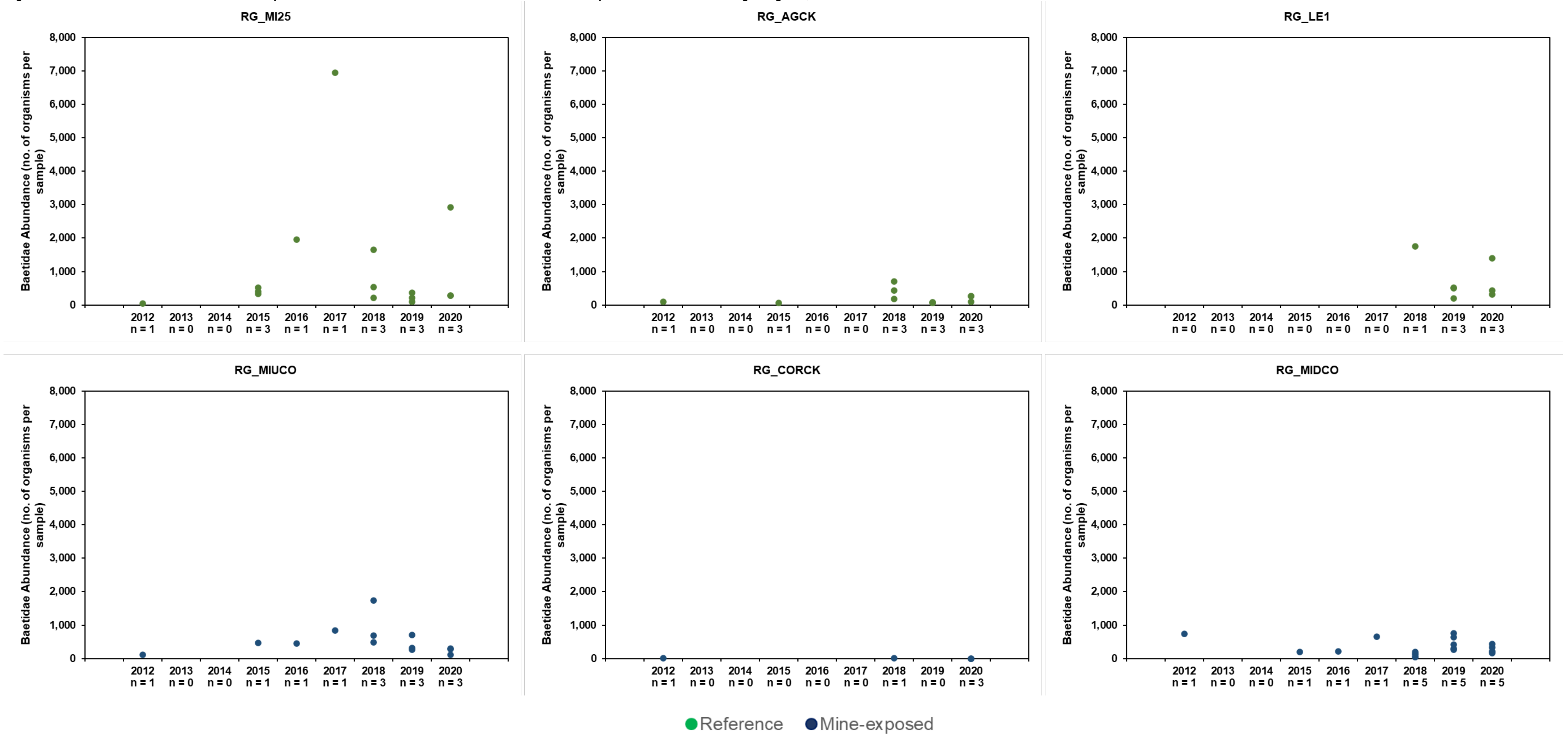
No. = number, n = sample size.

Figure 3.0-10b: Trichoptera Abundance in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



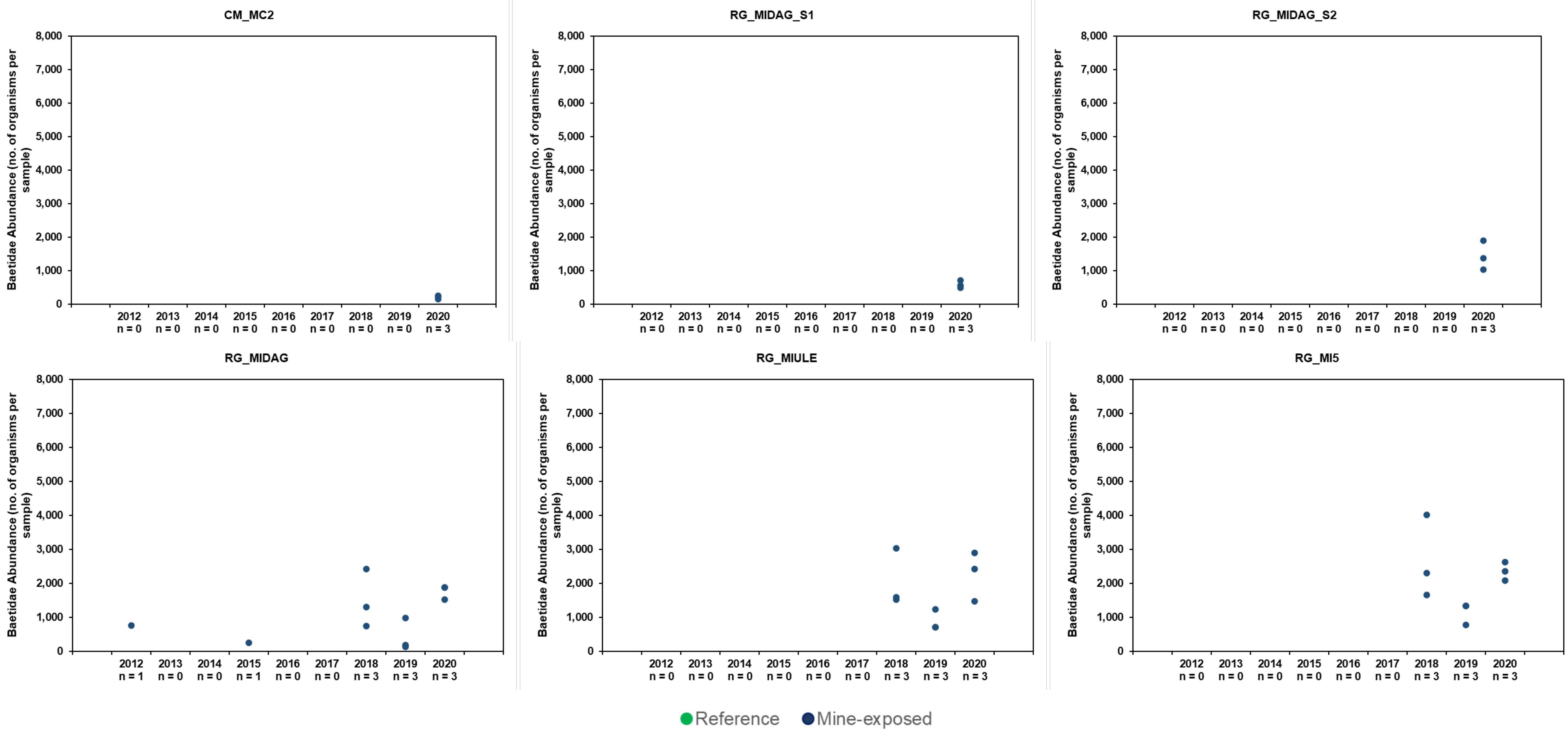
No. = number, n = sample size.

Figure 3.0-11a: Baetidae Abundance in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



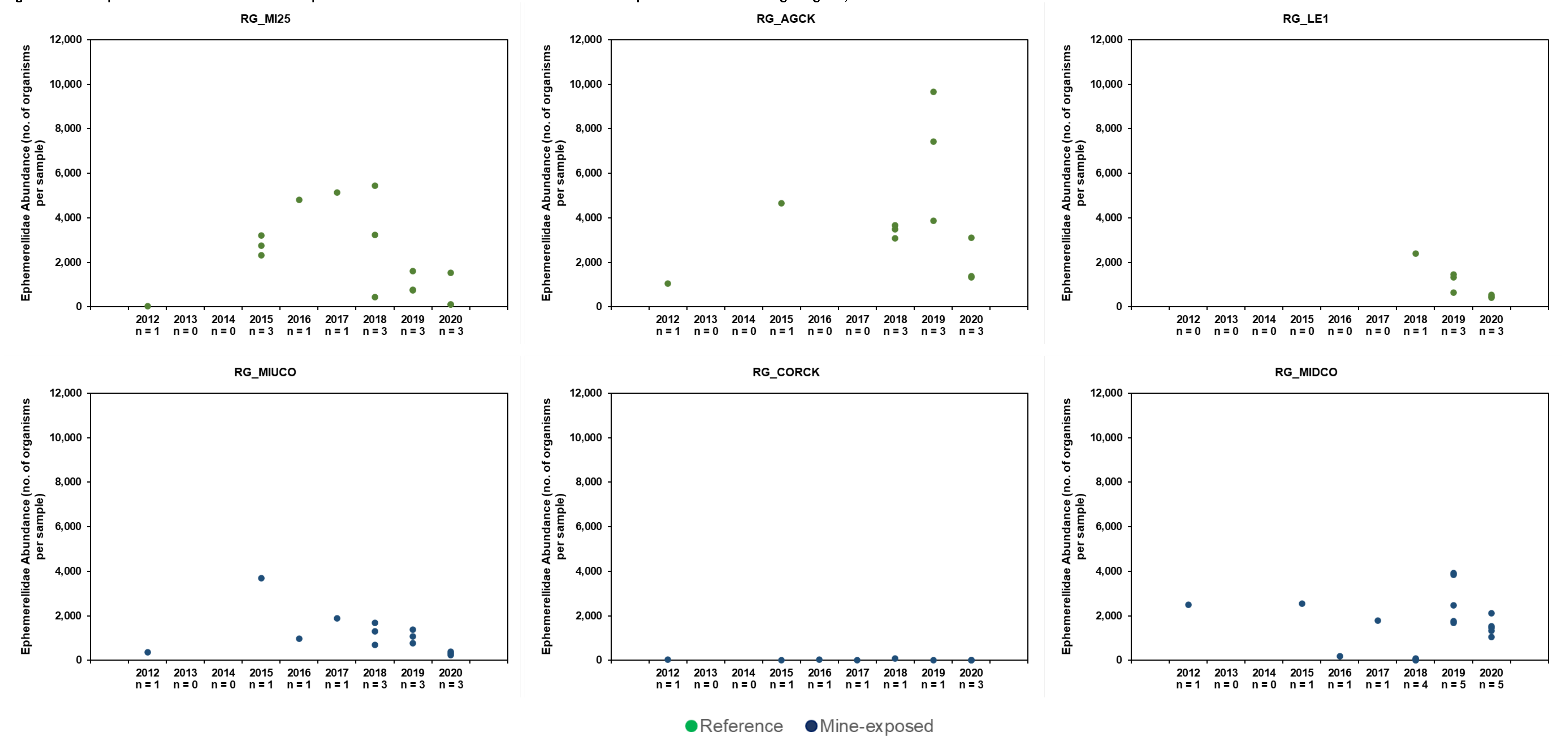
No. = number, n = sample size.

Figure 3.0-11b: Baetidae Abundance in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



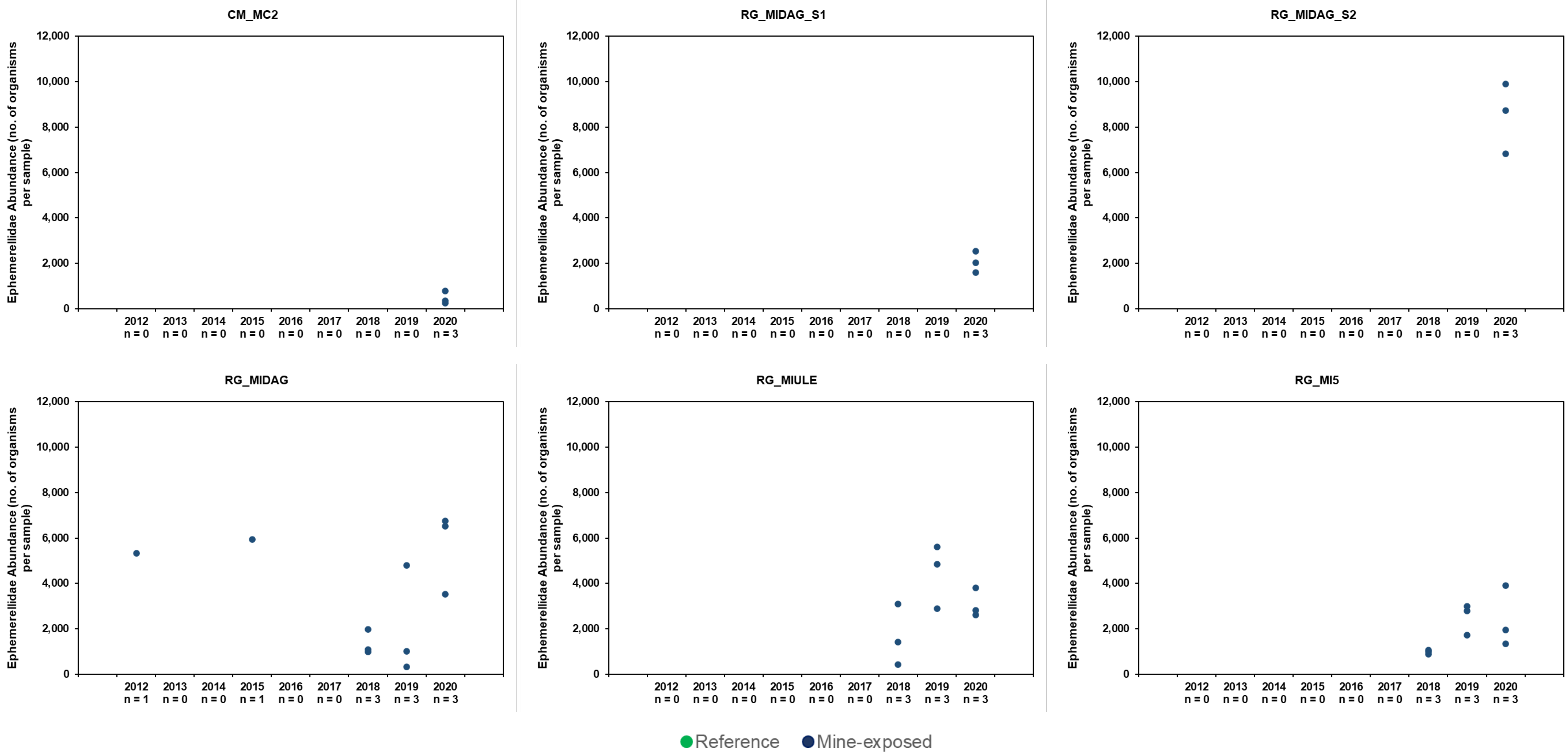
No. = number, n = sample size.

Figure 3.0-12a: Ephemerillidae Abundance in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



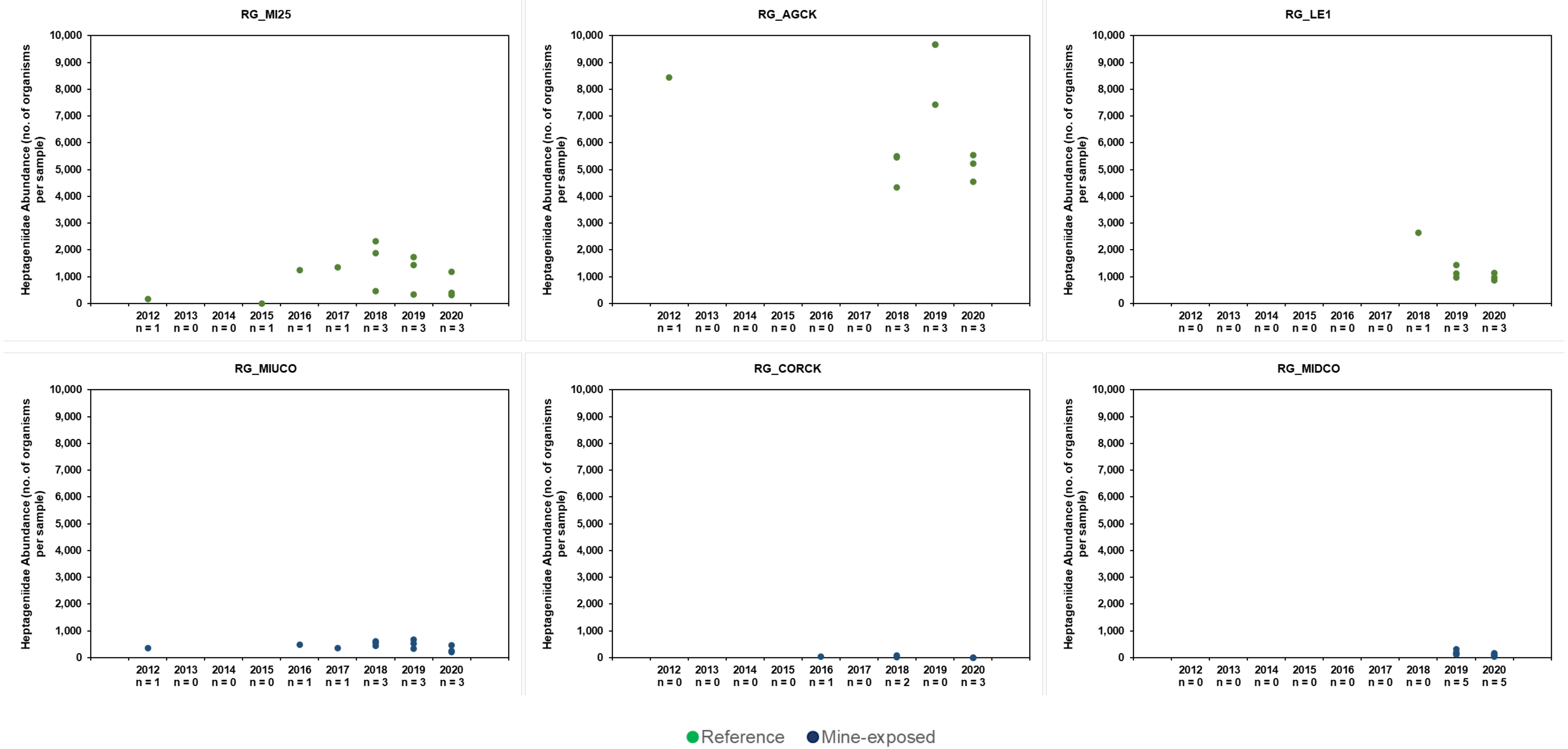
No. = number, n = sample size.

Figure 3.0-12b: Ephemerillidae Abundance in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



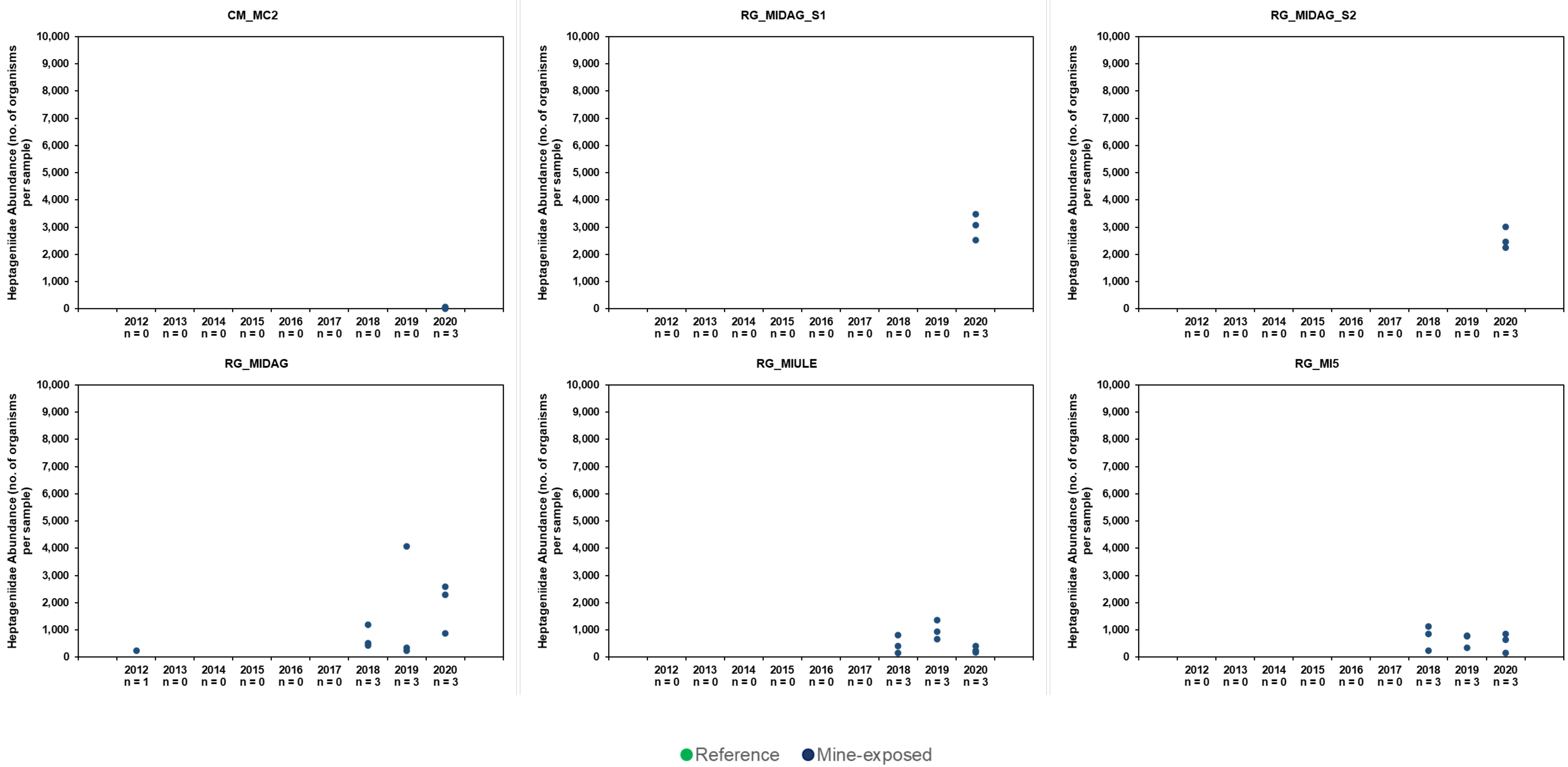
No. = number, n = sample size.

Figure 3.0-13a: Heptageniidae Abundance in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



No. = number, n = sample size.

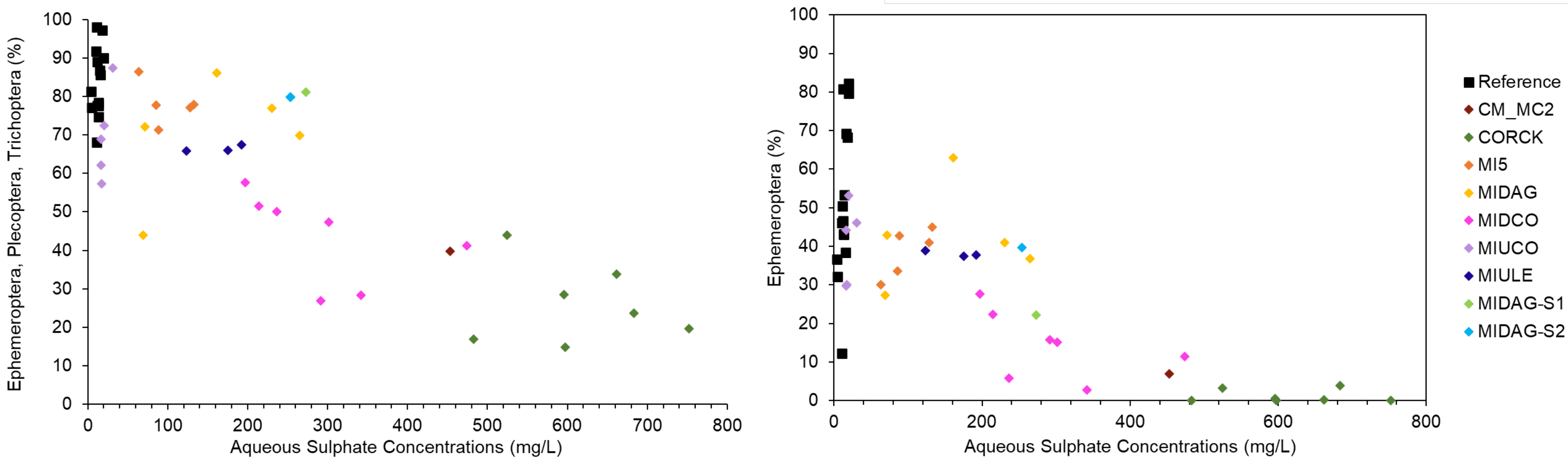
Figure 3.0-13b: Heptageniidae Abundance in Samples Collected from the Coal Mountain Mine Local Aquatic Effects Monitoring Program, 2012 to 2020



No. = number, n = sample size.

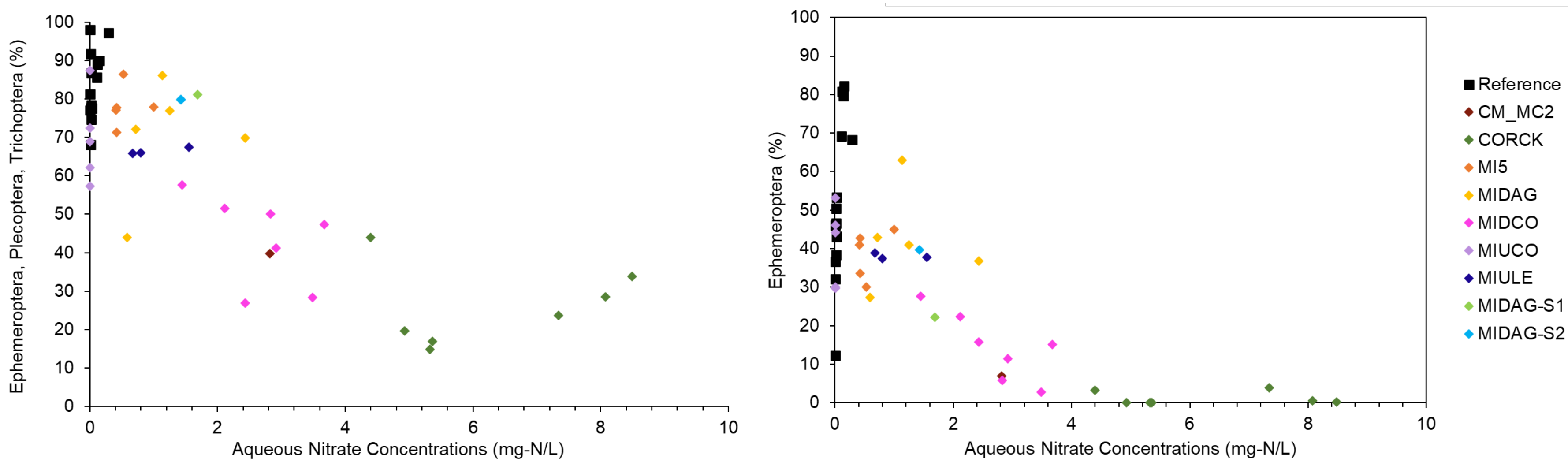
F.3.1 Correlations of Benthic Invertebrate Community Endpoints with Water Quality

Figure 3.1-1: Proportion of Ephemeroptera, Plecoptera, and Trichoptera versus Aqueous Sulphate (left panel) and Proportion of Ephemeroptera versus Aqueous Sulphate (right panel) Concentrations from the CMm LAEMP Study Area, 2012 to 2020.



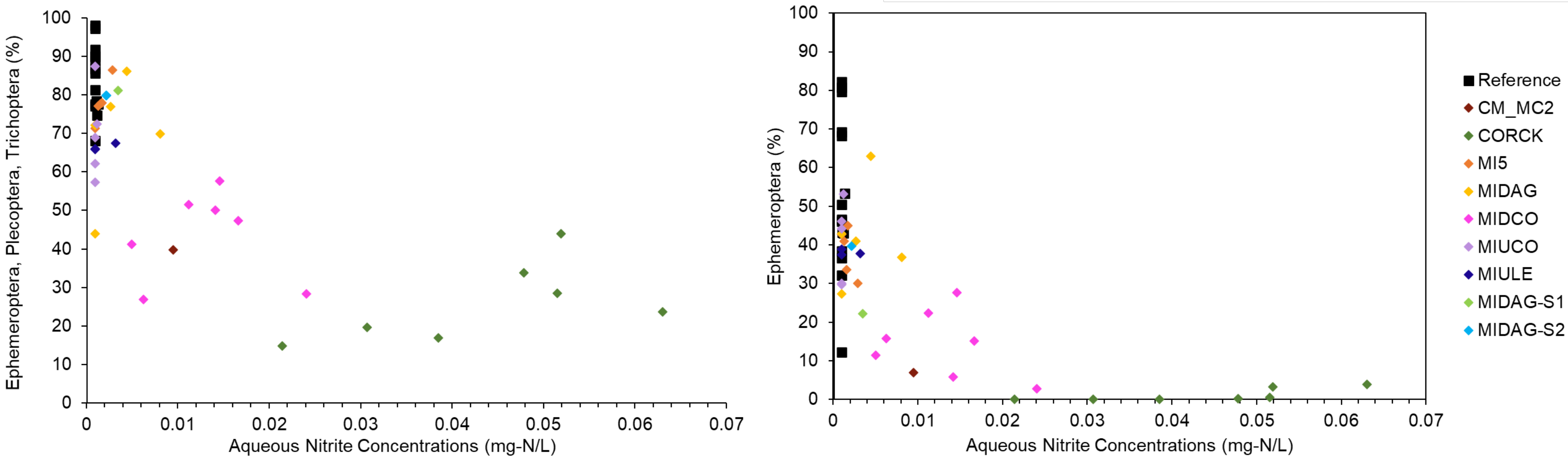
% = percent, mg/L = milligrams per litre

Figure 3.1-2: Proportion of Ephemeroptera, Plecoptera, and Trichoptera versus Aqueous Nitrate (left panel) and Proportion of Ephemeroptera versus Aqueous Nitrate (right panel) Concentrations from the CMm LAEMP Study Area, 2012 to 2020.



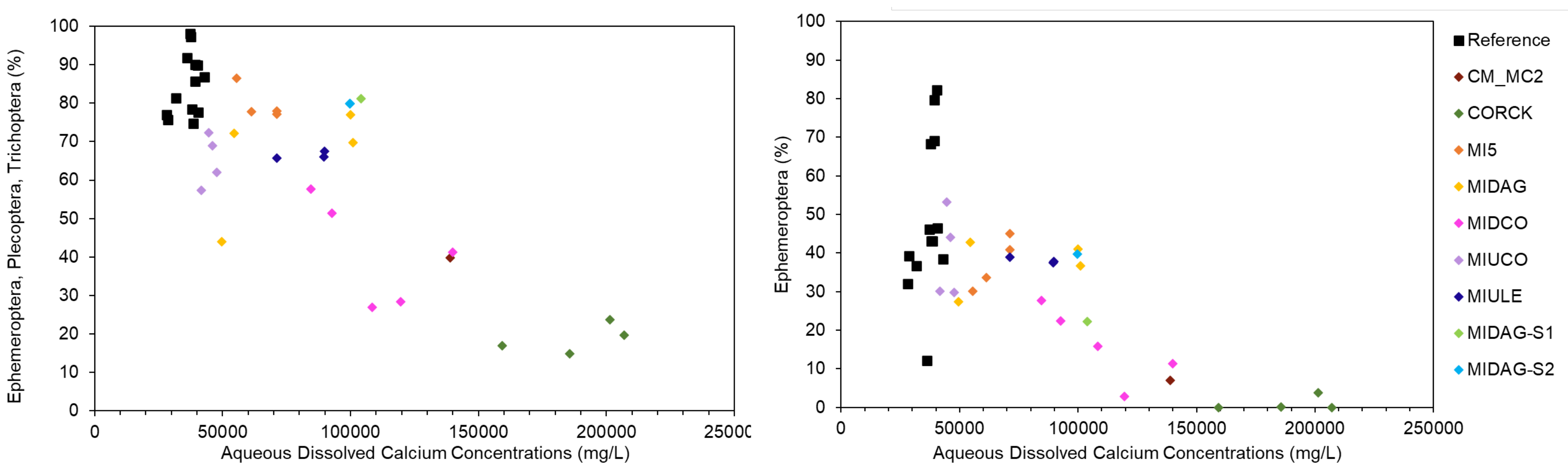
% = percent, mg-N/L = milligrams nitrogen per litre

Figure 3.1-3: Proportion of Ephemeroptera, Plecoptera, and Trichoptera versus Aqueous Nitrite (left panel) and Proportion of Ephemeroptera versus Aqueous Nitrite (right panel) Concentrations from the CMm LAEMP Study Area, 2012 to 2020.



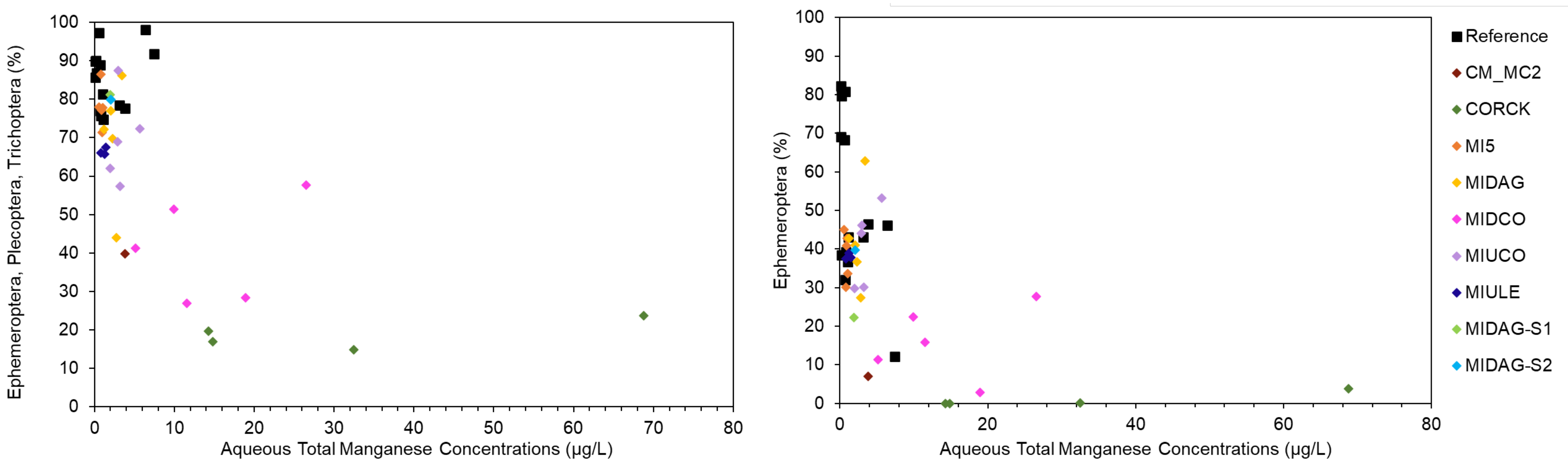
% = percent, mg-N/L = milligrams nitrogen per litre

Figure 3.1-4: Proportion of Ephemeroptera, Plecoptera, and Trichoptera versus Aqueous Calcium (left panel) and Proportion of Ephemeroptera versus Aqueous Calcium (right panel) Concentrations from the CMm LAEMP Study Area, 2012 to 2020.



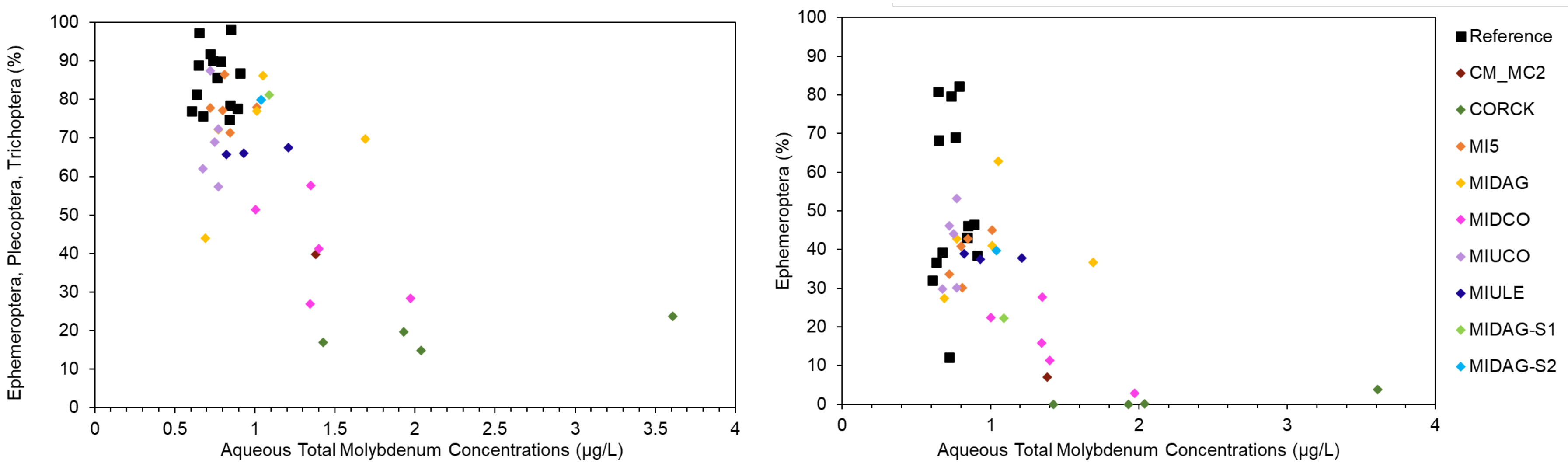
% = percent, mg/L = milligrams per litre

Figure 3.1-5: Proportion of Ephemeroptera, Plecoptera, and Trichoptera versus Aqueous Total Manganese (left panel) and Proportion of Ephemeroptera versus Aqueous Total Manganese (right panel) Concentrations from the CMm LAEMP Study Area, 2012 to 2020.



% = percent, µg/L = micrograms per litre

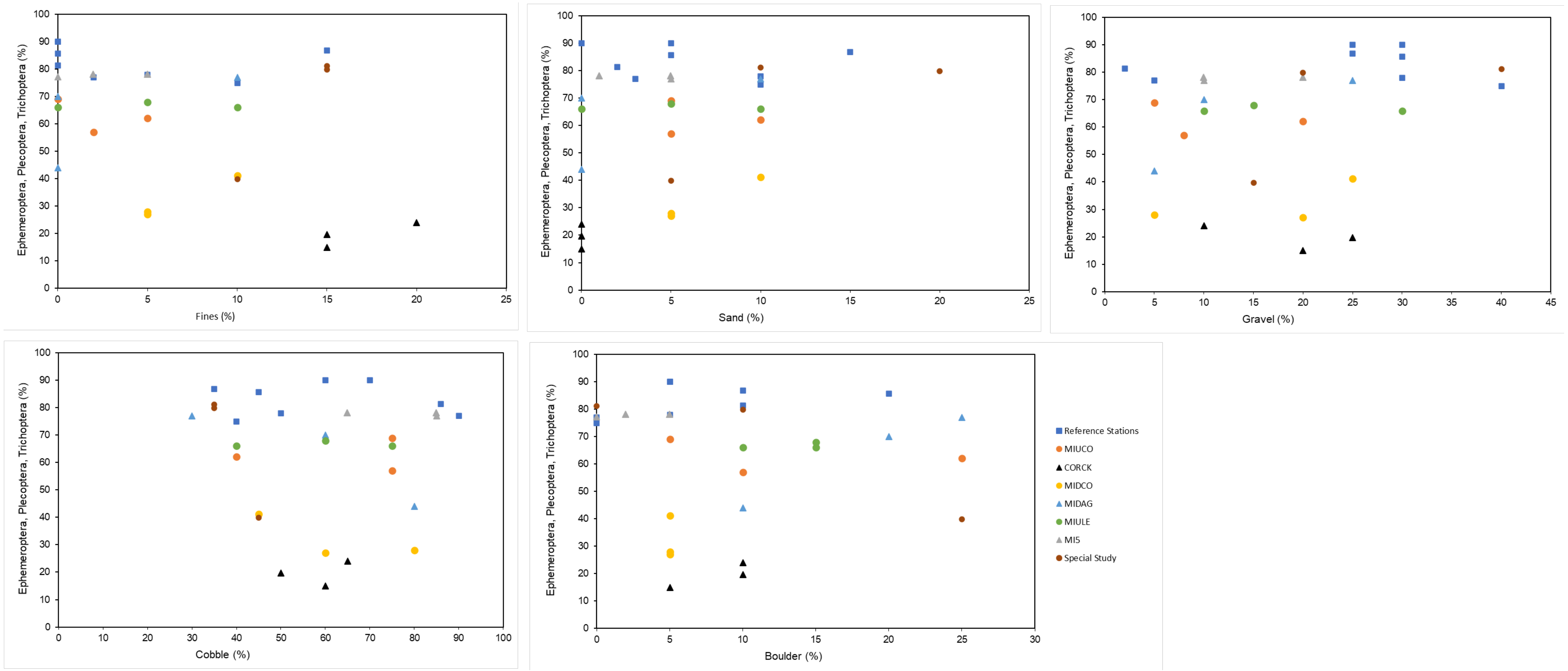
Figure 3.1-6: Proportion of Ephemeroptera, Plecoptera, and Trichoptera versus Aqueous Total Molybdenum (left panel) and Proportion of Ephemeroptera versus Aqueous Total Molybdenum (right panel) Concentrations from the CMm LAEMP Study Area, 2012 to 2020.



% = percent, µg/L = micrograms per litre

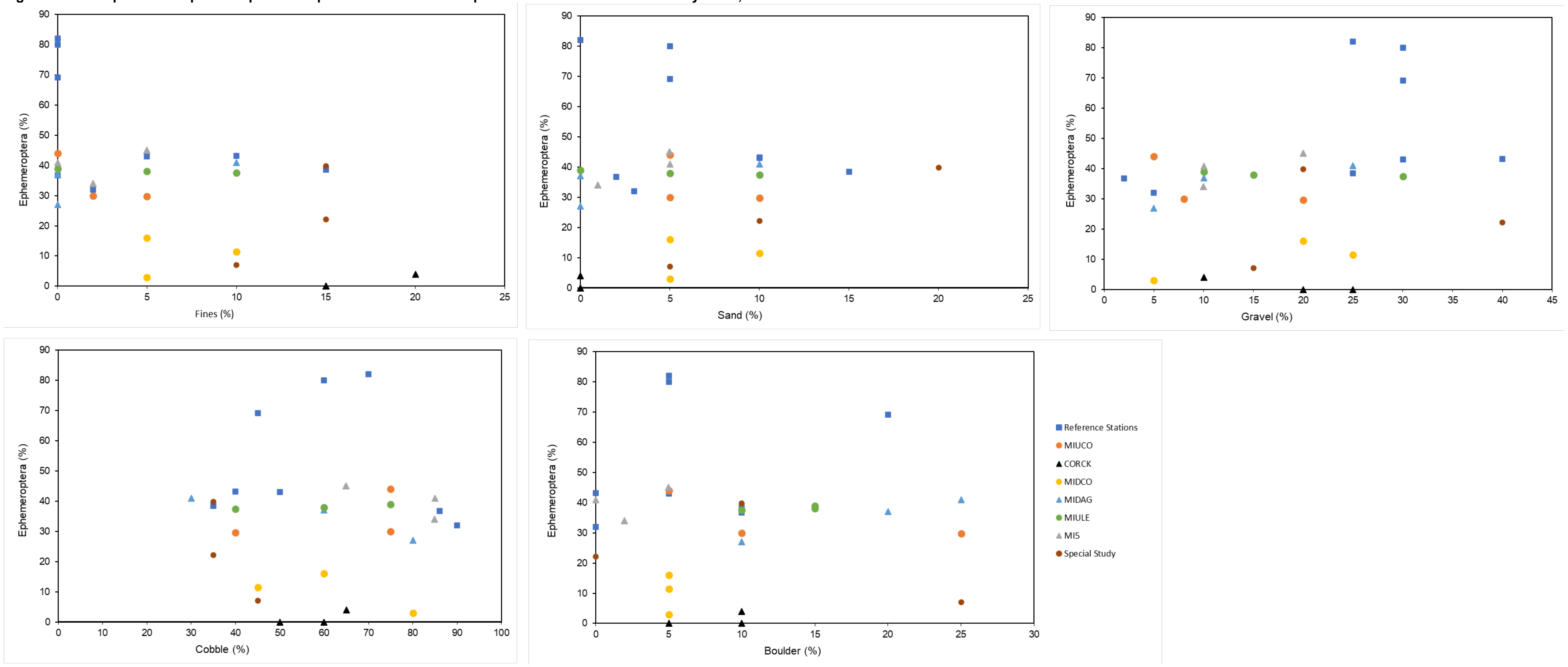
F.4 HABITAT COMPARISON

Figure 4.0-1: Proportion of Ephemeroptera, Plecoptera, and Trichoptera Compared to Substrate Composition in the CMm LAEMP Study Area , 2018 and 2020



% = percent

Figure 4.0-2: Proportion of Ephemeroptera Compared to Substrate Composition in the CMm LAEMP Study Area , 2018 and 2020



% = percent

APPENDIX G

Calcite

Table G-1: Calcite Data at Coal Mountain Operations Local Aquatic Effects Monitoring Program Sampling Stations, 2015 to 2020

Station		Location (UTMs)[a]		Replicates	Calcite Index					
		Easting	Northing		2015	2016	2017	2018	2019	2020
Reference	RG_MI25	668183	5482819	1	0.36	0.00	0.58	0.35	0.00	0.02
				2	0.36	-	-	0.24	0.00	0.00
				3	0.36	-	-	0.02	0.00	0.02
	RG_AGCK	667556	5488649	1	0.00	-	-	0.31	0.00	0.00
				2	-	-	-	0.21	0.00	0.00
				3	-	-	-	0.22	0.00	0.00
	RG_LE1	659635	5494114	1	-	-	-	0.00	0.00	0.00
				2	-	-	-	-	0.00	0.00
				3	-	-	-	-	0.00	0.00
Mine-influenced	RG_MIUCO	668134	5486768	1	0.87	0.52	0.59	1.41	0.00	0.04
				2	-	-	-	0.72	0.00	0.10
				3	-	-	-	0.74	0.00	0.13
	RG_CORCK	668476	5487347	1	1.36	1.00	2.19	2.74	2.30	2.77
				2	-	-	-	1.98	2.30	2.70
				3	-	-	-	2.48	2.90	2.88
	RG_MIDCO	667646	5487701	1	0.69	1	0.91	1.63	0.90	0.61
				2	-	-	-	1.78	0.99	0.55
				3	-	-	-	1.47	0.97	0.5
				4	-	-	-	1.53	0.98	0.62
				5	-	-	-	1.30	0.93	0.82
	RG_CM_MC2[(b)]	667249	5488144	1	-	-	-	-	-	0.64
				2	-	-	-	-	-	0.7
				3	-	-	-	-	-	0.8
	SS_MIDAG-S1[(b)]	666290	5488507	1	-	-	-	-	-	0.19
				2	-	-	-	-	-	0.04
				3	-	-	-	-	-	0.06
	SS_MIDAG-S2[(b)]	665770	5488854	1	-	-	-	-	-	0.01
				2	-	-	-	-	-	0.02
				3	-	-	-	-	-	0.07
	RG_MIDAG	665240	5489482	1	0.36	-	-	0.66	0.00	0.03
				2	-	-	-	0.55	0.00	0.01
				3	-	-	-	0.55	0.00	0.01
	RG_MIULE	660502	5493049	1	-	-	-	1.02	0.00	0.02
				2	-	-	-	0.56	0.00	0.04
				3	-	-	-	0.6	0.00	0.07
	RG_MI5	659501	5496620	1	0.5	-	-	0.42	0.00	0.03
				2	-	-	-	0.37	0.00	0.11
				3	-	-	-	0.80	0.00	0.09

a) UTM coordinates provided are from 2020 sampling program.
b) Supplemental stations for the Nickel Benchmark Study
- = data not available or data not recorded.

APPENDIX H

Sediment Quality Screening

Table H-1: Sediment Quality Screening Table, CMO LAEMP, 2020

Location		BC Working Sediment Quality Guidelines for the Protection of Aquatic Life		Reference Sites							Mine-Influenced Sites				
Watercourse				Michel Creek			Andy Goode Creek	Leach Creek			Michel Creek				
Station				MI25			AGCK	LE1			MIUCO				
Sample ID				RG_MI25_SE-1_2020-09-11_1016	RG_MI25_SE-2_2020-09-11_1033	RG_MI25_SE-3_2020-09-11_1455	RG_AGCK_SE-1_2020-09-10_1622	RG_LE1_SE-1_2020-09-17_1420	RG_LE1_SE-2_2020-09-17_1540	RG_LE1_SE-3_2020-09-17_1550	RG_MIUCO_SE-1_2020-09-12_1026	RG_MIUCO_SE-2_2020-09-12_1137	RG_MIUCO_SE-3_2020-09-12_1403	RG_MIUCO_SE-4_2020-09-12_1348	RG_MIUCO_SE-5_2020-09-12_1325
Replicate		Lower WSQG (mg/kg dw)	Upper WSQG (mg/kg dw)	1	2	3	1	1	2	3	1	2	3	4	5
Date				11-Sep-20	11-Sep-20	11-Sep-20	10-Sep-20	17-Sep-20	17-Sep-20	17-Sep-20	12-Sep-20	12-Sep-20	12-Sep-20	12-Sep-20	12-Sep-20
Parameter	Unit														
Physical Tests															
Moisture Content	%	-	-	56	57	55	91	43	43	35	61	70	39	46	44
pH (1:2 soil to water)	pH	-	-	8.0	7.9	8.1	7.1	7.7	7.4	7.9	7.9	7.9	8.1	8.1	8.0
pH (1:9 soil to water)	pH	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Texture	-	-	-	Silt loam	Loamy sand	Silt loam	Silt loam	Sandy loam	Sandy loam	Sandy loam	Silt loam	Silt loam	Loamy sand	Loamy sand	Sandy loam
Particle Size Distribution															
% Gravel (>2mm)	%	-	-	<1.0	<1.0	<1.0	1.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
% Sand (2.00mm to 1.00mm)	%	-	-	<1.0	4.4	<1.0	4.6	<1.0	<1.0	<1.0	<1.0	2.8	1.7	1.0	<1.0
% Sand (1.00mm to 0.50mm)	%	-	-	1.5	16	<1.0	7.7	1.1	2.1	<1.0	1.6	4.9	3.4	2.9	2.3
% Sand (0.50mm to 0.25mm)	%	-	-	3.2	28	2.7	6.8	6.5	9.3	9.8	5.1	6.0	14	14	10
% Sand (0.25mm to 0.125mm)	%	-	-	14	18	13	7.0	24	31	25	10	6.4	30	31	21
% Sand (0.125mm to 0.063mm)	%	-	-	18	9.0	21	8.3	28	24	28	17	13	24	23	22
% Silt (0.063mm to 0.0312mm)	%	-	-	27	7.8	27	28	18	15	17	27	29	12	12	19
% Silt (0.0312mm to 0.004mm)	%	-	-	29	11	29	29	17	14	15	31	33	10	11	19
% Clay (<4µm)	%	-	-	6.9	6.1	7.1	7.4	5.2	4.5	4.0	7.1	5.2	3.2	4.1	5.4
Organic Carbon															
Total Organic Carbon	%	-	-	3.4	2.0	2.9	8.9	2.9	5.8	1.6	3.4	5.2	1.4	2.0	2.4
Total Metals (<2mm fractions)															
Aluminum	mg/kg	-	-	16000	15400	15900	3550	9410	9650	10600	15900	14100	15400	15100	15800
Antimony	mg/kg	-	-	0.57	0.63	0.54	0.43	1.1	1.1	1.2	0.27	0.15	0.2	0.33	0.34
Arsenic	mg/kg	5.9	17	**10**	**12**	**10**	**6.1**	5.3	5.6	**6.0**	**7.5**	**6.4**	**7.0**	**8.1**	**7.6**
Barium	mg/kg	-	-	164	171	164	72	302	313	303	208	229	223	220	173
Beryllium	mg/kg	-	-	0.88	0.93	0.9	0.44	0.59	0.66	0.62	0.86	0.85	0.83	0.89	0.9
Bismuth	mg/kg	-	-	0.24	0.25	0.22	<0.20	<0.20	<0.20	<0.20	0.2	<0.20	<0.20	<0.20	<0.20
Boron	mg/kg	-	-	15	13	16	7.0	<5.0	<5.0	5.3	17	15	16	16	16
Cadmium	mg/kg	0.6	3.5	**1.3**	**1.5**	**1.3**	0.56	**1.6**	**2.0**	**1.5**	**0.86**	**0.88**	**0.61**	**0.68**	**0.77**
Calcium	mg/kg	-	-	17100	16700	16500	138000	5380	5170	4940	17900	32600	18800	12600	12700
Chromium	mg/kg	37	90	20	20	20	9.0	18	19	19	20	18	18	19	19
Cobalt	mg/kg	-	-	8.2	9.4	8.1	2.3	5.6	6.0	6.1	8.1	6.6	7.2	8.2	8.3
Copper	mg/kg	36	197	28	29	27	6.4	15	18	15	20	18	16	18	19
Iron	mg/kg	21200	43766	20900	**24800**	**21600**	6170	14500	14400	15300	21200	18800	20200	**21500**	20800
Lead	mg/kg	35	91	16	18	15	4.1	8.5	9.1	8.8	12	11	11	12	12
Lithium	mg/kg	-	-	21	24	22	4.6	9.8	11	11	21	19	20	21	21
Magnesium	mg/kg	-	-	6850	6570	6780	12300	2550	2220	2510	7050	8050	6540	6420	6620
Manganese	mg/kg	460	1100	**551**	**593**	**508**	111	228	251	273	**607**	264	342	396	430
Mercury	mg/kg	0.17	0.49	0.049	0.042	0.045	0.044	0.065	0.072	0.052	0.033	0.034	0.021	0.025	0.025
Molybdenum	mg/kg	-	-	5.8	5.9	6.0	0.7	1.3	1.3	1.5	2.3	1.9	2.0	2.4	2.4
Nickel	mg/kg	16	75	**31**	**34**	**32**	15	**24**	**26**	**26**	**24**	**22**	**21**	**23**	**24**
Phosphorus	mg/kg	-	-	1130	1240	1210	830	1170	1090	1290	1290	1170	1300	1270	1350
Potassium	mg/kg	-	-	3140	2740	3180	1090	1680	1720	1950	3590	3310	3610	3410	3470
Selenium	mg/kg	1.9	-	1.0	1.0	1.0	1.6	0.76	1.0	0.6	0.82	1.1	0.49	0.53	0.58
Silver	mg/kg	0.5	-	0.17	0.15	0.16	0.13	0.25	0.31	0.21	0.13	0.12	<0.10	0.1	<0.10
Sodium	mg/kg	-	-	89	86	87	149	<50	<50	<50	86	87	84	81	79
Strontium	mg/kg	-	-	48	50	50	157	40	44	41	52	73	50	42	38
Sulfur	mg/kg	-	-	<1000	<1000	<1000	1100	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000
Thallium	mg/kg	-	-	0.76	0.77	0.82	0.69	0.23	0.24	0.24	0.44	0.42	0.36	0.38	0.39
Tin	mg/kg	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium	mg/kg	-	-	22	18	21	25	68	57	67	20	12	12	18	21
Tungsten	mg/kg	-	-	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium	mg/kg	-	-	0.93	0.88	0.94	0.68	1.2	1.3	1.2	0.7	0.65	0.63	0.58	0.66
Vanadium	mg/kg	-	-	38	36	38	15	52	54	59	33	31	31	32	33
Zinc	mg/kg	123	315	**136**	**155**	**138**	105	103	107	109	99	93	88	95	97
Zirconium	mg/kg	-	-	1.0	1.1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.1
Polycyclic Aromatic Hydrocarbons (PAHs)															
Acenaphthene	mg/kg	0.0067	0.089	<0.0050	<0.0050	<0.0050	<0.025	<0.0050	<0.0050	<0.0050	<0.0050	<0.0080	<0.0050	<0.0050	<0.0050
Acenaphthylene	mg/kg	0.0059	0.13	<0.0050	<0.0050	<0.0050	<0.025	<0.0050	<0.0050	<0.0050	<0.0050	<0.0080	<0.0050	<0.0050	<0.0050
Acridine	mg/kg	-	-	<0.010	<0.010	<0.010	<0.050	<0.010	<0.015	<0.010	<0.010	<0.016	<0.010	<0.010	<0.010
Anthracene	mg/kg	0.047	0.25	<0.0040	<0.0040	<0.0040	<0.020	<0.0040	<0.0040	<0.0040	<0.0040	<0.0064	<0.0040	<0.0040	<0.0040
Benz(a)anthracene	mg/kg	0.032	0.39	<0.010	<0.010	<0.010	<0.050	0.018	0.024	<0.015	<0.010	<0.016	<0.010	<0.010	<0.010
Benzo(a)pyrene	mg/kg	0.032	0.78	<0.010	<0.010	<0.010	<0.050	<0.010	<0.010	<0.010	<0.010	<0.016	<0.010	<0.010	<0.010
Benzo(b&j)fluoranthene	mg/kg	-	-	0.011	<0.010	<0.010	<0.050	0.025	0.031	0.019	0.01	0.028	<0.010	<0.010	<0.010
Benzo(b+j+k)fluoranthene	mg/kg	-	-	<0.015	<0.015	<0.015	<0.075	0.025	0.031	0.019	<0.015	0.028	<0.015	<0.015	<0.015
Benzo(e)pyrene	mg/kg	-	-	0.014	0.011	0.012	<0.050	0.028	0.033	0.022	0.014	0.031	<0.010	<0.010	<0.010
Benzo(g,h,i)perylene	mg/kg	0.17	3.2	<0.010	<0.010	<0.010	<0.050	0.013	0.016	0.011	<0.010	<0.016	<0.010	<0.010	<0.010
Benzo(k)fluoranthene	mg/kg	0.24	13.40	<0.010	<0.010	<0.010	<0.050	<0.010	<0.010	<0.010	<0.010	<0.016	<0.010	<0.010	<0.010
Chrysene	mg/kg	0.057	0.86	0.025	0.019	<0.026	**0.064**	**0.059**	**0.078**	0.043	<0.030	0.055	0.017	0.015	0.015
Dibenz(a,h)anthracene	mg/kg	0.00622	0.135	<0.0050	<0.0050	<0.0050	<0.025	<0.0050	<0.0060	<0.0050	<0.0050	<0.0080	<0.0050	<0.0050	<0.0050
Fluoranthene	mg/kg	0.11	2.4	<0.010	<0.010	<0.010	<0.050	0.019	0.022	0.01	<0.010	<0.016	<0.010	<0.010	<0.010
Fluorene	mg/kg	0.021	0.14	<0.010	<0.010	<0.010	<0.050	<0.010	<0.010	<0.010	<0.010	<0.016	<0.010	<0.010	<0.010
Indeno(1,2,3-c,d)pyrene	mg/kg	0.2	3.2	<0.010	<0.010	<0.010	<0.050	<0.010	<0.010	<0.010	<0.010	<0.016	<0.010	<0.010	<0.010
1-Methylnaphthalene	mg/kg	-	-	<0.050	<0.050	<0.050	0.094	0.06	0.096	<0.050	<0.050	0.12	<0.050	<0.050	<0.050
2-Methylnaphthalene	mg/kg	0.02	0.2	0.013	<0.010	0.011	**0.12**	**0.06**	**0.088**	**0.037**	**0.027**	**0.16**	**0.022**	0.012	0.014
Naphthalene	mg/kg	0.035	0.39	<0.010	<0.010	<0.010	**0.061**	0.033	**0.039**	0.017	0.016	**0.055**	<0.010	<0.010	<0.010
Perylene	mg/kg	-	-	<0.010	<0.010	<0.010	<0.050	<0.010	<0.010	<0.010	0.023	<0.016	<0.010	0.012	0.013
Phenanthrene	mg/kg	0.042	0.52	0.024	0.016	0.023	**0.16**	**0.14**	**0.2**	**0.096**	0.037	**0.13**	0.027	0.022	0.021
Pyrene	mg/kg	0.053	0.88	0.01	<0.010	<0.010	<0.050	0.025	0.033	0.018	<0.010	0.018	<0.010	<0.010	<0.010
Quinoline	mg/kg	-	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.016	<0.050	<0.050	<0.050
d10-Acenaphthene	%	-	-	99	111	102	100	114	112	109	105	111	106	105	105
d12-Chrysene	%	-	-	108	117	107	112	123	120	116	112	118	112	110	110
d8-Naphthalene	%	-	-	97	108	99	99	110	110	106	104	109	103	102	102
d10-Phenanthrene	%	-	-	98	109	99	103	112	113	107	102	109	104	102	102
B(a)P Total Potency Equivalent	mg/kg	-	-	<0.020	<0.020	<0.020	0.048	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
LMW PAH[(a)]	mg/kg	0.10	-	0.071	0.06	0.068	**0.46**	**0.26**	**0.35**	**0.17**	**0.104**	**0.39**	0.083	0.068	0.069
HMW PAH[(b)]	mg/kg	1.00	-	0.07	0.06	0.07	0.29	0.14	0.17	0.1	0.08	0.13	0.06	0.06	0.06
Total PAH[(c)]	mg/kg	4.00	35.00	0.33	0.31	0.33	1.3	0.64	0.83	0.49	0.38	0.81	0.33	0.32	0.32
IACR: Coarse	-	-	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
IACR: Fine	-	-	-	<0.050	<0.050	<0.050	0.06	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
IACR (CCME)	-	-	-	0.15	<0.15	<0.15	0.55	0.3	0.37	0.22	<0.15	0.32	<0.15	<0.15	<0.15

Location	Mine-Influenced Sites														
Watercourse	Corbin Creek					Michel Creek					Michel Creek				
Station	CORCK					MIDCO					CM_MC2				
Sample ID	RG_CORCK_SE-1_2020-09-12_1614	RG_CORCK_SE-2_2020-09-12_1657	RG_CORCK_SE-3_2020-09-12_1704	RG_CORCK_SE-4_2020-09-13_0936	RG_CORCK_SE-5_2020-09-13_0946	RG_MIDCO_SE-1_2020-09-15_0801	RG_MIDCO_SE-2_2020-09-15_0805	RG_MIDCO_SE-3_2020-09-15_0825	RG_MIDCO_SE-4_2020-09-15_0840	RG_MIDCO_SE-5_2020-09-15_1118	CM_MC2_SE-1_2020-09-18_1408	CM_MC2_SE-2_2020-09-18_1435	CM_MC2_SE-3_2020-09-18_1450	CM_MC2_SE-4_2020-09-18_1458	CM_MC2_SE-5_2020-09-18_1510
Replicate	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Date	12-Sep-20	12-Sep-20	12-Sep-20	13-Sep-20	13-Sep-20	15-Sep-20	15-Sep-20	15-Sep-20	15-Sep-20	15-Sep-20	18-Sep-20	18-Sep-20	18-Sep-20	18-Sep-20	18-Sep-20
Parameter															
Physical Tests															
Moisture Content	73	70	57	80	62	67	80	77	78	58	76	73	64	75	72
pH (1:2 soil to water)	8.2	8.1	8.2	8.0	8.2	8.0	8.0	8.1	8.0	8.1	7.0	7.1	7.1	7.0	7.0
pH (1:9 soil to water)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Texture	Sandy loam	Silt loam	Sandy loam	Silt loam	Sandy loam	Sandy loam	Silt loam	Sandy loam	Silt loam	Sandy loam	Silt loam	Sandy loam	Sandy loam	Silt loam	Silt loam
Particle Size Distribution															
% Gravel (>2mm)	<1.0	<1.0	1.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.1	<1.0	1.2	1.1	<1.0
% Sand (2.00mm to 1.00mm)	1.0	<1.0	2.5	<1.0	<1.0	1.6	1.7	1.4	<1.0	2.6	1.9	5.8	1.6	3.5	<1.0
% Sand (1.00mm to 0.50mm)	2.9	<1.0	4.4	1.1	5.2	7.2	6.5	14	1.5	8.0	6.8	8.7	3.8	6.2	2.3
% Sand (0.50mm to 0.25mm)	12	2.9	11	3.5	12	17	4.4	22	5.2	11	12	11	19	7.1	8.5
% Sand (0.25mm to 0.125mm)	20	13	21	15	19	14	5.9	18	13	10	14	12	20	12	14
% Sand (0.125mm to 0.063mm)	16	17	18	17	15	9.2	9.5	10	15	16	10	11	11	11	14
% Silt (0.063mm to 0.0312mm)	22	29	17	27	17	21	29	14	28	22	24	23	20	28	28
% Silt (0.0312mm to 0.004mm)	23	33	21	31	25	25	36	17	31	24	26	25	21	29	29
% Clay (<4µm)	2.9	4.3	4.5	5.6	6.2	4.7	6.3	4.3	5.8	5.1	3.5	3.1	3.0	3.3	3.4
Organic Carbon															
Total Organic Carbon	7.3	7.7	6.1	9.2	8.9	3.5	4.7	4.3	4.8	3.5	4.6	3.9	4.0	4.4	4.3
Total Metals (<2mm fractions)															
Aluminum	2010	3030	4420	4300	3900	10800	9710	12800	9880	15100	5110	7470	9360	6270	6800
Antimony	0.25	0.23	0.12	0.25	0.22	0.36	0.31	0.37	0.29	0.37	0.18	0.24	0.3	0.2	0.19
Arsenic	1.6	1.9	3.1	2.5	3.2	**6.3**	5.0	**6.6**	5.3	**7.5**	2.6	3.8	5.1	3.1	3.0
Barium	135	145	161	201	167	134	147	148	148	141	150	163	156	153	153
Beryllium	0.29	0.35	0.43	0.44	0.44	0.74	0.6	0.78	0.61	0.8	0.3	0.46	0.59	0.39	0.38
Bismuth	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Boron	6.4	9.2	9.2	11	9.2	14	15	17	16	17	11	13	13	12	13
Cadmium	**7.9**	**9.4**	**8.4**	**8.8**	**9.1**	**1.4**	**2.0**	**1.6**	**1.8**	**1.7**	**1.3**	**1.5**	**1.3**	**1.4**	**1.5**
Calcium	289000	278000	243000	255000	216000	71300	96800	80300	86300	38400	210000	202000	140000	204000	209000
Chromium	3.2	4.2	6.4	6.8	5.9	14	13	16	13	19	7.2	9.7	12	8.1	9.3
Cobalt	244	191	247	232	191	72	73	79	111	40	82	86	71	94	89
Copper	4.5	5.5	7.4	8.6	8.5	14	13	16	13	18	5.6	8.0	11	7.2	6.8
Iron	2640	3340	4980	4300	4790	17500	13800	17700	13600	19600	6240	9270	12900	8400	7440
Lead	1.9	2.2	3.6	3.4	4.0	9.5	7.8	10	7.7	11	3.6	4.8	7.2	4.2	3.9
Lithium	3.2	3.8	5.1	4.3	4.2	17	14	18	13	19	6.4	9.9	13	8.6	8.2
Magnesium	5760	6170	6370	6190	6170	6480	6830	7440	6770	7690	6150	7150	6870	6450	6710
Manganese	**1640**	**1530**	**1610**	**1490**	**1360**	**904**	**664**	**652**	**788**	**685**	**581**	**595**	**603**	**752**	**595**
Mercury	0.03	0.017	0.024	0.027	0.025	0.023	0.029	0.026	0.026	0.025	0.012	0.012	0.017	0.014	0.015
Molybdenum	0.61	0.57	0.77	0.8	0.71	1.8	1.7	1.8	1.5	2.1	0.68	0.93	1.4	0.79	0.84
Nickel	**218**	**223**	**219**	**228**	**201**	**113**	**128**	**127**	**148**	**92**	**123**	**133**	**106**	**136**	**130**
Phosphorus	166	241	276	285	330	1040	965	1160	962	1150	585	727	978	570	633
Potassium	590	840	1080	1140	1010	2440	2280	2900	2480	3500	1520	2050	2350	1720	1970
Selenium	1.6	**2.9**	**2.1**	**4.9**	**2.7**	1.9	**2.8**	**2.2**	**2.9**	1.7	1.8	**2.2**	1.6	**2.1**	**2.3**
Silver	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	361	433	324	405	328	206	270	210	249	162	380	370	285	360	329
Strontium	392	411	321	351	295	123	163	140	141	76	336	291	213	286	285
Sulfur	4000	4700	3600	4400	3200	1400	1800	1500	1800	<1000	3800	3600	2600	3700	3800
Thallium	0.19	0.17	0.31	0.24	0.26	0.32	0.31	0.37	0.32	0.37	0.15	0.21	0.27	0.19	0.19
Tin	<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
Titanium	10	10	11	12	9.8	22	26	21	18	17	16	17	19	15	15
Tungsten	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium	2.1	2.1	1.8	2.1	1.7	0.8	0.85	0.94	0.9	0.75	1.5	1.2	1.1	1.1	1.2
Vanadium	6.1	8.5	13	13	12	24	23	28	23	32	12	17	22	14	16
Zinc	**773**	**922**	**777**	**852**	**849**	**157**	**200**	**173**	**204**	**185**	113	**132**	**129**	**128**	**133**
Zirconium	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons (PAHs)															
Acenaphthene	<0.020	<0.035	<0.060	<0.060	**0.049**	**0.0076**	<0.030	<0.011	<0.020	<0.010	<0.010	<0.010	**0.0069**	<0.010	<0.0080
Acenaphthylene	<0.0085	<0.0090	<0.0060	<0.015	**0.012**	<0.0075	<0.011	<0.011	<0.013	<0.0050	<0.010	<0.010	<0.0065	<0.010	<0.0080
Acridine	<0.040	<0.070	<0.10	<0.13	<0.10	<0.015	<0.040	<0.030	<0.055	<0.015	<0.020	<0.020	<0.013	<0.020	<0.016
Anthracene	<0.017	<0.0060	0.012	<0.020	0.0062	<0.0060	<0.0088	<0.022	<0.010	<0.0040	<0.0080	0.0081	<0.0052	<0.0080	0.0074
Benz(a)anthracene	0.025	**0.04**	**0.056**	**0.07**	**0.055**	<0.015	0.028	<0.022	<0.035	<0.010	<0.020	<0.020	<0.013	<0.020	<0.016
Benzo(a)pyrene	0.019	0.027	**0.047**	**0.05**	**0.038**	<0.015	<0.022	<0.022	<0.025	<0.010	<0.020	<0.020	<0.013	<0.020	<0.016
Benzo(b&j)fluoranthene	0.07	0.12	0.18	0.22	0.17	0.034	0.086	0.051	0.048	0.032	0.037	0.035	0.038	0.028	0.029
Benzo(b+j+k)fluoranthene	0.07	0.12	0.18	0.22	0.17	0.034	0.086	0.051	0.048	0.032	0.037	0.035	0.038	<0.028	0.029
Benzo(e)pyrene	0.09	0.15	0.23	0.27	0.2	0.041	0.099	0.059	0.056	0.039	0.048	<0.020	0.045	0.04	<0.016
Benzo(g,h,i)perylene	0.043	0.071	0.11	0.14	0.092	<0.015	0.046	0.027	0.034	0.018	0.02	<0.020	0.016	<0.020	0.017
Benzo(k)fluoranthene	<0.017	<0.015	<0.010	<0.025	<0.010	<0.015	<0.022	<0.022	<0.025	<0.010	<0.020	<0.020	<0.013	<0.020	<0.016
Chrysene	**0.12**	**0.19**	**0.29**	**0.36**	**0.28**	0.057	**0.15**	**0.09**	**0.081**	**0.061**	**0.06**	**0.063**	<0.070	0.054	<0.060
Dibenz(a,h)anthracene	<0.017	**0.019**	**0.026**	**0.034**	**0.025**	<0.0075	<0.022	<0.022	<0.020	<0.0060	<0.010	<0.010	<0.0065	<0.010	<0.0080
Fluoranthene	0.02	0.032	0.052	0.071	0.053	<0.015	0.023	<0.022	<0.035	0.011	<0.020	<0.020	<0.013	<0.020	<0.016
Fluorene	**0.065**	**0.11**	**0.17**	**0.22**	**0.14**	**0.024**	**0.069**	**0.037**	**0.037**	**0.024**	**0.027**	<0.030	**0.023**	**0.033**	0.02
Indeno(1,2,3-c,d)pyrene	<0.017	0.022	0.029	0.032	0.025	<0.015	<0.022	<0.022	<0.025	<0.010	<0.020	<0.020	<0.013	<0.020	<0.016
1-Methylnaphthalene	0.43	0.69	0.99	1.2	0.94	0.15	0.4	0.23	0.25	0.16	0.17	0.15	0.18	0.17	0.17
2-Methylnaphthalene	**0.72**	**1.2**	**1.7**	**2.1**	**1.6**	**0.24**	**0.65**	**0.37**	**0.41**	**0.25**	**0.28**	**0.25**	**0.29**	**0.29**	**0.28**
Naphthalene	**0.23**	**0.39**	**0.56**	**0.68**	**0.56**	**0.094**	**0.24**	**0.15**	**0.15**	**0.096**	**0.1**	**0.098**	**0.14**	**0.11**	**0.11**
Perylene	<0.017	<0.015	<0.010	<0.025	<0.010	<0.015	<0.022	<0.022	<0.025	0.012	<0.020	<0.020	<0.013	<0.020	<0.016
Phenanthrene	**0.33**	**0.55**	**0.81**	**0.97**	**0.78**	**0.15**	**0.38**	**0.23**	**0.24**	**0.16**	**0.16**	**0.15**	**0.18**	**0.16**	**0.16**
Pyrene	0.039	**0.064**	**0.095**	**0.11**	**0.09**	0.019	0.045	0.027	0.031	0.019	0.023	<0.020	0.022	<0.020	0.021
Quinoline	<0.017	<0.015	<0.050	<0.025	<0.050	<0.015	<0.022	<0.022	<0.025	<0.050	<0.020	<0.020	<0.013	<0.020	<0.016
d10-Acenaphthene	108	102	111	118	108	104	107	107	120	114	102	98	94	94	99
d12-Chrysene	115	109	118	128	114	110	118	114	125	119	117	110	107	105	114
d8-Naphthalene	105	100	109	115	106	104	106	103	120	112	100	96	90	92	98
d10-Phenanthrene	107	101	109	118	105	102	109	106	117	112	106	100	93	93	98
B(a)P Total Potency Equivalent	0.04	0.068	0.1	0.12	0.092	<0.020	0.037	0.032	0.033	<0.020	0.023	0.022	<0.020	0.021	<0.020
LMW PAH[(a)]	**1.39**	**2.3**	**3.3**	**4.0**	**3.1**	**0.53**	**1.39**	**0.83**	**0.89**	**0.55**	**0.6**	**0.56**	**0.65**	**0.62**	**0.59**
HMW PAH[(b)]	0.24	0.38	0.56	0.7	0.54	0.13	0.29	0.21	0.23	0.12	0.15	0.15	0.14	0.14	0.14
Total PAH[(c)]	2.4	3.9	**5.7**	**7.0**	**5.4**	1.0	2.5	1.6	1.7	1.0	1.2	1.1	1.2	1.1	1.1
IACR: Coarse	<0.050	<0.050	0.05	0.067	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
IACR: Fine	<0.050	0.071	0.097	0.13	0.092	<0.050	0.058	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
IACR (CCME)	0.72	1.2	1.7	2.1	1.6	0.35	0.85	0.55	0.56	0.31	0.41	0.4	0.35	0.34	0.31

Location	Mine-Influenced Sites														
Watercourse	Michel Creek					Michel Creek					Michel Creek				
Station	MIDAG-S1					MIDAG-S2					MIDAG				
Sample ID	RG_MIDAG-S1_SE-1_2020-09-18_0850	RG_MIDAG-S1_SE-2_2020-09-18_0915	RG_MIDAG-S1_SE-3_2020-09-18_0935	RG_MIDAG-S1_SE-4_2020-09-18_1040	RG_MIDAG-S1_SE-5_2020-09-18_1020	RG_MIDAG-S2_SE-1_2020-09-17_0840	RG_MIDAG-S2_SE-2_2020-09-17_1233	RG_MIDAG-S2_SE-3_2020-09-17_1341	RG_MIDAG-S2_SE-4_2020-09-17_1457	RG_MIDAG-S2_SE-5_2020-09-17_1514	RG_MIDAG_SE-1_2020-09-15_1714	RG_MIDAG_SE-2_2020-09-15_1723	RG_MIDAG_SE-3_2020-09-16_0805	RG_MIDAG_SE-4_2020-09-16_0922	RG_MIDAG_SE-5_2020-09-16_0932
Replicate	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Date	18-Sep-20	18-Sep-20	18-Sep-20	18-Sep-20	18-Sep-20	17-Sep-20	17-Sep-20	17-Sep-20	17-Sep-20	17-Sep-20	15-Sep-20	15-Sep-20	16-Sep-20	16-Sep-20	16-Sep-20
Parameter															
Physical Tests															
Moisture Content	65	67	66	66	52	79	77	75	74	76	86	77	74	77	75
pH (1:2 soil to water)	7.3	7.2	7.4	7.5	7.7	7.9	7.7	7.9	8.0	7.7	7.8	7.9	7.9	8.0	8.0
pH (1:9 soil to water)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Texture	Silt loam	Sandy loam	Sandy loam	Sandy loam	Silt loam	Silt loam	Silt loam	Silt loam	Silt loam	Silt loam	Silt loam	Silt loam	Silt loam	Sandy loam	Silt loam
Particle Size Distribution															
% Gravel (>2mm)	2.3	<1.0	<1.0	1.1	<1.0	<1.0	<1.0	<1.0	1.1	<1.0	9.8	<1.0	<1.0	<1.0	<1.0
% Sand (2.00mm to 1.00mm)	4.0	2.1	2.4	3.3	<1.0	<1.0	<1.0	<1.0	1.7	1.2	<1.0	1.7	<1.0	1.4	<1.0
% Sand (1.00mm to 0.50mm)	4.9	5.5	6.0	6.9	<1.0	<1.0	<1.0	2.2	4.0	7.6	1.5	6.7	6.3	12	2.2
% Sand (0.50mm to 0.25mm)	12	17	9.6	13	4.6	1.3	2.0	5.8	4.6	11	2.4	8.5	14	15	6.5
% Sand (0.25mm to 0.125mm)	12	15	13	14	15	4.9	4.5	11	5.2	10	3.3	9.0	12	11	11
% Sand (0.125mm to 0.063mm)	12	9.7	14	12	19	8.6	7.4	10	8.1	10	5.2	8.7	9.5	9.0	12
% Silt (0.063mm to 0.0312mm)	23	21	23	22	26	36	36	30	33	25	32	28	22	22	29
% Silt (0.0312mm to 0.004mm)	26	25	27	25	29	41	41	34	37	29	37	32	28	25	32
% Clay (<4µm)	4.1	4.4	5.1	3.7	4.8	7.1	7.2	6.2	5.3	5.9	8.2	5.3	8.5	5.2	5.5
Organic Carbon															
Total Organic Carbon	8.7	8.4	8.9	8.2	5.0	7.9	7.1	8.8	8.5	7.3	8.5	6.0	6.3	6.1	5.8
Total Metals (<2mm fractions)															
Aluminum	9780	12300	12600	13200	11900	10200	10400	9620	8770	10800	9420	10200	11200	11000	10300
Antimony	0.51	0.41	0.37	0.29	0.35	0.23	0.34	0.43	0.44	0.42	0.34	0.36	<0.10	0.16	0.28
Arsenic	**8.0**	**8.2**	**7.8**	**8.4**	**8.5**	**6.3**	5.9	**7.0**	**6.3**	**6.9**	5.5	**6.3**	**6.8**	**6.9**	**6.1**
Barium	115	142	151	131	149	151	141	141	138	137	158	143	163	126	135
Beryllium	0.79	0.87	0.89	0.86	0.76	0.65	0.64	0.73	0.71	0.72	0.62	0.73	0.8	0.75	0.71
Bismuth	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Boron	13	17	15	14	14	13	15	12	12	13	14	15	9.2	12	13
Cadmium	**1.2**	**1.3**	**1.2**	**1.3**	**0.89**	**1.1**	**1.0**	**1.2**	**1.2**	**1.2**	**1.3**	**1.1**	**1.3**	**1.0**	**1.1**
Calcium	54300	55900	37100	52400	45300	74400	77600	48900	62500	50700	91000	72900	55300	63400	65200
Chromium	17	18	19	20	18	16	16	15	14	17	17	17	17	16	16
Cobalt	46	41	33	35	12	50	40	35	45	38	39	39	23	30	34
Copper	17	16	17	17	14	13	13	15	14	15	12	13	15	13	12
Iron	14400	15700	15500	15800	15400	13400	12800	15100	13400	15200	12400	14100	17000	15600	13600
Lead	9.6	9.5	9.8	9.7	8.9	7.9	7.4	9.1	8.4	8.9	7.8	8.9	9.6	8.6	7.9
Lithium	13	16	16	16	15	13	12	14	13	14	12	14	14	15	14
Magnesium	12100	11000	10400	12900	12200	10600	10200	9450	10500	9770	9190	9430	9480	9490	10800
Manganese	**483**	**694**	**496**	**693**	**867**	**486**	392	**482**	**477**	**511**	412	445	406	327	350
Mercury	0.047	0.045	0.048	0.047	0.037	0.043	0.047	0.041	0.046	0.037	0.037	0.033	0.043	0.034	**0.46**
Molybdenum	1.6	1.7	1.5	1.6	1.7	1.3	1.3	1.6	1.4	1.6	1.3	1.5	1.1	1.2	1.3
Nickel	**111**	**83**	**76**	**89**	**33**	**87**	**75**	**64**	**86**	**65**	**77**	**75**	**59**	**71**	**74**
Phosphorus	1170	1270	1110	1270	1170	989	1090	1070	1100	1080	994	998	1010	1050	1010
Potassium	2090	2810	2830	3010	2820	2500	2640	2160	1960	2590	2450	2610	2770	2740	2560
Selenium	**2.1**	**2.3**	**2.0**	**2.1**	1.7	**3.2**	**3.2**	**2.6**	**2.6**	**2.8**	**4.7**	**3.3**	**5.7**	**2.5**	**3.2**
Silver	0.19	0.16	0.17	0.16	0.12	0.13	0.14	0.14	0.16	0.13	0.13	0.13	0.14	0.12	0.12
Sodium	196	165	159	188	152	188	191	139	159	148	199	185	120	140	186
Strontium	88	86	70	87	70	113	120	81	100	86	133	115	87	96	100
Sulfur	1100	<1000	<1000	<1000	<1000	1100	1000	<1000	<1000	<1000	1500	1000	1400	<1000	<1000
Thallium	0.56	0.6	0.53	0.56	0.45	0.45	0.41	0.49	0.48	0.5	0.4	0.42	0.43	0.43	0.44
Tin	<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
Titanium	27	17	14	12	15	13	24	23	24	20	16	19	7.4	8.0	14
Tungsten	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium	0.98	1.1	1.0	0.98	0.9	0.92	0.84	0.9	0.93	0.83	0.86	0.84	0.81	0.81	0.81
Vanadium	28	31	32	33	31	27	27	26	24	28	26	27	29	27	27
Zinc	**129**	**133**	**127**	**140**	106	123	118	**128**	117	**129**	117	**126**	**130**	118	**128**
Zirconium	1.1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons (PAHs)															
Acenaphthene	<0.030	<0.020	<0.020	<0.020	<0.020	<0.016	<0.020	<0.015	<0.017	<0.018	<0.018	<0.020	<0.012	<0.030	<0.010
Acenaphthylene	<0.0070	<0.0070	<0.0070	<0.0050	<0.0050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.018	<0.010	<0.010	<0.010	<0.010
Acridine	<0.014	<0.014	<0.040	<0.020	<0.010	<0.025	<0.022	<0.026	<0.035	<0.030	<0.035	<0.020	<0.020	<0.021	<0.020
Anthracene	0.0094	<0.0056	<0.0056	<0.0040	<0.0040	<0.0080	<0.0080	<0.0080	<0.0080	<0.0080	<0.014	<0.0080	<0.0080	<0.0080	<0.0080
Benz(a)anthracene	0.03	0.03	<0.050	0.019	0.017	<0.020	0.022	0.03	0.028	0.025	<0.035	<0.020	<0.020	<0.040	<0.020
Benzo(a)pyrene	0.016	0.015	0.018	0.011	<0.010	<0.020	<0.020	<0.020	<0.020	<0.020	<0.035	<0.020	<0.020	<0.020	<0.020
Benzo(b&j)fluoranthene	0.13	0.088	0.11	0.08	0.07	0.077	0.068	0.078	0.1	0.1	0.046	0.068	0.084	0.083	0.059
Benzo(b+j+k)fluoranthene	0.13	0.1	0.13	0.08	0.07	0.077	0.068	0.078	0.1	0.1	<0.055	0.068	0.084	0.083	0.059
Benzo(e)pyrene	0.12	0.087	0.11	0.085	0.077	0.079	0.073	0.073	0.1	0.098	0.048	0.069	0.082	0.081	0.065
Benzo(g,h,i)perylene	0.042	0.031	0.039	0.029	0.026	0.031	0.025	0.031	0.036	0.039	<0.035	0.026	0.028	0.03	0.026
Benzo(k)fluoranthene	<0.014	0.016	0.015	<0.010	<0.010	<0.020	<0.020	<0.020	<0.020	<0.020	<0.035	<0.020	<0.020	<0.020	<0.020
Chrysene	<0.20	**0.15**	<0.19	<0.14	**0.12**	**0.14**	**0.11**	**0.12**	**0.17**	**0.18**	<0.090	**0.11**	**0.13**	**0.15**	**0.095**
Dibenz(a,h)anthracene	**0.012**	**0.0087**	**0.016**	**0.0096**	**0.008**	<0.010	<0.010	<0.010	<0.015	<0.011	<0.035	<0.010	<0.010	<0.010	<0.010
Fluoranthene	0.057	0.043	0.049	0.033	0.029	0.036	0.031	0.054	0.048	0.041	0.037	0.04	0.044	**0.12**	0.032
Fluorene	**0.049**	**0.039**	**0.031**	**0.032**	**0.027**	**0.048**	**0.028**	**0.036**	<0.042	**0.044**	<0.035	**0.037**	**0.032**	**0.048**	<0.020
Indeno(1,2,3-c,d)pyrene	<0.014	<0.014	0.02	0.011	<0.010	<0.020	<0.020	<0.020	<0.020	<0.020	<0.035	<0.020	<0.020	<0.020	<0.020
1-Methylnaphthalene	0.41	0.28	0.35	0.31	0.23	0.28	0.22	0.24	0.31	0.3	0.12	0.22	0.22	0.24	0.19
2-Methylnaphthalene	**0.57**	**0.42**	**0.51**	**0.49**	**0.34**	**0.41**	**0.34**	**0.36**	**0.47**	**0.45**	**0.18**	**0.33**	**0.33**	**0.36**	**0.29**
Naphthalene	**0.24**	**0.19**	**0.25**	**0.22**	**0.15**	**0.17**	**0.15**	**0.14**	**0.19**	**0.19**	**0.074**	**0.14**	**0.14**	**0.16**	**0.12**
Perylene	0.017	0.015	0.015	0.014	0.013	<0.020	<0.020	<0.020	<0.020	<0.021	<0.035	<0.020	<0.020	<0.020	<0.020
Phenanthrene	**0.55**	**0.35**	**0.48**	**0.35**	**0.31**	**0.33**	**0.27**	**0.27**	**0.4**	**0.39**	**0.18**	**0.28**	**0.26**	**0.38**	**0.23**
Pyrene	**0.069**	<0.060	**0.063**	0.042	0.037	0.046	0.041	0.049	**0.056**	0.051	0.038	0.042	0.05	**0.1**	0.031
Quinoline	<0.014	<0.014	<0.014	<0.050	<0.050	<0.020	<0.020	<0.020	<0.020	<0.021	<0.035	<0.020	<0.020	<0.020	<0.020
d10-Acenaphthene	96	91	95	97	94	109	110	108	120	118	118	114	113	110	112
d12-Chrysene	104	99	105	111	100	119	121	118	120	121	127	122	124	123	120
d8-Naphthalene	96	94	97	101	94	108	109	105	112	113	118	113	112	110	108
d10-Phenanthrene	97	94	97	102	97	110	112	109	120	121	117	113	115	111	112
B(a)P Total Potency Equivalent	0.046	0.04	0.053	0.033	0.024	0.027	0.027	0.029	0.034	0.032	0.045	0.026	0.028	0.029	0.025
LMW PAH[(a)]	**1.46**	**1.04**	**1.29**	**1.13**	**0.86**	**1.0**	**0.83**	**0.84**	**1.14**	**1.12**	**0.51**	**0.82**	**0.8**	**1.0**	**0.69**
HMW PAH[(b)]	0.38	0.31	0.39	0.25	0.22	0.27	0.24	0.29	0.34	0.33	0.27	0.24	0.28	0.44	0.21
Total PAH[(c)]	2.8	2.0	2.5	2.1	1.6	1.9	1.6	1.7	2.2	2.2	1.3	1.6	1.7	2.1	1.4
IACR: Coarse	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
IACR: Fine	0.068	0.067	0.074	<0.050	<0.050	<0.050	<0.050	0.052	0.061	0.061	0.053	<0.050	0.052	0.053	<0.050
IACR (CCME)	1.1	0.9	1.1	0.7	0.63	0.7	0.66	0.76	0.92	0.91	0.6	0.62	0.74	0.77	0.56

Location	Mine-Influenced Sites									
Watercourse	Michel Creek					Michel Creek				
Station	MIULE					MI5				
Sample ID	RG_MIULE_SE-1_2020-09-16_1145	RG_MIULE_SE-2_2020-09-16_1205	RG_MIULE_SE-3_2020-09-16_1457	RG_MIULE_SE-4_2020-09-17_0815	RG_MIULE_SE-5_2020-09-17_0840	RG_MI5_SE-1_2020-09-19_1125	RG_MI5_SE-2_2020-09-17_1700	RG_MI5_SE-4_2020-09-19_1155	RG_MI5_SE-5_2020-09-19_1215	RG_MI5_SE-3_2020-09-19_1140
Replicate	1	2	3	4	5	1	2	3	4	5
Date	16-Sep-20	16-Sep-20	16-Sep-20	17-Sep-20	17-Sep-20	19-Sep-20	17-Sep-20	19-Sep-20	19-Sep-20	19-Sep-20
Parameter										
Physical Tests										
Moisture Content	57	42	74	64	79	82	67	64	86	86
pH (1:2 soil to water)	8.1	8.1	7.9	8.1	7.7	-	-	-	-	-
pH (1:9 soil to water)	-	-	-	-	-	6.9	7.3	7.2	6.9	6.8
Texture	Sandy loam	Silt loam	Sandy loam	Silt loam	Silt loam	Sandy loam	Loamy sand	Sandy loam	Silt loam	Silt loam
Particle Size Distribution										
% Gravel (>2mm)	<1.0	<1.0	<1.0	<1.0	<1.0	1.1	2.1	3.6	3.2	<1.0
% Sand (2.00mm to 1.00mm)	<1.0	<1.0	<1.0	<1.0	<1.0	3.8	<1.0	<1.0	1.2	1.5
% Sand (1.00mm to 0.50mm)	<1.0	1.8	2.7	1.2	2.5	23	6.5	4.6	<1.0	1.3
% Sand (0.50mm to 0.25mm)	8.6	2.9	12	4.8	7.1	26	30	20	2.0	1.4
% Sand (0.25mm to 0.125mm)	18	11	24	9.9	12	9.6	23	18	5.6	3.7
% Sand (0.125mm to 0.063mm)	18	20	18	16	20	5.0	11	12	6.8	6.7
% Silt (0.063mm to 0.0312mm)	24	28	20	30	27	12	12	19	37	38
% Silt (0.0312mm to 0.004mm)	26	30	19	33	26	14	13	19	38	40
% Clay (<4µm)	4.5	5.4	3.2	5.1	5.8	5.5	1.9	3.1	6.0	6.8
Organic Carbon										
Total Organic Carbon	2.9	3.4	7.0	4.4	8.1	7.6	2.5	4.8	10	9.0
Total Metals (<2mm fractions)										
Aluminum	9910	10500	9290	11500	7430	6020	8970	8670	6780	7430
Antimony	0.58	0.67	0.35	0.33	0.26	0.63	0.8	0.61	0.48	0.54
Arsenic	**6.1**	**8.5**	**6.5**	**6.5**	4.8	5.7	5.7	5.9	3.9	4.1
Barium	210	249	206	218	203	216	232	250	300	254
Beryllium	0.67	0.76	0.65	0.78	0.52	0.46	0.58	0.56	0.41	0.47
Bismuth	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Boron	12	11	11	13	10	7.9	8.3	8.6	11	12
Cadmium	**1.1**	**1.3**	**0.99**	**1.3**	**0.97**	**1.2**	**1.3**	**1.2**	**1.5**	**1.7**
Calcium	41900	44200	53700	46300	84100	75600	37200	52800	99300	84900
Chromium	16	17	15	18	12	13	16	15	13	14
Cobalt	12	14	13	14	14	5.7	8.9	8.4	12	6.4
Copper	13	16	12	15	9.4	9.9	13	12	9.8	11
Iron	14800	18000	14300	16000	11400	11100	13800	13700	9270	10100
Lead	8.5	10	7.9	9.5	6.2	5.6	8.1	7.5	5.7	6.2
Lithium	13	15	12	14	9.2	6.6	9.4	8.9	6.7	7.8
Magnesium	9350	11000	8310	9610	7660	4970	5950	5190	5000	5420
Manganese	202	306	290	229	248	200	169	252	254	134
Mercury	0.035	0.041	0.032	0.044	0.029	0.024	0.04	0.037	0.034	0.038
Molybdenum	1.4	1.8	1.5	1.4	1.1	1.2	1.2	1.4	0.87	0.94
Nickel	**35**	**41**	**36**	**45**	**40**	**27**	**36**	**34**	**40**	**37**
Phosphorus	1080	1210	1060	1160	912	1250	1280	1220	1140	1360
Potassium	2460	2390	2400	2880	1900	1570	1860	1940	1590	1820
Selenium	**2.0**	1.3	**1.9**	**1.9**	**2.8**	**2.6**	**2.0**	1.6	**4.5**	**4.8**
Silver	0.12	0.17	0.12	0.16	0.1	0.11	0.17	0.15	0.17	0.17
Sodium	100	103	121	125	167	182	119	126	259	283
Strontium	74	74	87	80	116	114	70	104	146	122
Sulfur	<1000	<1000	<1000	<1000	1300	1500	<1000	<1000	2100	2400
Thallium	0.4	0.5	0.35	0.46	0.28	0.17	0.28	0.24	0.19	0.27
Tin	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium	30	32	13	13	12	34	44	30	36	36
Tungsten	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium	0.72	0.79	0.77	0.81	0.77	0.97	1.0	0.96	0.96	1.0
Vanadium	32	34	31	35	24	31	42	41	26	31
Zinc	110	**129**	100	**124**	89	78	106	97	81	97
Zirconium	<1.0	1.1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons (PAHs)										
Acenaphthene	<0.0050	<0.010	<0.010	<0.011	<0.010	<0.013	<0.0075	0.0067	<0.013	<0.016
Acenaphthylene	<0.0050	<0.0050	<0.010	<0.0050	<0.010	<0.013	<0.0075	<0.0065	<0.013	<0.015
Acridine	<0.010	<0.020	<0.020	0.01	<0.020	<0.025	<0.015	0.014	<0.025	<0.025
Anthracene	<0.0040	<0.0040	<0.0080	<0.0040	<0.0080	0.018	<0.0060	<0.0052	0.015	<0.025
Benz(a)anthracene	<0.010	<0.010	<0.020	0.014	<0.020	0.029	0.017	0.023	<0.025	<0.025
Benzo(a)pyrene	<0.010	<0.010	<0.020	<0.010	<0.020	<0.025	<0.015	<0.013	<0.025	<0.025
Benzo(b&j)fluoranthene	0.031	0.046	0.038	0.054	0.04	<0.025	0.032	0.033	0.031	0.03
Benzo(b+j+k)fluoranthene	0.031	0.046	0.038	0.054	0.04	<0.035	0.032	0.033	<0.035	<0.035
Benzo(e)pyrene	0.032	0.048	0.041	0.053	0.044	<0.025	0.034	0.037	0.033	0.036
Benzo(g,h,i)perylene	0.011	0.017	<0.020	0.018	<0.020	<0.025	<0.015	0.014	<0.025	<0.025
Benzo(k)fluoranthene	<0.010	<0.010	<0.020	<0.010	<0.020	<0.025	<0.015	<0.013	<0.025	<0.025
Chrysene	**0.06**	**0.083**	**0.069**	**0.094**	**0.076**	0.042	<0.060	**0.07**	<0.050	**0.069**
Dibenz(a,h)anthracene	<0.0050	<0.0060	<0.010	<0.0070	<0.010	<0.013	<0.0075	<0.0065	<0.013	<0.015
Fluoranthene	0.017	0.027	0.023	0.035	0.036	0.049	0.025	0.035	<0.025	0.039
Fluorene	<0.020	0.02	<0.020	**0.024**	**0.026**	<0.025	<0.015	0.019	<0.025	**0.028**
Indeno(1,2,3-c,d)pyrene	<0.010	<0.010	<0.020	<0.010	<0.020	<0.025	<0.015	<0.013	<0.025	<0.025
1-Methylnaphthalene	0.086	0.12	0.14	0.15	0.14	0.057	0.089	0.16	0.081	0.1
2-Methylnaphthalene	**0.13**	**0.19**	**0.21**	**0.22**	**0.21**	**0.065**	**0.12**	**0.21**	**0.12**	**0.14**
Naphthalene	**0.061**	**0.082**	**0.091**	**0.1**	**0.11**	**0.042**	**0.062**	**0.11**	**0.064**	**0.079**
Perylene	<0.010	<0.010	<0.020	0.012	<0.020	<0.025	<0.015	<0.013	<0.025	<0.025
Phenanthrene	**0.14**	**0.18**	**0.19**	**0.23**	**0.2**	**0.11**	**0.16**	**0.26**	**0.15**	**0.17**
Pyrene	0.021	0.028	0.025	0.034	0.039	0.044	0.028	0.035	0.027	0.035
Quinoline	<0.050	<0.050	<0.020	<0.050	<0.020	<0.025	<0.015	<0.013	<0.025	<0.025
d10-Acenaphthene	110	107	113	109	110	97	95	102	100	107
d12-Chrysene	121	115	123	117	121	95	98	102	102	109
d8-Naphthalene	109	104	113	109	109	94	90	99	97	101
d10-Phenanthrene	111	106	112	110	112	100	101	109	106	112
B(a)P Total Potency Equivalent	<0.020	<0.020	0.023	<0.020	0.023	0.026	<0.020	<0.020	0.026	0.028
LMW PAH[(a)]	**0.36**	**0.49**	**0.53**	**0.6**	**0.57**	**0.29**	**0.38**	**0.61**	**0.4**	**0.48**
HMW PAH[(b)]	0.12	0.16	0.17	0.19	0.2	0.2	0.15	0.18	0.17	0.21
Total PAH[(c)]	0.77	1.0	1.1	1.2	1.2	0.78	0.81	1.1	0.89	1.0
IACR: Coarse	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
IACR: Fine	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
IACR (CCME)	0.3	0.4	0.42	0.49	0.43	0.33	0.36	0.39	0.39	0.41

Note: Data were screened against BC working sediment quality guidelines (WSQGs) for the protection of Aquatic Life (BC ENV 2021) where available.
(a) = Low molecular weight PAHs are comprised of acenaphthene, acenaphthylene, anthracene, fluorene, 2-methylnaphthalene, naphthalene, and phenanthrene.
(b) = High molecular weight PAHs are comprised of benz(a)anthracene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, fluoranthene, and pyrene.
(c) = Sum of all compounds analyzed in the chemical class, values below the method detection limit were assigned a value of the detection limit.

Value = concentration exceeds the BC Lower Sediment Water Quality Guideline.
Value = concentration exceeds the BC Upper Sediment Water Quality Guideline.

CCME = Canadian Council of the Minsters of the Environment; LMW = low molecular weight; HMW = high molecular weight; WSQG = working sediment quality guidelines.
- = no guideline or no data; % = percent; mg/kg = milligrams per kilograms; dw = dry weight; < = less than; > = greater than; mm = millimetres

APPENDIX I

Field and Habitat Data

Table I-1: Supporting Habitat Data at Coal Mountain Operations Local Aquatic Effects Monitoring Program Sampling Stations, 2020

Station ID		**Reference**			**Mine-influenced**								
		MI25	**AGCK**	**LE1**	**MIUCO**	**CORCK**	**MIDCO**	**CM_MC2[(a)]**	**MIDAG-S1[(a)]**	**MIDAG-S2[(a)]**	**MIDAG**	**MIULE**	**MI5**
Watercourse		Michel Creek	Andy Good Creek	Leach Creek	Michel Creek	Corbin Creek	Michel Creek						
Date Sampled		11-Sep-20	10-Sep-20	13-Sep-20	12-Sep-20	12-Sep-20	13-Sep-20	18-Sep-20	18-Sep-20	17-Sep-20	15-Sep-20	16-Sep-20	17-Sep-20
Zone 11 UTMs - Easting		668183	667556	659635	668134	668476	667646	667249	666290	665770	665240	660502	659501
Zone 11 UTMs - Northing		5482819	5488649	5494114	5486768	5487347	5487701	5488144	5488507	5488854	5489482	5493049	5496620
Habitat Characteristics													
Surrounding Land Use and Area Description		old channel disturbance and berm	u/s of campsite trial bridge	Forest, hwy and railway	Mining	Mining	Mining	Mining	Mining	Mining/CPR rail line adjacent	Mining	Mining/road adjacent	Mining
Anthropogenic Influences		-	-	-	-	CMO	CMO upstream	CMO upstream	CMO upstream	CMO upstream	CMO upstream	CMO upstream	CMO upstream
Length of Reach Assessed (m)		30	30	200	50	30	50	50	30	50	50	50	-
Substrate	% Bedrock	0	0	0	0	0	5	0	0	0	0	0	0
	% Boulder	10	20	10	25	10	5	25	0	10	25	10	0
	% Cobble	35	45	86	40	50	45	45	35	35	30	40	85
	% Gravel	25	30	2	20	25	25	15	40	20	25	30	10
	% Sand	15	5	2	10	0	10	5	10	20	10	10	5
	% Finer	15	0	0	5	15	10	10	15	15	10	10	0
Bank Stability		unstable, substantial erosion	stable, no erosion	moderate	moderate	stable, no erosion	stable, no erosion	moderate	unstable, substantial erosion	unstable, substantial erosion	unstable, substantial erosion	unstable, substantial erosion	unstable, substantial erosion
Water Colour & Clarity		colourless/clear	colourless/clear	clear/clear	colourless/clear	colourless/ slightly turbid	colourless/clear	colourless/clear	colourless/clear	colourless/clear	colourless/clear	colourless/clear	colourless/clear
Channel Measurements													
Bankfull Width (m)		5	14	16	11	8	10	9	15	21	18	17	40
Wetted Width (m)		3	8	13	6	6	8	7	8	17	11	11	17
Bankfull-Wetted Depth (cm)		22	71	12	31	44	32	37	20	22	31	37	50

Note: Stations are ordered upstream to downstream.

a) Supplemental stations for the Nickel Benchmark Study

"-" = data not available or data not recorded; % = percent; cm = centimetre; m = metre; u/s = upstream

Table I-2: Kick and Sweep Net Data for Samples Collected at Coal Mountain Operations Local Aquatic Effects Monitoring Program Stations, 2020

Field Parameters	Reference				Mine-Exposed							
	RG_AGCK	RG_MI25	RG_LE1	RG_MIUCO	RG_CORCK	RG_MIDCO	RG_CM_MC2	SS_MIDAG-S	SS_MIDAG-S	RG_MIDAG	RG_MIULE	RG_MI5
Easting	667556	668183	659635	668134	668538	667715	5488144	5488507	5488854	665266	660502	659405
Northing	5488649	5482819	5494114	5486768	5487367	5487622	667249	666290	665770	5489411	5493049	5496775
Date	10-Sep-20	11-Sep-20	17-Sep-20	12-Sep-20	12-Sep-20	15-Sep-20	18-Sep-20	18-Sep-20	17-Sep-20	16-Sep-20	16-Sep-20	17-Sep-20
Samplers' Initials	KBa	KBa	Mca	KBa	KBa	KBa	KBa	KBa	KBa	KBa	KBa	JT
Number of Jars	1	1	1	1	1	1	1	2	1	1	1	1
Total Kick Distance (m)	20	10.5	20	18	25	21	15	12.5	18	8	20	10
Full Transect (Yes / No)	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Number of Transects	3.5	7.0	3.0	3.0	5.0	3.0	2.5	3.5	2.0	4.0	2.5	1.0
Easting	667577	668216	659578	668183	668575	667784	5488092	5488459	5488815	665219	660547	659476
Northing	5488701	5482779	5494044	5486713	5487425	5487581	667246	666365	665792	5489325	5492994	5496730
Date	10-Sep-20	11-Sep-20	17-Sep-20	12-Sep-20	12-Sep-20	15-Sep-20	19-Sep-20	18-Sep-20	17-Sep-20	16-Sep-20	16-Sep-20	19-Sep-20
Samplers' Initials	KBa	KBa	Mca	KBa	KBa	KBa	KBa	KBa	KBa	KBa	KBa	KBa
Number of Jars	1	1	1	1	2	1	1	1	1	1	1	1
Total Kick Distance (m)	24	9	20	16	16	23	14	22	20	20	16	12
Full Transect (Yes / No)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Transects	2.0	9.0	1.0	2.0	4.0	2.5	2.0	2.0	2.0	2.0	2.0	1.0
Easting	667612	668237	659610	668203	668476	667842	5488020	5488463	5488770	665240	660631	659495
Northing	5488720	5482723	5493980	5486680	5487347	5487551	667250	666411	665789	5489482	5493027	5496624
Date	10-Sep-20	11-Sep-20	17-Sep-20	12-Sep-20	12-Sep-20	15-Sep-20	19-Sep-20	18-Sep-20	17-Sep-20	15-Sep-20	17-Sep-20	19-Sep-20
Samplers' Initials	KBa	KBa	Mca	KBa	KBa	KBa	KBa	KBa	KBa	KBa	KBa	KBa
Number of Jars	1	1	1	1	3	1	1	1	1	1	1	1
Total Kick Distance (m)	18	5	15	20	15	20	15	18	22	20	17	28
Full Transect (Yes / No)	Yes	No	No	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Number of Transects	3.0	5.0	0.3	4.0	3.0	2.5	3.0	3.0	2.0	2.5	1.5	2.0
Easting	-	-	-	-	-	667674	-	-	-	-	-	-
Northing	-	-	-	-	-	5487640	-	-	-	-	-	-
Date	-	-	-	-	-	15-Sep-20	-	-	-	-	-	-
Samplers' Initials	-	-	-	-	-	KBa	-	-	-	-	-	-
Number of Jars	-	-	-	-	-	1	-	-	-	-	-	-
Total Kick Distance (m)	-	-	-	-	-	12	-	-	-	-	-	-
Full Transect (Yes / No)	-	-	-	-	-	No	-	-	-	-	-	-
Number of Transects	-	-	-	-	-	8.0	-	-	-	-	-	-
Easting	-	-	-	-	-	667646	-	-	-	-	-	-
Northing	-	-	-	-	-	5487701	-	-	-	-	-	-
Date	-	-	-	-	-	13-Sep-20	-	-	-	-	-	-
Samplers' Initials	-	-	-	-	-	KBa	-	-	-	-	-	-
Number of Jars	-	-	-	-	-	1	-	-	-	-	-	-
Total Kick Distance (m)	-	-	-	-	-	18	-	-	-	-	-	-
Full Transect (Yes / No)	-	-	-	-	-	Yes	-	-	-	-	-	-
Number of Transects	-	-	-	-	-	2.0	-	-	-	-	-	-

"-" = data not available or data not recorded; m = metre

Table I-3: Channel Measurements of Sampling Stations at Coal Mountain Operations Local Aquatic Effects Monitoring Program, 2020

	Replicate		Location (UTMs)[a] Easting	Northing	A	B	C	D	E	Mean
Reference Stations		MI25	668183	5482819						
	1	Depth (cm)			7.00	13.00	13.00	12.00	8.00	10.60
		Velocity (m/s)			0.19	0.37	0.34	0.21	0.27	0.28
	2	Depth (cm)			8.00	13.00	16.00	10.00	9.00	11.20
		Velocity (m/s)			0.34	0.36	0.58	0.41	0.55	0.45
	3	Depth (cm)			15.00	15.00	13.00	19.00	16.00	15.60
		Velocity (m/s)			0.07	0.18	0.32	0.16	0.18	0.18
		AGCK	667556	5488649						
	1	Depth (cm)			26.00	25.00	24.00	18.00	27.00	24.00
		Velocity (m/s)			0.46	0.30	0.57	0.15	0.08	0.31
	2	Depth (cm)			9.50	14.00	16.50	18.00	17.00	15.00
		Velocity (m/s)			0.36	0.18	0.59	0.24	0.39	0.35
	3	Depth (cm)			15.00	17.00	18.00	21.00	18.50	17.90
		Velocity (m/s)			0.11	0.54	0.22	0.38	0.53	0.35
		LE1	659635	5494114						
	1	Depth (cm)			8.00	14.50	18.50	13.50	14.50	13.80
		Velocity (m/s)			0.76	0.63	0.51	0.43	0.64	0.59
	2	Depth (cm)			13.00	9.50	16.00	12.00	22.00	14.50
		Velocity (m/s)			0.12	0.23	0.37	0.53	0.36	0.32
	3	Depth (cm)			19.00	10.00	17.00	21.00	17.00	16.80
		Velocity (m/s)			0.19	0.34	0.37	0.50	0.29	0.34
Mine-influenced Stations		MIUCO	668134	5486768						
	1	Depth (cm)			15.00	18.00	19.50	17.00	12.50	16.40
		Velocity (m/s)			0.55	0.42	0.64	0.33	0.23	0.43
	2	Depth (cm)			15.00	16.00	18.50	14.50	16.00	16.00
		Velocity (m/s)			0.21	0.15	0.17	0.28	0.08	0.18
	3	Depth (cm)			14.00	23.00	19.00	17.00	19.00	18.40
		Velocity (m/s)			0.24	0.35	0.23	0.18	0.41	0.28
		CORCK	668476	5487347						
	1	Depth (cm)			11.00	20.00	18.00	17.00	11.50	15.50
		Velocity (m/s)			0.25	0.44	0.30	0.23	0.22	0.29
	2	Depth (cm)			20.00	21.50	17.00	9.00	16.00	16.70
		Velocity (m/s)			0.53	0.32	0.17	0.30	0.19	0.30
	3	Depth (cm)			11.50	12.00	14.00	15.00	12.50	13.00
		Velocity (m/s)			0.03	0.43	0.42	0.61	0.19	0.34
		MIDCO	667646	5487701						
	1	Depth (cm)			15.00	16.00	24.00	21.00	14.00	18.00
		Velocity (m/s)			0.49	0.28	0.46	0.31	0.28	0.36
	2	Depth (cm)			17.50	22.00	11.50	7.00	8.00	13.20
		Velocity (m/s)			0.46	0.76	0.27	0.17	0.38	0.41
	3	Depth (cm)			27.00	25.00	21.00	17.00	10.00	20.00
		Velocity (m/s)			0.39	0.52	0.38	0.18	0.14	0.32
	4	Depth (cm)			19.00	23.00	21.00	21.00	17.00	20.20
		Velocity (m/s)			0.14	0.16	0.18	0.36	0.45	0.26
	5	Depth (cm)			20.00	24.50	23.00	27.00	22.50	23.40
		Velocity (m/s)			0.42	0.50	0.31	0.17	0.26	0.33
		CM_MCTM[(b)]	667249	5488144						
	1	Depth (cm)			23.00	21.00	22.00	15.00	26.00	21.40
		Velocity (m/s)			0.59	0.20	0.42	0.34	0.29	0.37
	2	Depth (cm)			16.00	25.00	26.00	11.00	17.50	19.10
		Velocity (m/s)			0.65	0.25	0.47	0.50	0.76	0.52
	3	Depth (cm)			15.50	19.00	22.50	11.00	17.50	17.10
		Velocity (m/s)			0.68	0.29	0.31	0.67	0.45	0.48
		MIDAG-S1[(b)]	666290	5488507						
	1	Depth (cm)			10.00	15.00	16.50	12.50	10.50	12.90
		Velocity (m/s)			0.74	1.08	1.01	0.84	0.34	0.80
	2	Depth (cm)			13.00	15.00	14.00	12.00	13.00	13.40
		Velocity (m/s)			0.50	0.55	0.80	0.47	0.72	0.61
	3	Depth (cm)			15.00	11.00	21.00	27.00	23.00	19.40
		Velocity (m/s)			0.25	0.68	0.70	0.72	0.67	0.60
		MIDAG-S2[(b)]	665770	5488854						
	1	Depth (cm)			10.50	14.00	19.00	17.50	15.00	15.20
		Velocity (m/s)			0.13	0.68	0.54	0.74	0.32	0.48
	2	Depth (cm)			17.00	19.00	22.00	16.50	13.00	17.50
		Velocity (m/s)			0.55	0.36	0.49	0.15	0.36	0.38
	3	Depth (cm)			23.50	19.00	19.00	11.50	13.00	17.20
		Velocity (m/s)			0.37	0.34	0.21	0.20	0.22	0.27
		MIDAG	665240	5489482						
	1	Depth (cm)			33.00	19.00	11.50	16.50	16.00	19.20
		Velocity (m/s)			0.57	0.62	0.38	0.26	0.61	0.49
	2	Depth (cm)			19.50	34.00	39.00	31.00	24.00	29.50
		Velocity (m/s)			0.70	0.57	0.60	0.16	0.26	0.46
	3	Depth (cm)			15.00	18.50	15.00	12.50	19.50	16.10
		Velocity (m/s)			0.52	0.63	0.40	0.51	0.64	0.54
		MIULE	660502	5493049						
	1	Depth (cm)			13.50	22.00	38.00	24.50	21.00	23.80
		Velocity (m/s)			0.11	0.51	0.66	0.39	0.05	0.35
	2	Depth (cm)			16.00	21.00	42.00	23.00	17.00	23.80
		Velocity (m/s)			0.63	0.53	0.37	0.61	0.21	0.47
	3	Depth (cm)			7.00	10.50	34.00	39.50	29.00	24.00
		Velocity (m/s)			0.19	0.27	0.48	0.23	0.28	0.29
		MI5	659501	5496620						
	1	Depth (cm)			22.00	20.00	28.00	20.00	30.00	24.00
		Velocity (m/s)			0.46	0.74	0.59	0.40	1.09	0.65
	2	Depth (cm)			16.00	11.00	15.00	14.00	14.00	14.00
		Velocity (m/s)			0.51	0.50	0.35	0.47	0.16	0.40
	3	Depth (cm)			25.50	27.00	25.00	27.00	19.00	24.70
		Velocity (m/s)			0.57	0.31	0.46	0.58	0.42	0.47

Notes: Stations are ordered upstream to downstream. Velocity measurements were taken at five randomly chosen locations throughout the kick sample area. Velocity was measured at the bottom of the water column.

a) UTM coordinates provided are from 2020 sampling program.

b) Supplemental stations for the Nickel Benchmark Study

"-" = data not available or data not recorded; % = percent; cm = centimetre; m = metre

APPENDIX J

Benthic Invertebrate Community Data

Table J-1: Benthic Invertebrate Community Data at CMO LAEMP Sampling Stations, 2012 to 2020

Watercourse	Station	Reference or Mine-influenced	Location (UTMs)[a]		Year	Replicate	Sample	Richness (# of taxa)	Abundance (# of individuals)	Percent Dominance	Simpson's Diversity	Shannon's Diversity	Simpson's Dominance	Simpson's Eveness	EPT Richness	% EPT	Ephemeroptera Richness	% Ephemeroptera	Trichoptera Richness	% Trichoptera	Plecoptera Richness	% Plecoptera	Chironomidae Richness	% Chironomidae	% Oligochaeta	Diptera Richness	% Diptera	% Acari	% Mollusca
			Easting	Northing																									
Michel Creek	MI25	Reference Sites	668186	5482838	2012	1	RG_MI25_BIC-1_2012-09-15	40	2050	17.5	0.9	3.0	1.1	0.3	29	91.8	9	12.2	7	23.8	13	55.8	3	3.4	1	6	5	2	0
Michel Creek	MI25	Reference Sites	668186	5482838	2013	1	RG_MI25_BIC-1_2013-09-15	28	26100	43.4	0.7	1.6	1.5	0.1	20	97.6	7	49.0	5	1.5	8	47.2	2	1.3	0	6	2	0	0
Michel Creek	MI25	Reference Sites	668186	5482838	2015	1	RG_MI25_BIC-1_2015-09-10	37	7140	16.5	0.9	2.7	1.1	0.3	23	83.8	8	47.1	6	5.0	9	31.7	10	14.3	0	13	16	1	0
Michel Creek	MI25	Reference Sites	668186	5482838	2016	1	RG_MI25_BIC-1_2016-09-13	45	16160	29.2	0.9	2.6	1.2	0.2	26	68.1	7	50.4	9	5.1	10	12.6	13	30.0	0	16	31	0	0
Michel Creek	MI25	Reference Sites	668186	5482838	2017	1	RG_MI25_BIC-1_2017-09-14	39	25200	27.3	0.9	2.4	1.2	0.2	22	77.6	7	53.4	7	4.3	8	19.9	9	19.8	0	13	21	0	0
Michel Creek	MI25	Reference Sites	668184	5482818	2018	1	RG_MI25_BIC-1_2018-09-10	41	14560	35.7	0.8	2.4	1.2	0.1	23	85.9	7	62.2	7	9.6	9	14.0	9	12.5	0	14	13	1	0
Michel Creek	MI25	Reference Sites	668186	5482838	2019	1	RG_MI25_BIC-1_2019-09-04	37	6420	24.0	0.9	2.5	1.2	0.2	27	80.1	8	49.5	8	10.3	11	20.2	8	18.7	1	8	19	0	0
Michel Creek	MI25	Reference Sites	668183	5482819	2020	1	RG_MI25_BIC-1_2020-09-11	41	9300	18.8	0.9	2.8	1.1	0.2	28	90.5	8	60.6	9	8.6	11	21.3	8	7.3	0	9	8	1	0
Michel Creek	MI25	Reference Sites	668186	5482838	2013	2	RG_MI25_BIC-2_2013-09-15	30	10500	35.3	0.8	2.0	1.3	0.2	25	99.0	8	44.8	9	3.8	8	50.5	2	0.4	0	3	1	0	0
Michel Creek	MI25	Reference Sites	668186	5482838	2015	2	RG_MI25_BIC-2_2015-09-10	32	7200	24.7	0.9	2.6	1.1	0.3	19	79.7	8	49.7	4	5.0	7	25.0	7	17.5	0	11	19	0	0
Michel Creek	MI25	Reference Sites	668184	5482818	2018	2	RG_MI25_BIC-2_2018-09-10	40	5014	18.2	0.9	3.0	1.1	0.3	22	63.2	7	23.1	7	21.4	8	18.8	10	30.2	2	13	33	1	0
Michel Creek	MI25	Reference Sites	668186	5482838	2019	2	RG_MI25_BIC-2_2019-09-04	39	4200	23.2	0.9	2.8	1.1	0.2	20	60.1	7	33.6	4	11.0	9	15.5	10	30.4	0	15	34	3	0
Michel Creek	MI25	Reference Sites	668183	5482819	2020	2	RG_MI25_BIC-2_2020-09-11	45	4113	12.6	0.9	3.2	1.1	0.4	32	84.2	11	19.1	9	33.4	12	31.6	6	10.9	0	10	13	0	0
Michel Creek	MI25	Reference Sites	668186	5482838	2013	3	RG_MI25_BIC-3_2013-09-15	29	17300	46.9	0.7	1.7	1.4	0.1	20	97.6	8	44.5	4	0.9	8	52.1	5	1.3	0	6	2	0	0
Michel Creek	MI25	Reference Sites	668186	5482838	2015	3	RG_MI25_BIC-3_2015-09-10	34	6640	19.9	0.9	2.7	1.1	0.3	23	69.3	8	42.8	7	5.4	8	21.1	9	27.1	0	11	31	0	0
Michel Creek	MI25	Reference Sites	668184	5482818	2018	3	RG_MI25_BIC-3_2018-09-10	52	14340	21.3	0.9	3.0	1.1	0.2	28	86.2	10	44.2	7	18.3	11	23.7	13	9.2	1	18	11	1	0
Michel Creek	MI25	Reference Sites	668186	5482838	2019	3	RG_MI25_BIC-3_2019-09-04	40	6440	25.8	0.9	2.8	1.1	0.2	23	83.9	8	46.0	6	18.0	9	19.9	10	11.8	1	14	14	0	0
Michel Creek	MI25	Reference Sites	668183	5482819	2020	3	RG_MI25_BIC-3_2020-09-11	44	2285	13.6	0.9	3.1	1.1	0.3	28	85.8	9	35.7	8	17.3	11	32.8	7	9.4	0	13	12	0	0
Andy Good Creek	AGCK	Reference Sites	667555	5488644	2012	1	AGCK_BIC-1_2012-09-16	27	11980	66.4	0.5	1.5	1.8	0.1	18	89.0	8	80.8	3	1.0	7	7.2	5	10.4	0	6	11	1	0
Andy Good Creek	AGCK	Reference Sites	667555	5488644	2013	1	AGCK_BIC-1_2013-09-15	29	27840	65.4	0.5	1.4	1.8	0.1	24	95.1	9	76.4	6	1.3	9	17.4	1	1.7	3	2	2	0	0
Andy Good Creek	AGCK	Reference Sites	667555	5488644	2015	1	AGCK_BIC-1_2015-09-12	27	7180	59.6	0.6	1.5	1.7	0.1	20	97.2	9	68.2	4	4.5	7	24.5	5	1.9	0	6	3	0	0
Andy Good Creek	AGCK	Reference Sites	667557	5488648	2018	1	AGCK_BIC-1_2018-09-08	27	10500	50.9	0.7	1.6	1.5	0.1	18	96.0	10	88.6	2	0.4	6	7.0	6	3.0	0	8	4	0	0
Andy Good Creek	AGCK	Reference Sites	667555	5488644	2019	1	AGCK_BIC-1_2019-09-06	27	16280	57.1	0.6	1.5	1.6	0.1	15	92.6	9	86.4	2	3.4	4	2.8	8	4.7	0	10	7	0	0
Andy Good Creek	AGCK	Reference Sites	667556	5488649	2020	1	AGCK_BIC-1_2020-09-10	33	9400	35.5	0.8	2.5	1.2	0.2	24	86.4	9	66.2	4	5.5	11	14.7	5	11.5	0	7	13	1	0
Andy Good Creek	AGCK	Reference Sites	667557	5488648	2018	2	AGCK_BIC-2_2018-09-08	33	11200	37.3	0.8	2.0	1.3	0.1	17	88.9	9	81.4	2	1.4	6	6.1	12	9.1	0	14	11	0	0
Andy Good Creek	AGCK	Reference Sites	667555	5488644	2019	2	AGCK_BIC-2_2019-09-06	30	14760	62.2	0.6	1.5	1.7	0.1	16	89.6	9	83.9	2	2.8	5	2.8	7	8.3	1	11	10	0	0
Andy Good Creek	AGCK	Reference Sites	667556	5488649	2020	2	AGCK_BIC-2_2020-09-10	32	12180	39.9	0.8	2.1	1.3	0.1	22	86.4	9	75.5	5	4.8	8	6.1	8	11.3	0	9	13	0	0
Andy Good Creek	AGCK	Reference Sites	667557	5488648	2018	3	AGCK_BIC-3_2018-09-08	32	13760	37.5	0.8	2.1	1.3	0.1	20	85.2	9	69.0	3	2.0	8	14.1	7	13.5	0	10	14	0	0
Andy Good Creek	AGCK	Reference Sites	667555	5488644	2019	3	AGCK_BIC-3_2019-09-06	31	12220	57.3	0.6	1.8	1.6	0.1	20	87.6	10	76.6	3	3.9	7	7.0	5	6.5	1	8	11	0	0
Andy Good Creek	AGCK	Reference Sites	667556	5488649	2020	3	AGCK_BIC-3_2020-09-10	34	10240	43.4	0.8	2.2	1.3	0.1	27	84.4	7	65.8	9	5.9	11	12.7	5	14.8	0	7	16	0	0
Leach Creek	LE1	Reference Sites	659635	5494108	2018	1	LE1_BIC-1_2018-09-13	46	17300	14.0	0.9	3.1	1.1	0.3	25	75.7	7	39.3	7	11.3	11	25.1	10	11.0	0	16	19	1	0
Leach Creek	LE1	Reference Sites	659632	5494112	2019	1	LE1_BIC-1_2019-09-05	41	7360	19.0	0.9	2.9	1.1	0.3	23	71.5	5	28.8	10	29.9	8	12.8	5	6.0	0	10	21	3	0
Leach Creek	LE1	Reference Sites	659635	5494114	2020	1	LE1_BIC-1_2020-09-17	43	7020	14.2	0.9	3.1	1.1	0.3	29	86.3	9	43.9	11	10.3	9	32.2	7	3.1	0	11	9	3	0
Leach Creek	LE1	Reference Sites	659632	5494112	2019	2	LE1_BIC-2_2019-09-05	36	9480	29.1	0.9	2.6	1.2	0.2	22	81.4	7	35.0	6	34.0	9	12.4	6	7.8	0	10	16	1	0
Leach Creek	LE1	Reference Sites	659635	5494114	2020	2	LE1_BIC-2_2020-09-17	42	4230	13.7	0.9	3.1	1.1	0.4	27	81.8	9	37.8	9	12.8	9	31.2	4	3.8	0	10	12	3	0
Leach Creek	LE1	Reference Sites	659632	5494112	2019	3	LE1_BIC-3_2019-09-05	43	8640	26.6	0.9	2.6	1.1	0.2	26	78.2	8	32.4	7	33.1	11	12.7	9	7.6	0	12	19	1	0
Leach Creek	LE1	Reference Sites	659635	5494114	2020	3	LE1_BIC-3_2020-09-17	43	6600	13.0	0.9	3.1	1.1	0.4	34	75.8	9	28.5	11	11.8	14	35.5	2	1.5	0	5	15	3	0
Michel Creek	MIUCO	Exposure Sites	668134	5486767	2012	1	RG_MIUCO_BIC-1_2012-09-15	38	1806	19.1	0.9	2.9	1.1	0.3	29	87.4	8	46.2	10	12.0	11	29.2	1	0.3	0	5	6	2	0
Michel Creek	MIUCO	Exposure Sites	668134	5486767	2015	1	RG_MIUCO_BIC-1_2015-09-10	37	7820	24.0	0.9	2.6	1.1	0.2	23	72.4	9	53.2	8	7.2	6	12.0	8	4.3	0	12	23	1	0
Michel Creek	MIUCO	Exposure Sites	668134	5486767	2016	1	RG_MIUCO_BIC-1_2016-09-13	37	4175	20.1	0.9	2.9	1.1	0.3	25	80.5	9	45.8	8	19.2	8	15.6	3	4.8	0	7	13	1	0
Michel Creek	MIUCO	Exposure Sites	668134	5486767	2017	1	RG_MIUCO_BIC-1_2017-09-14	38	7120	20.5	0.9	2.8	1.1	0.3	26	81.7	7	43.5	9	26.1	10	12.1	4	3.4	1	7	12	3	0
Michel Creek	MIUCO	Exposure Sites	668135	5486767	2018	1	RG_MIUCO_BIC-1_2018-09-10	39	8400	13.1	0.9	3.0	1.1	0.4	27	69.3	8	42.6	10	9.5	9	17.1	4	4.3	0	9	21	5	0
Michel Creek	MIUCO	Exposure Sites	668134	5486767	2019	1	RG_MIUCO_BIC-1_2019-09-09	47	10280	20.9	0.9	3.2	1.1	0.3	32	54.7	9	26.8	11	11.3	12	16.5	6	12.1	1	10	37	3	0
Michel Creek	MIUCO	Exposure Sites	668134	5486768	2020	1	RG_MIUCO_BIC-1_2020-09-12	46	3190	23.8	0.9	3.0	1.1	0.2	31	58.6	10	24.1	8	17.6	13	16.9	4	2.5	0	10	29	3	0
Michel Creek	MIUCO	Exposure Sites	668135	5486767	2018	2	RG_MIUCO_BIC-2_2018-09-10	34	3200	20.6	0.9	2.8	1.1	0.3	22	71.3	8	50.9	6	6.9	8	13.4	4	5.9	1	8	19	2	0
Michel Creek	MIUCO	Exposure Sites	668134	5486767	2019	2	RG_MIUCO_BIC-2_2019-09-09	41	5229	18.0	0.9	2.9	1.1	0.3	27	61.2	9	33.1	9	18.9	9	9.3	5	9.1	1	10	27	2	0
Michel Creek	MIUCO	Exposure Sites	668134	5486768	2020	2	RG_MIUCO_BIC-2_2020-09-12	47	3136	21.2	0.9	3.1	1.1	0.3	33	62.0	10	36.5	9	11.0	14	14.5	3	2.9	1	9	26	2	0
Michel Creek	MIUCO	Exposure Sites	668135	5486767	2018	3	RG_MIUCO_BIC-3_2018-09-10	35	7680	18.0	0.9	2.8	1.1	0.3	23	66.1	9	38.8	7	10.9	7	16.4	3	2.1	1	7	23	4	0
Michel Creek	MIUCO	Exposure Sites	668134	5486767	2019	3	RG_MIUCO_BIC-3_2019-09-09	44	5200	16.5	0.9	3.0	1.1	0.3	26	56.2	11	30.2	6	11.0	9	15.0	8	7.3	0	13	27	6	0
Michel Creek	MIUCO	Exposure Sites	668134	5486768	2020	3	RG_MIUCO_BIC-3_2020-09-12	42	2508	16.0	0.9	3.1	1.1	0.3	30	65.6	11	28.5	8	17.8	11	19.3	3	1.5	0	7	19	3	0
Corbin Creek	CORCK	Exposure Sites	668556	5487388	2012	1	RG_CORCK_BIC-1_2012-09-15	30	1230	28.3	0.9	2.5	1.2	0.2	18	44.0	4	3.3	8	25.6	6	15.1	5	23.2	2	8	24	2	0
Corbin Creek	CORCK	Exposure Sites	668556	5487388	2015	1	RG_CORCK_BIC-1_2015-09-11	36	29180	53.1	0.7	1.9	1.4	0.1	13	17.0	0	0.0	5	8.1	8	8.9	10	24.5	2	16	78	1	0
Corbin Creek	CORCK	Exposure Sites	668556	5487388	2016	1	RG_CORCK_BIC-1_2016-09-13	37	16180	12.7	0.9	2.7	1.1	0.3	12	28.6	3	0.5	4	12.2	5	15.8	10	39.3	10	16	57	4	0
Corbin Creek	CORCK	Exposure Sites	668556	5487388	2017	1	RG_CORCK_BIC-1_2017-09-14	28	10000	26.6	0.8	2.3	1.2	0.2	8	33.8	1	0.2	5	26.4	2	7.2	9	30.0	2	15	61	2	0
Corbin Creek	CORCK	Exposure Sites	668539	5487366	2018	1	RG_CORCK_BIC-1_2018-09-08	31	1560	19.1	0.9	2.7	1.1	0.3	13	37.2	4	11.2	4	19.6	5	6.4	5	37.8	9	12	49	4	0
Corbin Creek	CORCK	Exposure Sites	668556	5487388	2019	1	RG_CORCK_BIC-1_2019-09-07	30	11580	23.2	0.9	2.4	1.1	0.3	11	15.2	1	0.2	6	8.5	4	6.6	6	58.9	6	13	76	2	0
Corbin Creek	CORCK	Exposure Sites	668476	5487347	2020	1	RG_CORCK_BIC-1_2020-09-12	24	5463	25.7	0.9	2.4	1.2	0.3	10	26.8	0	0.0	6	22.4	4	4.3	5	46.7	14	11	58	0	0
Corbin Creek	CORCK	Exposure Sites	668539	5487366	2018	2	RG_CORCK_BIC-2_2018-09-08	25	3073	23.3	0.9	2.4	1.2	0.3	7	13.0	1	0.3	5	10.4	1	2.4	7	62.4	10	13	75	1	0
Corbin Creek	CORCK	Exposure Sites	668556	5487388	2019	2	RG_CORCK_BIC-2_2019-09-07	28	22360	17.6	0.9	2.5	1.1	0.3	8	11.1	0	0.0	5	8.5	3	2.6	7	57.2	15	13	69	4	0
Corbin Creek	CORCK	Exposure Sites	668476	5487347	2020	2	RG_CORCK_BIC-2_2020-09-12	21	6300	35.1	0.8	2.2	1.2	0.3	8	18.1	0	0.0	6	14.9	2	3.2	4	65.1	5	12	77	0	0
Corbin Creek	CORCK	Exposure Sites	668539	5487366	2018	3	RG_CORCK_BIC-3_2018-09-08	24	5433	20.2	0.9	2.5	1.1	0.4	9	20.9	0	0.0	5	10.1	4	10.7	4	43.9	15	10	61	3	0
Corbin Creek	CORCK	Exposure Sites	668556	5487388	2019	3	RG_CORCK_BIC-3_2019-09-07	28	14500	18.6	0.9	2.5	1.1	0.3	10	18.3	1	0.1	6	10.8	3	7.4	5	54.8	11	12	67	4	0
Corbin Creek	CORCK	Exposure Sites	668476	5487347	2020	3	RG_CORCK_BIC-3_2020-09-12	27	17960	24.8	0.9	2.4	1.2	0.3	9	14.1	0	0.0	5	5.1	4	9.0	5	54.6	15	13	70	1	0
Michel Creek	MIDCO	Exposure Sites	667711	5487625	2012	1	RG_MIDCO_BIC-1_2012-09-15	38	11667	15.7	0.9	2.8	1.1	0.3	25	57.7	6	27.7	6	7.1	13	22.9	3	14.3	0	6	31	1	0
Michel Creek	MIDCO	Exposure Sites	667711	5487625	2015	1	RG_MIDCO_BIC-1_2015-09-11	37	12360	22.8	0.9	2.7	1.1	0.3	22	51.5	7	22.3	7	8.6	8	20.6	7	20.6	0	12	45	0	0
Michel Creek	MIDCO	Exposure Sites	667711	5487625	2016	1	RG_MIDCO_BIC-1_2016-09-13	46	7500	19.7	0.9	3.2	1.1	0.3	26	50.1	6	5.9	9	16.0	11	28.3	7	33.9	6	13	40	2	0
Michel Creek	MIDCO	Exposure Sites	667711	5487625	2017	1	RG_MIDCO_BIC-1_2017-09-14	46	17580	15.5	0.9	3.0	1.1	0.3	28	47.3	6	15.1	10	13.3	12	18.9	7	15.7	15	13	32	2	0
Michel Creek	MIDCO	Exposure Sites	667616	5487621	2018	1	RG_MIDCO_BIC-1_2018-09-09	44	7100	23.7	0.9	2.8	1.1	0.2	21	35.5	5	2.8	6	17.7	10	14.9	8	24.2	3	15	54	6	0
Michel Creek	MIDCO	Exposure Sites	667711	5487625	2019	1	RG_MIDCO_BIC-1_2019-09-09	46	18980	29.7	0.9	2.7	1.1	0.2	22	26.4	5	13.9	9	5.7	8	6.8	9	21.0	11	17	54	7	0
Michel Creek	MIDCO	Exposure Sites	667646	5487701	2020	1	RG_MIDCO_BIC-1_2020-09-13	47	16280	29.2	0.9	2.8	1.1	0.2	27	41.8	7	11.3	10	11.3	10	19.2	8	16.0	1	14	46	9	0
Michel Creek	MIDCO	Exposure Sites	667616	5487621	2018	2	RG_MIDCO_BIC-2_2018-09-09	34	6050	22.0	0.9	2.7	1.1	0.3	19	21.5	4	2.2	8	7.2	7	12.1	6	37.7	5	11	64	9	0
Michel Creek	MIDCO	Exposure Sites	667711	5487625	2019	2	RG_MIDCO_BIC-2_2019-09-09	46	34580	49.0	0.7	2.1	1.4	0.1	23	22.0	6	13.1	7	4.8	10	4.1	8	13.0	49	16	24	4	0
Michel Creek	MIDCO	Exposure Sites	667646	5487701	2020	2	RG_MIDCO_BIC-2_2020-09-13	49	18200	33.4	0.9	2.6	1.2	0.1	28	37.7	7	13.0	11	9.6	10	15.2	8	14.1	1	15	49	10	0
Michel Creek	MIDCO	Exposure Sites	667616	5487621	2018	3	RG_MIDCO_BIC-3_2018-09-09	36	6140	25.7	0.9	2.7	1.1	0.2	17	26.4	2	1.0	7	13.4	8	12.1	8	36.2	1	12	64	7	0
Michel Creek	MIDCO	Exposure Sites	667711	5487625	2019	3	RG_MIDCO_BIC-3_2019-09-09	40	12040	20.8	0.9	2.7	1.1	0.2	21	44.0	7	28.4	7	7.1	7	8.5	8	11.5	21	14	28	4	0
Michel Creek	MIDCO	Exposure Sites	667646	5487701	2020	3	RG_MIDCO_BIC-3_2020-09-13	50	17140	33.3	0.9	2.7	1.2	0.1	31	39.6	8	8.5	13	13.0	10	18.1	6	19.1	0	11	54	4	0
Michel Creek	MIDCO	Exposure Sites	667616	5487621	2018	4	RG_MIDCO_BIC-4_2018-09-09	38	7000	24.1	0.9	2.7	1.1	0.2	24	38.0	6	4.3	9	7.1	9	26.6	6	28.1	2	10	56	4	0
Michel Creek	MIDCO	Exposure Sites	667711	5487625	2019	4	RG_MIDCO_BIC-4_2019-09-09	46	30340	46.9	0.7	2.1	1.3	0.1	27	15.8	6	6.9	12	3.9	9	4.9	9	18.9	47	14	35	2	0
Michel Creek	MIDCO	Exposure Sites	667646	5487701	2020	4	RG_MIDCO_BIC-4_2020-09-13	54	19280	26.1	0.9	2.9	1.1	0.2	35	49.4	8	10.8	14	13.1	13	25.5	8	14.8	0	14	44	4	0
Michel Creek	MIDCO	Exposure Sites	667616	5487621	2018	5	RG_MIDCO_BIC-5_2018-09-09	38	6350	47.0	0.8	2.3	1.3	0.1	20	20.5	6	3.9	7	8.1	7	8.4	8	18.6	4	11	67	7	0
Michel Creek	MIDCO	Exposure Sites	667711	5487625	2019	5	RG_MIDCO_BIC-5_2019-09-09	44	25920	34.0	0.8	2.3	1.2	0.1	25	26.2	7	16.5	8	3.9	10	5.9	9	14.7	34	14	37	2	0
Michel Creek	MIDCO	Exposure Sites	667646	5487701	2020	5	RG_MIDCO_BIC-5_2020-09-13	44	12180	38.1	0.8	2.5	1.2	0.1	26	37.8	5	13.5	10	4.9	11	19.4	6	10.8	0	14	52	8	0
Michel Creek	CM MC2	Exposure Sites	667249	5488144	2020	1	CM_MC2_BIC-1_2020-09-19	46	13100	37.7	0.8	2.6	1.2	0.1	26	34.2	5	7.9	11	7.8	10	18.5	5	12.4	1	12	57	7	0
Michel Creek	CM MC2	Exposure Sites	667249	5488144	2020	2	CM_MC2_BIC-2_2020-09-19	45	11060	18.0	0.9	2.9	1.1	0.3	28	47.0	5	4.9	12	12.7	11	29.5	6	13.1	0	12	47	5	0
Michel Creek	CM MC2	Exposure Sites	667249	5488144	2020	3	CM_MC2_BIC-3_2020-09-19	40	8380	27.9	0.9	2.7	1.1	0.2	24	38.2	4	8.1	12	9.8	8	20.3	5	10.3	0	11	52	9	0
Michel Creek	MIDAG-S1	Exposure Sites	666290	5488507	2020	1	RG_MIDAG-S1_BIC-1_2020-09-18	49	29200	27.2	0.9	2.9	1.1	0.2	32	79.5	7	18.0	12	11.6	13	49.9	7	8.6	0	12	17	3	0
Michel Creek	MIDAG-S1	Exposure Sites	666290	5488507	2020	2	RG_MIDAG-S1_BIC-2_2020-09-18	50	28800	45.4	0.8	2.4	1.3	0.1	34	92.0	9	19.4	13	9.5	12	63.1	7	1.0	0	13	7	1	0
Michel Creek	MIDAG-S1	Exposure Sites	666290	5488507	2020	3	RG_MIDAG-S1_BIC-3_2020-09-18	46	21320	14.1	0.9	3.0	1.1	0.3	31	72.0	9	29.2	10	11.6	12	31.1	6	10.2	0	11	25	3	0
Michel Creek	MIDAG-S2	Exposure Sites	665770	5488854	2020	1	RG_MIDAG-S2_BIC-1_2020-09-17	59	37060	25.4	0.9	2.8	1.1	0.2	37	80.7	10	37.1	13	9.3	14	34.3	8	8.8	0	14	15	3	0
Michel Creek	MIDAG-S2	Exposure Sites	665770	5488854	2020	2	RG_MIDAG-S2_BIC-2_2020-09-17	49	24240	26.6	0.9	2.7	1.1	0.2	34	81.1	12	41.9	10	7.2	12	32.0	7	10.5	0	11	15	3	0
Michel Creek	MIDAG-S2	Exposure Sites	665770	5488854	2020	3	RG_MIDAG-S2_BIC-3_2020-09-17	52	33920	24.2	0.9	2.8	1.1	0.2	36	77.5	12	40.3	12	7.0	12	30.2	7	10.6	0	13	19	3	0
Michel Creek	MIDAG	Exposure Sites	665258	5489417	2012	1	RG_MIDAG_BIC-1_2012-09-16	33	10067	23.5	0.9	2.6	1.1	0.2	23	86.1	8	62.9	8	7.6	7	15.6	4	2.0	0	6	10	3	0
Michel Creek	MIDAG	Exposure Sites	665258	5489417	2015	1	RG_MIDAG_BIC-1_2015-09-12	36	14520	23.0	0.9	2.4	1.2	0.2	21	72.2	10	42.8	5	13.4	6	16.0	7	2.2	0	11	26	0	0
Michel Creek	MIDAG	Exposure Sites	665220	5489324	2018	1	RG_MIDAG_BIC-1_2018-09-08	42	6160	16.6	0.9	3.0	1.1	0.3	23	64.6	9	38.3	4	12.3	10	14.0	9	8.1	2	14	25	7	0
Michel Creek	MIDAG	Exposure Sites	665258	5489417	2019	1	RG_MIDAG_BIC-1_2019-09-10	40	6860	25.9	0.9	2.7	1.1	0.2	19	37.3	7	23.9	4	4.7	8	8.7	9	24.8	5	14	53	3	0
Michel Creek	MIDAG	Exposure Sites	665240	5489482	2020	1	RG_MIDAG_BIC-1_2020-09-15	47	13860	22.7	0.9	3.0	1.1	0.2	31	80.2	10	42.7	10	17.2	11	20.3	6	8.4	0	11	15	3	0
Michel Creek	MIDAG	Exposure Sites	665220	5489324	2018	2	RG_MIDAG_BIC-2_2018-09-08	41	16220	12.1	0.9	3.0	1.1	0.4	27	70.0	8	34.5	7	7.5	12	28.0	6	11.8	0	10	27	1	0
Michel Creek	MIDAG	Exposure Sites	665258	5489417	2019	2	RG_MIDAG_BIC-2_2019-09-10	54	26120	18.9	0.9	2.8	1.1	0.2	31	60.4	10	37.8	11	11.0	10	11.6	12	13.5	3	17	34	2	0
Michel Creek	MIDAG	Exposure Sites	665240	5489482	2020	2	RG_MIDAG_BIC-2_2020-09-15	53	30340	20.6	0.9	2.9	1.1	0.2	35	71.4	12	37.0	10	10.1	13	24.3	8	15.1	0	13	26	2	0
Michel Creek	MIDAG	Exposure Sites	665220	5489324	2018	3	RG_MIDAG_BIC-3_2018-09-08	31	7220	14.2	0.9	2.9	1.1	0.4	19	74.8	6	37.4	5	24.1	8	13.3	5	14.4	0	9	20	4	0
Michel Creek	MIDAG	Exposure Sites	665258	5489417	2019	3	RG_MIDAG_BIC-3_2019-09-10	37	3489	46.1	0.8	2.3	1.3	0.1	16	34.1	7	20.4	4	7.0	5	6.7	9	9.3	4	15	58	2	0
Michel Creek	MIDAG	Exposure Sites	665240	5489482	2020	3	RG_MIDAG_BIC-3_2020-09-15	58	24760	22.1	0.9	3.0	1.1	0.2	37	79.2	11	43.2	12	14.4	14	21.6	8	11.3	0	14	18	2	0
Michel Creek	MIULE	Exposure Sites	660503	5493048	2018	1	RG_MIULE_BIC-1_2018-09-11	31	7080	19.0	0.9	2.8	1.1	0.4	17	62.1	6	29.9	4	22.3	7	9.9	6	15.5	1	9	28	8	0
Michel Creek	MIULE	Exposure Sites	660502	5493059	2019	1	RG_MIULE_BIC-1_2019-09-06	41	12940	19.8	0.9	3.0	1.1	0.3	25	63.7	7	33.1	9	21.8	9	8.8	7	18.4	1	10	29	6	0
Michel Creek	MIULE	Exposure Sites	660502	5493049	2020	1	RG_MIULE_BIC-1_2020-09-16	55	18180	15.5	0.9	3.0	1.1	0.2	32	60.7	11	36.4	9	9.5	12	14.9	9	16.2	0	19	31	6	0
Michel Creek	MIULE	Exposure Sites	660503	5493048	2018	2	RG_MIULE_BIC-2_2018-09-11	41	16420	16.7	0.9	2.9	1.1	0.3	24	70.5	8	42.4	6	10.1	10	18.0	7	9.4	1	13	22	5	0
Michel Creek	MIULE	Exposure Sites	660502	5493059	2019	2	RG_MIULE_BIC-2_2019-09-06	48	17800	23.3	0.9	2.8	1.1	0.2	26	61.3	9	41.9	8	11.5	9	8.0	10	15.2	3	15	30	4	0
Michel Creek	MIULE	Exposure Sites	660502	5493049	2020	2	RG_MIULE_BIC-2_2020-09-16	48	15480	15.4	0.9	3.0	1.1	0.3	32	71.3	12	37.2	10	11.6	10	22.5	4	14.7	0	10	23	3	0
Michel Creek	MIULE	Exposure Sites	660502	5493059	2018	3	RG_MIULE_BIC-3_2019-09-06	40	17740	27.2	0.9	2.6	1.1	0.2	21	69.9	8	41.0	6	24.8	7	4.1	8	10.6	3	14	22	3	0
Michel Creek	MIULE	Exposure Sites	660503	5493048	2019	3	RG_MIULE_BIC-3_2018-09-11	40	8160	15.9	0.9	2.9	1.1	0.3	23	72.3	7	41.9	7	15.4	9	15.0	6	7.8	2	12	21	4	0
Michel Creek	MIULE	Exposure Sites	660502	5493049	2020	3	RG_MIULE_BIC-3_2020-09-16	41	11520	18.6	0.9	2.7	1.1	0.2	25	66.0	10	38.9	8	12.2	7	14.9	5	9.9	0	10	29	4	0
Michel Creek	MI5	Exposure Sites	659387	5496818	2012	1	RG_MI5_BIC-1_2012-09-16	38	7600	10.9	0.9	3.1	1.1	0.4	26	71.4	10	42.8	6	10.9	10	17.8	3	8.6	0	8	22	3	0
Michel Creek	MI5	Exposure Sites	659387	5496818	2015	1	RG_MI5_BIC-1_2015-09-13	26	7120	37.3	0.8	2.2	1.2	0.2	18	86.5	8	30.1	3	49.7	7	6.7	3	5.1	0	6	10	0	0
Michel Creek	MI5	Exposure Sites	659496	5496774	2018	1	RG_MI5_BIC-1_2018-09-11	42	14040	20.2	0.9	2.8	1.1	0.3	28	78.6	8	42.9	9	10.0	11	25.8	5	4.1	0	11	20	1	0
Michel Creek	MI5	Exposure Sites	659387	5496818	2019	1	RG_MI5_BIC-1_2019-09-05	37	14560	30.9	0.8	2.3	1.2	0.2	19	81.0	6	33.8	7	44.0	6	3.3	9	5.5	1	12	15	2	0
Michel Creek	MI5	Exposure Sites	659501	5496620	2020	1	RG_MI5_BIC-1_2020-09-17	44	12260	19.4	0.9	2.9	1.1	0.2	27	69.8	10	34.9	9	15.3	8	19.6	7	3.4	0	11	24	5	0
Michel Creek	MI5	Exposure Sites	659496	5496774	2018	2	RG_MI5_BIC-2_2018-09-11	35	6480	15.7	0.9	2.8	1.1	0.3	20	68.2	6	44.4	4	14.5	10	9.3	6	4.9	2	10	25	3	0
Michel Creek	MI5	Exposure Sites	659387	5496818	2019	2	RG_MI5_BIC-2_2019-09-05	43	16220	24.4	0.9	2.7	1.1	0.2	23	77.1	8	31.4	8	38.2	7	7.4	8	6.5	2	12	17	3	0
Michel Creek	MI5	Exposure Sites	659501	5496620	2020	2	RG_MI5_BIC-2_2020-09-17	44	16720	16.5	0.9	2.9	1.1	0.3	29	74.6	9	41.3	11	12.2	9	21.2	3	1.4	0	9	21	3	0
Michel Creek	MI5	Exposure Sites	659496	5496774	2018	3	RG_MI5_BIC-3_2018-09-11	30	8880	20.1	0.9	2.7	1.1	0.4	20	87.2	9	47.7	5	18.7	6	20.7	2	2.7	0	6	9	2	0
Michel Creek	MI5	Exposure Sites	659387	5496818	2019	3	RG_MI5_BIC-3_2019-09-05	35	7960	24.4	0.9	2.5	1.1	0.2	18	75.4	7	35.7	7	35.2	4	4.5	7	5.0	1	11	20	3	0
Michel Creek	MI5	Exposure Sites	659501	5496620	2020	3	RG_MI5_BIC-3_2020-09-17	45	10140	24.2	0.9	2.8	1.1	0.2	31	86.8	10	46.5	10	14.4	11	25.8	3	1.2	0	9	8	2	0

a) UTM coordinates for 2012 to 2019 data available from the RAEMP; 2020 UTMs included here for reference.

"-" = data not available; % = percent; EPT = ephemeroptera, plecoptera, trichoptera.

Table J-1: Benthic Invertebrate Co

Watercourse	Station	% Bivalvia
Michel Creek	MI25	0
Michel Creek	MI25	0
Michel Creek	MI25	0
Michel Creek	MI25	0
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Michel Creek	MI25	0
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Michel Creek	MI25	0
Michel Creek	MI25	0
Michel Creek	MI25	0
Andy Good Creek	AGCK	0
Andy Good Creek	AGCK	0
Andy Good Creek	AGCK	0
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Andy Good Creek	AGCK	0
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Andy Good Creek	AGCK	0
Andy Good Creek	AGCK	0
Andy Good Creek	AGCK	0
Andy Good Creek	AGCK	0
Leach Creek	LE1	0
Leach Creek	LE1	0
Leach Creek	LE1	0
Leach Creek	LE1	0
Leach Creek	LE1	0
Leach Creek	LE1	0
Leach Creek	LE1	0
Michel Creek	MIUCO	0
Michel Creek	MIUCO	0
Michel Creek	MIUCO	0
Michel Creek	MIUCO	0
Michel Creek	MIUCO	0
Michel Creek	MIUCO	0
Michel Creek	MIUCO	0
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Michel Creek	MIUCO	0
Michel Creek	MIUCO	0
Corbin Creek	CORCK	0
Corbin Creek	CORCK	0
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Corbin Creek	CORCK	0
Michel Creek	MIDCO	0
Michel Creek	MIDCO	0
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Michel Creek	MIDCO	0
Michel Creek	CM MC2	0
Michel Creek	CM MC2	0
Michel Creek	CM MC2	0
Michel Creek	MIDAG-S1	0
Michel Creek	MIDAG-S1	0
Michel Creek	MIDAG-S1	0
Michel Creek	MIDAG-S2	0
Michel Creek	MIDAG-S2	0
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Michel Creek	MI5	0
Michel Creek	MI5	0

a) UTM coordinates for 2012 to 2019 data availabl

"-" = data not available; % = percent; EPT = ephem

Table J-2: Site Specific Normal Ranges at CMO LAEMP Sampling Stations, 2012 to 2020

Variable	Station	Year	Replicate	Status	Lower Bound	Upper Bound
Richness	RG_MI25	2012	1	Reference	29	44
Richness	RG_MI25	2013	1	Reference	30	45
Richness	RG_MI25	2013	2	Reference	30	45
Richness	RG_MI25	2013	3	Reference	30	46
Richness	RG_MI25	2015	1	Reference	30	45
Richness	RG_MI25	2015	2	Reference	30	45
Richness	RG_MI25	2015	3	Reference	30	45
Richness	RG_MI25	2016	1	Reference	29	45
Richness	RG_MI25	2017	1	Reference	31	46
Richness	RG_MI25	2018	1	Reference	31	46
Richness	RG_MI25	2018	2	Reference	31	46
Richness	RG_MI25	2018	3	Reference	31	45
Richness	RG_MI25	2019	1	Reference	31	46
Richness	RG_MI25	2019	2	Reference	31	46
Richness	RG_MI25	2019	3	Reference	30	45
Richness	RG_MI25	2020	1	Reference	30	45
Richness	RG_MI25	2020	2	Reference	29	44
Richness	RG_MI25	2020	3	Reference	30	45
Richness	RG_AGCK	2012	1	Reference	23	38
Richness	RG_AGCK	2013	1	Reference	24	39
Richness	RG_AGCK	2015	1	Reference	24	38
Richness	RG_AGCK	2018	1	Reference	24	39
Richness	RG_AGCK	2018	2	Reference	24	39
Richness	RG_AGCK	2018	3	Reference	25	40
Richness	RG_AGCK	2019	1	Reference	24	39
Richness	RG_AGCK	2019	2	Reference	23	38
Richness	RG_AGCK	2019	3	Reference	24	39
Richness	RG_AGCK	2020	1	Reference	21	37
Richness	RG_AGCK	2020	2	Reference	24	39
Richness	RG_AGCK	2020	3	Reference	23	38
Richness	RG_LE1	2018	1	Reference	33	48
Richness	RG_LE1	2019	1	Reference	32	47
Richness	RG_LE1	2019	2	Reference	31	45
Richness	RG_LE1	2019	3	Reference	31	46
Richness	RG_LE1	2020	1	Reference	30	45
Richness	RG_LE1	2020	2	Reference	31	46
Richness	RG_LE1	2020	3	Reference	32	47
Richness	RG_MIUCO	2012	1	Mine-Influenced	29	44
Richness	RG_MIUCO	2015	1	Mine-Influenced	28	44
Richness	RG_MIUCO	2016	1	Mine-Influenced	29	44
Richness	RG_MIUCO	2017	1	Mine-Influenced	28	43
Richness	RG_MIUCO	2018	1	Mine-Influenced	29	44
Richness	RG_MIUCO	2018	2	Mine-Influenced	29	44
Richness	RG_MIUCO	2018	3	Mine-Influenced	29	44
Richness	RG_MIUCO	2019	1	Mine-Influenced	27	42
Richness	RG_MIUCO	2019	2	Mine-Influenced	27	42
Richness	RG_MIUCO	2019	3	Mine-Influenced	27	42
Richness	RG_MIUCO	2020	1	Mine-Influenced	28	43
Richness	RG_MIUCO	2020	2	Mine-Influenced	28	43
Richness	RG_MIUCO	2020	3	Mine-Influenced	27	43
Richness	RG_CORCK	2012	1	Mine-Influenced	27	42
Richness	RG_CORCK	2015	1	Mine-Influenced	27	42
Richness	RG_CORCK	2016	1	Mine-Influenced	27	42
Richness	RG_CORCK	2017	1	Mine-Influenced	27	42
Richness	RG_CORCK	2018	1	Mine-Influenced	25	40
Richness	RG_CORCK	2018	2	Mine-Influenced	27	41
Richness	RG_CORCK	2018	3	Mine-Influenced	26	41
Richness	RG_CORCK	2019	1	Mine-Influenced	23	38
Richness	RG_CORCK	2019	2	Mine-Influenced	-20	28
Richness	RG_CORCK	2019	3	Mine-Influenced	-19	28
Richness	RG_CORCK	2020	1	Mine-Influenced	23	38
Richness	RG_CORCK	2020	2	Mine-Influenced	24	40
Richness	RG_CORCK	2020	3	Mine-Influenced	23	38
Richness	RG_MIDCO	2012	1	Mine-Influenced	28	43
Richness	RG_MIDCO	2015	1	Mine-Influenced	28	43
Richness	RG_MIDCO	2016	1	Mine-Influenced	28	43
Richness	RG_MIDCO	2017	1	Mine-Influenced	27	42
Richness	RG_MIDCO	2018	1	Mine-Influenced	28	43
Richness	RG_MIDCO	2018	2	Mine-Influenced	27	42
Richness	RG_MIDCO	2018	3	Mine-Influenced	25	41
Richness	RG_MIDCO	2018	4	Mine-Influenced	27	42
Richness	RG_MIDCO	2018	5	Mine-Influenced	29	44
Richness	RG_MIDCO	2019	1	Mine-Influenced	28	43
Richness	RG_MIDCO	2019	2	Mine-Influenced	26	41
Richness	RG_MIDCO	2019	3	Mine-Influenced	27	42
Richness	RG_MIDCO	2019	4	Mine-Influenced	26	41
Richness	RG_MIDCO	2019	5	Mine-Influenced	28	43
Richness	RG_MIDCO	2020	1	Mine-Influenced	28	43
Richness	RG_MIDCO	2020	2	Mine-Influenced	28	43
Richness	RG_MIDCO	2020	3	Mine-Influenced	26	41
Richness	RG_MIDCO	2020	4	Mine-Influenced	27	42
Richness	RG_MIDCO	2020	5	Mine-Influenced	27	42
Richness	RG_MIDAG	2012	1	Mine-Influenced	26	41
Richness	RG_MIDAG	2015	1	Mine-Influenced	27	42
Richness	RG_MIDAG	2018	1	Mine-Influenced	26	42
Richness	RG_MIDAG	2018	2	Mine-Influenced	27	42
Richness	RG_MIDAG	2018	3	Mine-Influenced	27	42
Richness	RG_MIDAG	2019	1	Mine-Influenced	24	40
Richness	RG_MIDAG	2019	2	Mine-Influenced	26	41
Richness	RG_MIDAG	2019	3	Mine-Influenced	26	41
Richness	RG_MIDAG	2020	1	Mine-Influenced	25	40
Richness	RG_MIDAG	2020	2	Mine-Influenced	27	42
Richness	RG_MIDAG	2020	3	Mine-Influenced	26	41
Richness	RG_MIULE	2018	1	Mine-Influenced	27	42
Richness	RG_MIULE	2018	2	Mine-Influenced	28	43
Richness	RG_MIULE	2018	3	Mine-Influenced	27	43
Richness	RG_MIULE	2019	1	Mine-Influenced	26	41
Richness	RG_MIULE	2019	2	Mine-Influenced	27	42
Richness	RG_MIULE	2019	3	Mine-Influenced	27	42
Richness	RG_MIULE	2020	1	Mine-Influenced	25	41
Richness	RG_MIULE	2020	2	Mine-Influenced	25	40
Richness	RG_MIULE	2020	3	Mine-Influenced	26	42
Richness	RG_MI5	2012	1	Mine-Influenced	29	44
Richness	RG_MI5	2015	1	Mine-Influenced	28	43
Richness	RG_MI5	2018	1	Mine-Influenced	30	45
Richness	RG_MI5	2018	2	Mine-Influenced	30	45
Richness	RG_MI5	2018	3	Mine-Influenced	29	44
Richness	RG_MI5	2019	1	Mine-Influenced	28	43

Table J-2: Site Specific Normal Ranges at CMO LAEMP Sampling Stations, 2012 to 2020

Variable	Station	Year	Replicate	Status	Lower Bound	Upper Bound
Richness	RG_MI5	2019	2	Mine-Influenced	29	44
Richness	RG_MI5	2019	3	Mine-Influenced	28	43
Richness	RG_MI5	2020	1	Mine-Influenced	30	45
Richness	RG_MI5	2020	2	Mine-Influenced	30	45
Richness	RG_MI5	2020	3	Mine-Influenced	29	44
Richness	CM_MC2	2020	1	Mine-Influenced	28	43
Richness	CM_MC2	2020	2	Mine-Influenced	27	42
Richness	CM_MC2	2020	3	Mine-Influenced	28	43
Richness	RG_MIDAG-S1	2020	1	Mine-Influenced	27	43
Richness	RG_MIDAG-S1	2020	2	Mine-Influenced	27	43
Richness	RG_MIDAG-S1	2020	3	Mine-Influenced	27	43
Richness	RG_MIDAG-S2	2020	1	Mine-Influenced	27	42
Richness	RG_MIDAG-S2	2020	2	Mine-Influenced	27	42
Richness	RG_MIDAG-S2	2020	3	Mine-Influenced	27	42
Abundance	RG_MI25	2012	1	Reference	8970	90136
Abundance	RG_MI25	2013	1	Reference	7977	81842
Abundance	RG_MI25	2013	2	Reference	8025	82765
Abundance	RG_MI25	2013	3	Reference	8040	82463
Abundance	RG_MI25	2015	1	Reference	9190	94331
Abundance	RG_MI25	2015	2	Reference	9121	95102
Abundance	RG_MI25	2015	3	Reference	9152	93542
Abundance	RG_MI25	2016	1	Reference	7736	86267
Abundance	RG_MI25	2017	1	Reference	8034	80570
Abundance	RG_MI25	2018	1	Reference	7240	78169
Abundance	RG_MI25	2018	2	Reference	4482	77404
Abundance	RG_MI25	2018	3	Reference	7328	76575
Abundance	RG_MI25	2019	1	Reference	8555	85916
Abundance	RG_MI25	2019	2	Reference	7644	78648
Abundance	RG_MI25	2019	3	Reference	7376	80634
Abundance	RG_MI25	2020	1	Reference	7859	78897
Abundance	RG_MI25	2020	2	Reference	7181	79987
Abundance	RG_MI25	2020	3	Reference	7781	81598
Abundance	RG_AGCK	2012	1	Reference	2741	15695
Abundance	RG_AGCK	2013	1	Reference	2512	13448
Abundance	RG_AGCK	2015	1	Reference	2164	12073
Abundance	RG_AGCK	2018	1	Reference	2475	15118
Abundance	RG_AGCK	2018	2	Reference	2405	14639
Abundance	RG_AGCK	2018	3	Reference	2353	14055
Abundance	RG_AGCK	2019	1	Reference	2522	14062
Abundance	RG_AGCK	2019	2	Reference	2354	13511
Abundance	RG_AGCK	2019	3	Reference	2468	13661
Abundance	RG_AGCK	2020	1	Reference	2225	12400
Abundance	RG_AGCK	2020	2	Reference	2464	13594
Abundance	RG_AGCK	2020	3	Reference	2304	13049
Abundance	RG_LE1	2018	1	Reference	2169	13192
Abundance	RG_LE1	2019	1	Reference	2043	13160
Abundance	RG_LE1	2019	2	Reference	2128	13223
Abundance	RG_LE1	2019	3	Reference	2043	13150
Abundance	RG_LE1	2020	1	Reference	2059	13322
Abundance	RG_LE1	2020	2	Reference	2224	12998
Abundance	RG_LE1	2020	3	Reference	2157	12408
Abundance	RG_MIUCO	2012	1	Mine-Influenced	6140	65065
Abundance	RG_MIUCO	2015	1	Mine-Influenced	5049	54739
Abundance	RG_MIUCO	2016	1	Mine-Influenced	5318	55661
Abundance	RG_MIUCO	2017	1	Mine-Influenced	5314	56945
Abundance	RG_MIUCO	2018	1	Mine-Influenced	4885	58025
Abundance	RG_MIUCO	2018	2	Mine-Influenced	5235	62029
Abundance	RG_MIUCO	2018	3	Mine-Influenced	5192	60638
Abundance	RG_MIUCO	2019	1	Mine-Influenced	5173	60615
Abundance	RG_MIUCO	2019	2	Mine-Influenced	5182	59147
Abundance	RG_MIUCO	2019	3	Mine-Influenced	5188	57939
Abundance	RG_MIUCO	2020	1	Mine-Influenced	4891	54681
Abundance	RG_MIUCO	2020	2	Mine-Influenced	5517	59231
Abundance	RG_MIUCO	2020	3	Mine-Influenced	5065	55082
Abundance	RG_CORCK	2012	1	Mine-Influenced	3749	21128
Abundance	RG_CORCK	2015	1	Mine-Influenced	3713	21909
Abundance	RG_CORCK	2016	1	Mine-Influenced	3707	20186
Abundance	RG_CORCK	2017	1	Mine-Influenced	3646	19933
Abundance	RG_CORCK	2018	1	Mine-Influenced	3623	21501
Abundance	RG_CORCK	2018	2	Mine-Influenced	3689	20661
Abundance	RG_CORCK	2018	3	Mine-Influenced	3511	21446
Abundance	RG_CORCK	2019	1	Mine-Influenced	3627	20280
Abundance	RG_CORCK	2019	2	Mine-Influenced	3742	22367
Abundance	RG_CORCK	2019	3	Mine-Influenced	2579	31953
Abundance	RG_CORCK	2020	1	Mine-Influenced	3683	20865
Abundance	RG_CORCK	2020	2	Mine-Influenced	3633	21123
Abundance	RG_CORCK	2020	3	Mine-Influenced	3406	24681
Abundance	RG_MIDCO	2012	1	Mine-Influenced	3681	24718
Abundance	RG_MIDCO	2015	1	Mine-Influenced	3832	25305
Abundance	RG_MIDCO	2016	1	Mine-Influenced	3431	23471
Abundance	RG_MIDCO	2017	1	Mine-Influenced	3534	24515
Abundance	RG_MIDCO	2018	1	Mine-Influenced	3302	23899
Abundance	RG_MIDCO	2018	2	Mine-Influenced	3572	24541
Abundance	RG_MIDCO	2018	3	Mine-Influenced	3511	23922
Abundance	RG_MIDCO	2018	4	Mine-Influenced	3585	24841
Abundance	RG_MIDCO	2018	5	Mine-Influenced	3420	24476
Abundance	RG_MIDCO	2019	1	Mine-Influenced	3348	23303
Abundance	RG_MIDCO	2019	2	Mine-Influenced	3471	23927
Abundance	RG_MIDCO	2019	3	Mine-Influenced	3522	23957
Abundance	RG_MIDCO	2019	4	Mine-Influenced	3666	24968
Abundance	RG_MIDCO	2019	5	Mine-Influenced	3542	24243
Abundance	RG_MIDCO	2020	1	Mine-Influenced	3342	23390
Abundance	RG_MIDCO	2020	2	Mine-Influenced	3389	24090
Abundance	RG_MIDCO	2020	3	Mine-Influenced	3072	22455
Abundance	RG_MIDCO	2020	4	Mine-Influenced	3525	23860
Abundance	RG_MIDCO	2020	5	Mine-Influenced	3316	23896
Abundance	RG_MIDAG	2012	1	Mine-Influenced	2688	18719
Abundance	RG_MIDAG	2015	1	Mine-Influenced	2464	17608
Abundance	RG_MIDAG	2018	1	Mine-Influenced	2461	18402
Abundance	RG_MIDAG	2018	2	Mine-Influenced	2371	17243
Abundance	RG_MIDAG	2018	3	Mine-Influenced	2443	17606
Abundance	RG_MIDAG	2019	1	Mine-Influenced	2517	17422
Abundance	RG_MIDAG	2019	2	Mine-Influenced	2455	18302
Abundance	RG_MIDAG	2019	3	Mine-Influenced	2631	18279
Abundance	RG_MIDAG	2020	1	Mine-Influenced	2066	16906
Abundance	RG_MIDAG	2020	2	Mine-Influenced	2518	18251
Abundance	RG_MIDAG	2020	3	Mine-Influenced	2464	18104
Abundance	RG_MIULE	2018	1	Mine-Influenced	744	7034

Table J-2: Site Specific Normal Ranges at CMO LAEMP Sampling Stations, 2012 to 2020

Variable	Station	Year	Replicate	Status	Lower Bound	Upper Bound
Abundance	RG_MIULE	2018	2	Mine-Influenced	805	7454
Abundance	RG_MIULE	2018	3	Mine-Influenced	789	7071
Abundance	RG_MIULE	2019	1	Mine-Influenced	817	7332
Abundance	RG_MIULE	2019	2	Mine-Influenced	792	7281
Abundance	RG_MIULE	2019	3	Mine-Influenced	855	8153
Abundance	RG_MIULE	2020	1	Mine-Influenced	833	6961
Abundance	RG_MIULE	2020	2	Mine-Influenced	797	6826
Abundance	RG_MIULE	2020	3	Mine-Influenced	818	7201
Abundance	RG_MI5	2012	1	Mine-Influenced	2105	12351
Abundance	RG_MI5	2015	1	Mine-Influenced	1577	10190
Abundance	RG_MI5	2018	1	Mine-Influenced	1823	11455
Abundance	RG_MI5	2018	2	Mine-Influenced	1914	11415
Abundance	RG_MI5	2018	3	Mine-Influenced	2019	11662
Abundance	RG_MI5	2019	1	Mine-Influenced	1883	11140
Abundance	RG_MI5	2019	2	Mine-Influenced	2192	12633
Abundance	RG_MI5	2019	3	Mine-Influenced	2025	11411
Abundance	RG_MI5	2020	1	Mine-Influenced	1756	11534
Abundance	RG_MI5	2020	2	Mine-Influenced	2109	12261
Abundance	RG_MI5	2020	3	Mine-Influenced	1781	11082
Abundance	RG_CM_MC2	2020	1	Mine-Influenced	1011	10501
Abundance	RG_CM_MC2	2020	2	Mine-Influenced	999	10355
Abundance	RG_CM_MC2	2020	3	Mine-Influenced	1038	10853
Abundance	RG_MIDAG-S1	2020	1	Mine-Influenced	759	8184
Abundance	RG_MIDAG-S1	2020	2	Mine-Influenced	751	8201
Abundance	RG_MIDAG-S1	2020	3	Mine-Influenced	721	7944
Abundance	RG_MIDAG-S2	2020	1	Mine-Influenced	523	8311
Abundance	RG_MIDAG-S2	2020	2	Mine-Influenced	565	8017
Abundance	RG_MIDAG-S2	2020	3	Mine-Influenced	579	8659
EPT Abundance	RG_MI25	2012	1	Reference	5498	80405
EPT Abundance	RG_MI25	2013	1	Reference	4856	72624
EPT Abundance	RG_MI25	2013	2	Reference	4883	73193
EPT Abundance	RG_MI25	2013	3	Reference	4872	73141
EPT Abundance	RG_MI25	2015	1	Reference	5742	84957
EPT Abundance	RG_MI25	2015	2	Reference	5679	85518
EPT Abundance	RG_MI25	2015	3	Reference	5733	84307
EPT Abundance	RG_MI25	2016	1	Reference	4661	76074
EPT Abundance	RG_MI25	2017	1	Reference	5051	72316
EPT Abundance	RG_MI25	2018	1	Reference	4436	69793
EPT Abundance	RG_MI25	2018	2	Reference	2140	66812
EPT Abundance	RG_MI25	2018	3	Reference	4395	67811
EPT Abundance	RG_MI25	2019	1	Reference	5497	77812
EPT Abundance	RG_MI25	2019	2	Reference	4807	70551
EPT Abundance	RG_MI25	2019	3	Reference	4510	71583
EPT Abundance	RG_MI25	2020	1	Reference	4769	69581
EPT Abundance	RG_MI25	2020	2	Reference	4042	68792
EPT Abundance	RG_MI25	2020	3	Reference	4719	72256
EPT Abundance	RG_AGCK	2012	1	Reference	2122	14953
EPT Abundance	RG_AGCK	2013	1	Reference	1928	12760
EPT Abundance	RG_AGCK	2015	1	Reference	1648	11427
EPT Abundance	RG_AGCK	2018	1	Reference	1906	14385
EPT Abundance	RG_AGCK	2018	2	Reference	1873	13978
EPT Abundance	RG_AGCK	2018	3	Reference	1843	13421
EPT Abundance	RG_AGCK	2019	1	Reference	1944	13383
EPT Abundance	RG_AGCK	2019	2	Reference	1784	12789
EPT Abundance	RG_AGCK	2019	3	Reference	1911	13024
EPT Abundance	RG_AGCK	2020	1	Reference	1627	11638
EPT Abundance	RG_AGCK	2020	2	Reference	1911	12965
EPT Abundance	RG_AGCK	2020	3	Reference	1738	12317
EPT Abundance	RG_LE1	2018	1	Reference	1302	11599
EPT Abundance	RG_LE1	2019	1	Reference	1206	11472
EPT Abundance	RG_LE1	2019	2	Reference	1166	11326
EPT Abundance	RG_LE1	2019	3	Reference	1150	11296
EPT Abundance	RG_LE1	2020	1	Reference	1087	11187
EPT Abundance	RG_LE1	2020	2	Reference	1269	11203
EPT Abundance	RG_LE1	2020	3	Reference	1249	10742
EPT Abundance	RG_MIUCO	2012	1	Mine-Influenced	3947	58900
EPT Abundance	RG_MIUCO	2015	1	Mine-Influenced	3022	48309
EPT Abundance	RG_MIUCO	2016	1	Mine-Influenced	3297	49622
EPT Abundance	RG_MIUCO	2017	1	Mine-Influenced	3161	50102
EPT Abundance	RG_MIUCO	2018	1	Mine-Influenced	2935	51187
EPT Abundance	RG_MIUCO	2018	2	Mine-Influenced	3286	55636
EPT Abundance	RG_MIUCO	2018	3	Mine-Influenced	3197	54031
EPT Abundance	RG_MIUCO	2019	1	Mine-Influenced	3009	52876
EPT Abundance	RG_MIUCO	2019	2	Mine-Influenced	2986	51265
EPT Abundance	RG_MIUCO	2019	3	Mine-Influenced	3000	50383
EPT Abundance	RG_MIUCO	2020	1	Mine-Influenced	2851	47820
EPT Abundance	RG_MIUCO	2020	2	Mine-Influenced	3416	52770
EPT Abundance	RG_MIUCO	2020	3	Mine-Influenced	2982	48139
EPT Abundance	RG_CORCK	2012	1	Mine-Influenced	2668	19556
EPT Abundance	RG_CORCK	2015	1	Mine-Influenced	2744	20549
EPT Abundance	RG_CORCK	2016	1	Mine-Influenced	2658	18723
EPT Abundance	RG_CORCK	2017	1	Mine-Influenced	2596	18453
EPT Abundance	RG_CORCK	2018	1	Mine-Influenced	2425	19532
EPT Abundance	RG_CORCK	2018	2	Mine-Influenced	2554	18921
EPT Abundance	RG_CORCK	2018	3	Mine-Influenced	2412	19632
EPT Abundance	RG_CORCK	2019	1	Mine-Influenced	2181	18015
EPT Abundance	RG_CORCK	2019	2	Mine-Influenced	3	18078
EPT Abundance	RG_CORCK	2019	3	Mine-Influenced	-3	25640
EPT Abundance	RG_CORCK	2020	1	Mine-Influenced	2268	18664
EPT Abundance	RG_CORCK	2020	2	Mine-Influenced	2395	19074
EPT Abundance	RG_CORCK	2020	3	Mine-Influenced	2064	21956
EPT Abundance	RG_MIDCO	2012	1	Mine-Influenced	2324	22189
EPT Abundance	RG_MIDCO	2015	1	Mine-Influenced	2504	22985
EPT Abundance	RG_MIDCO	2016	1	Mine-Influenced	2234	21304
EPT Abundance	RG_MIDCO	2017	1	Mine-Influenced	2215	21904
EPT Abundance	RG_MIDCO	2018	1	Mine-Influenced	2076	21451
EPT Abundance	RG_MIDCO	2018	2	Mine-Influenced	2218	21877
EPT Abundance	RG_MIDCO	2018	3	Mine-Influenced	2005	20892
EPT Abundance	RG_MIDCO	2018	4	Mine-Influenced	2273	22261
EPT Abundance	RG_MIDCO	2018	5	Mine-Influenced	2248	22253
EPT Abundance	RG_MIDCO	2019	1	Mine-Influenced	2160	21028
EPT Abundance	RG_MIDCO	2019	2	Mine-Influenced	2094	21121
EPT Abundance	RG_MIDCO	2019	3	Mine-Influenced	2163	21294
EPT Abundance	RG_MIDCO	2019	4	Mine-Influenced	2255	22233
EPT Abundance	RG_MIDCO	2019	5	Mine-Influenced	2266	21827
EPT Abundance	RG_MIDCO	2020	1	Mine-Influenced	2157	21074
EPT Abundance	RG_MIDCO	2020	2	Mine-Influenced	2190	21794
EPT Abundance	RG_MIDCO	2020	3	Mine-Influenced	1867	19846

Table J-2: Site Specific Normal Ranges at CMO LAEMP Sampling Stations, 2012 to 2020

Variable	Station	Year	Replicate	Status	Lower Bound	Upper Bound
EPT Abundance	RG_MIDCO	2020	4	Mine-Influenced	2177	21247
EPT Abundance	RG_MIDCO	2020	5	Mine-Influenced	2066	21379
EPT Abundance	RG_MIDAG	2012	1	Mine-Influenced	1779	17070
EPT Abundance	RG_MIDAG	2015	1	Mine-Influenced	1634	16080
EPT Abundance	RG_MIDAG	2018	1	Mine-Influenced	1683	16951
EPT Abundance	RG_MIDAG	2018	2	Mine-Influenced	1526	15635
EPT Abundance	RG_MIDAG	2018	3	Mine-Influenced	1593	16011
EPT Abundance	RG_MIDAG	2019	1	Mine-Influenced	1553	15582
EPT Abundance	RG_MIDAG	2019	2	Mine-Influenced	1523	16364
EPT Abundance	RG_MIDAG	2019	3	Mine-Influenced	1709	16571
EPT Abundance	RG_MIDAG	2020	1	Mine-Influenced	1240	15036
EPT Abundance	RG_MIDAG	2020	2	Mine-Influenced	1642	16575
EPT Abundance	RG_MIDAG	2020	3	Mine-Influenced	1565	16319
EPT Abundance	RG_MIULE	2018	1	Mine-Influenced	440	6221
EPT Abundance	RG_MIULE	2018	2	Mine-Influenced	498	6687
EPT Abundance	RG_MIULE	2018	3	Mine-Influenced	490	6348
EPT Abundance	RG_MIULE	2019	1	Mine-Influenced	477	6454
EPT Abundance	RG_MIULE	2019	2	Mine-Influenced	478	6502
EPT Abundance	RG_MIULE	2019	3	Mine-Influenced	530	7318
EPT Abundance	RG_MIULE	2020	1	Mine-Influenced	477	6099
EPT Abundance	RG_MIULE	2020	2	Mine-Influenced	429	5906
EPT Abundance	RG_MIULE	2020	3	Mine-Influenced	498	6427
EPT Abundance	RG_MI5	2012	1	Mine-Influenced	1231	10784
EPT Abundance	RG_MI5	2015	1	Mine-Influenced	871	8761
EPT Abundance	RG_MI5	2018	1	Mine-Influenced	1057	10025
EPT Abundance	RG_MI5	2018	2	Mine-Influenced	1139	10061
EPT Abundance	RG_MI5	2018	3	Mine-Influenced	1170	10133
EPT Abundance	RG_MI5	2019	1	Mine-Influenced	1059	9627
EPT Abundance	RG_MI5	2019	2	Mine-Influenced	1318	11157
EPT Abundance	RG_MI5	2019	3	Mine-Influenced	1131	9816
EPT Abundance	RG_MI5	2020	1	Mine-Influenced	1002	10049
EPT Abundance	RG_MI5	2020	2	Mine-Influenced	1248	10760
EPT Abundance	RG_MI5	2020	3	Mine-Influenced	996	9535
EPT Abundance	RG_CM_MC2	2020	1	Mine-Influenced	559	9033
EPT Abundance	RG_CM_MC2	2020	2	Mine-Influenced	522	8773
EPT Abundance	RG_CM_MC2	2020	3	Mine-Influenced	558	9293
EPT Abundance	RG_MIDAG-S1	2020	1	Mine-Influenced	478	7458
EPT Abundance	RG_MIDAG-S1	2020	2	Mine-Influenced	483	7520
EPT Abundance	RG_MIDAG-S1	2020	3	Mine-Influenced	467	7282
EPT Abundance	RG_MIDAG-S2	2020	1	Mine-Influenced	340	7609
EPT Abundance	RG_MIDAG-S2	2020	2	Mine-Influenced	371	7342
EPT Abundance	RG_MIDAG-S2	2020	3	Mine-Influenced	386	7955
Percent EPT	RG_MI25	2012	1	Reference	61	89
Percent EPT	RG_MI25	2013	1	Reference	61	89
Percent EPT	RG_MI25	2013	2	Reference	61	88
Percent EPT	RG_MI25	2013	3	Reference	61	89
Percent EPT	RG_MI25	2015	1	Reference	62	90
Percent EPT	RG_MI25	2015	2	Reference	62	90
Percent EPT	RG_MI25	2015	3	Reference	63	90
Percent EPT	RG_MI25	2016	1	Reference	60	88
Percent EPT	RG_MI25	2017	1	Reference	63	90
Percent EPT	RG_MI25	2018	1	Reference	61	89
Percent EPT	RG_MI25	2018	2	Reference	48	86
Percent EPT	RG_MI25	2018	3	Reference	60	89
Percent EPT	RG_MI25	2019	1	Reference	64	91
Percent EPT	RG_MI25	2019	2	Reference	63	90
Percent EPT	RG_MI25	2019	3	Reference	61	89
Percent EPT	RG_MI25	2020	1	Reference	61	88
Percent EPT	RG_MI25	2020	2	Reference	56	86
Percent EPT	RG_MI25	2020	3	Reference	61	89
Percent EPT	RG_AGCK	2012	1	Reference	77	95
Percent EPT	RG_AGCK	2013	1	Reference	77	95
Percent EPT	RG_AGCK	2015	1	Reference	76	95
Percent EPT	RG_AGCK	2018	1	Reference	77	95
Percent EPT	RG_AGCK	2018	2	Reference	78	95
Percent EPT	RG_AGCK	2018	3	Reference	78	95
Percent EPT	RG_AGCK	2019	1	Reference	77	95
Percent EPT	RG_AGCK	2019	2	Reference	76	95
Percent EPT	RG_AGCK	2019	3	Reference	77	95
Percent EPT	RG_AGCK	2020	1	Reference	73	94
Percent EPT	RG_AGCK	2020	2	Reference	78	95
Percent EPT	RG_AGCK	2020	3	Reference	75	94
Percent EPT	RG_LE1	2018	1	Reference	60	88
Percent EPT	RG_LE1	2019	1	Reference	59	87
Percent EPT	RG_LE1	2019	2	Reference	55	86
Percent EPT	RG_LE1	2019	3	Reference	56	86
Percent EPT	RG_LE1	2020	1	Reference	53	84
Percent EPT	RG_LE1	2020	2	Reference	57	86
Percent EPT	RG_LE1	2020	3	Reference	58	87
Percent EPT	RG_MIUCO	2012	1	Mine-Influenced	64	91
Percent EPT	RG_MIUCO	2015	1	Mine-Influenced	60	88
Percent EPT	RG_MIUCO	2016	1	Mine-Influenced	62	89
Percent EPT	RG_MIUCO	2017	1	Mine-Influenced	59	88
Percent EPT	RG_MIUCO	2018	1	Mine-Influenced	60	88
Percent EPT	RG_MIUCO	2018	2	Mine-Influenced	63	90
Percent EPT	RG_MIUCO	2018	3	Mine-Influenced	62	89
Percent EPT	RG_MIUCO	2019	1	Mine-Influenced	58	87
Percent EPT	RG_MIUCO	2019	2	Mine-Influenced	58	87
Percent EPT	RG_MIUCO	2019	3	Mine-Influenced	58	87
Percent EPT	RG_MIUCO	2020	1	Mine-Influenced	58	87
Percent EPT	RG_MIUCO	2020	2	Mine-Influenced	62	89
Percent EPT	RG_MIUCO	2020	3	Mine-Influenced	59	87
Percent EPT	RG_CORCK	2012	1	Mine-Influenced	71	93
Percent EPT	RG_CORCK	2015	1	Mine-Influenced	74	94
Percent EPT	RG_CORCK	2016	1	Mine-Influenced	72	93
Percent EPT	RG_CORCK	2017	1	Mine-Influenced	71	93
Percent EPT	RG_CORCK	2018	1	Mine-Influenced	67	91
Percent EPT	RG_CORCK	2018	2	Mine-Influenced	69	92
Percent EPT	RG_CORCK	2018	3	Mine-Influenced	69	92
Percent EPT	RG_CORCK	2019	1	Mine-Influenced	60	89
Percent EPT	RG_CORCK	2019	2	Mine-Influenced	0	81
Percent EPT	RG_CORCK	2019	3	Mine-Influenced	0	80
Percent EPT	RG_CORCK	2020	1	Mine-Influenced	62	89
Percent EPT	RG_CORCK	2020	2	Mine-Influenced	66	90
Percent EPT	RG_CORCK	2020	3	Mine-Influenced	61	89
Percent EPT	RG_MIDCO	2012	1	Mine-Influenced	63	90
Percent EPT	RG_MIDCO	2015	1	Mine-Influenced	65	91
Percent EPT	RG_MIDCO	2016	1	Mine-Influenced	65	91

Table J-2: Site Specific Normal Ranges at CMO LAEMP Sampling Stations, 2012 to 2020

Variable	Station	Year	Replicate	Status	Lower Bound	Upper Bound
Percent EPT	RG_MIDCO	2017	1	Mine-Influenced	63	89
Percent EPT	RG_MIDCO	2018	1	Mine-Influenced	63	90
Percent EPT	RG_MIDCO	2018	2	Mine-Influenced	62	89
Percent EPT	RG_MIDCO	2018	3	Mine-Influenced	57	87
Percent EPT	RG_MIDCO	2018	4	Mine-Influenced	63	90
Percent EPT	RG_MIDCO	2018	5	Mine-Influenced	66	91
Percent EPT	RG_MIDCO	2019	1	Mine-Influenced	65	90
Percent EPT	RG_MIDCO	2019	2	Mine-Influenced	60	88
Percent EPT	RG_MIDCO	2019	3	Mine-Influenced	61	89
Percent EPT	RG_MIDCO	2019	4	Mine-Influenced	62	89
Percent EPT	RG_MIDCO	2019	5	Mine-Influenced	64	90
Percent EPT	RG_MIDCO	2020	1	Mine-Influenced	65	90
Percent EPT	RG_MIDCO	2020	2	Mine-Influenced	65	90
Percent EPT	RG_MIDCO	2020	3	Mine-Influenced	61	88
Percent EPT	RG_MIDCO	2020	4	Mine-Influenced	62	89
Percent EPT	RG_MIDCO	2020	5	Mine-Influenced	62	89
Percent EPT	RG_MIDAG	2012	1	Mine-Influenced	66	91
Percent EPT	RG_MIDAG	2015	1	Mine-Influenced	66	91
Percent EPT	RG_MIDAG	2018	1	Mine-Influenced	68	92
Percent EPT	RG_MIDAG	2018	2	Mine-Influenced	64	91
Percent EPT	RG_MIDAG	2018	3	Mine-Influenced	65	91
Percent EPT	RG_MIDAG	2019	1	Mine-Influenced	62	89
Percent EPT	RG_MIDAG	2019	2	Mine-Influenced	62	89
Percent EPT	RG_MIDAG	2019	3	Mine-Influenced	65	91
Percent EPT	RG_MIDAG	2020	1	Mine-Influenced	60	89
Percent EPT	RG_MIDAG	2020	2	Mine-Influenced	65	91
Percent EPT	RG_MIDAG	2020	3	Mine-Influenced	64	90
Percent EPT	RG_MIULE	2018	1	Mine-Influenced	59	88
Percent EPT	RG_MIULE	2018	2	Mine-Influenced	62	90
Percent EPT	RG_MIULE	2018	3	Mine-Influenced	62	90
Percent EPT	RG_MIULE	2019	1	Mine-Influenced	58	88
Percent EPT	RG_MIULE	2019	2	Mine-Influenced	60	89
Percent EPT	RG_MIULE	2019	3	Mine-Influenced	62	90
Percent EPT	RG_MIULE	2020	1	Mine-Influenced	57	88
Percent EPT	RG_MIULE	2020	2	Mine-Influenced	54	87
Percent EPT	RG_MIULE	2020	3	Mine-Influenced	61	89
Percent EPT	RG_MI5	2012	1	Mine-Influenced	58	87
Percent EPT	RG_MI5	2015	1	Mine-Influenced	55	86
Percent EPT	RG_MI5	2018	1	Mine-Influenced	58	88
Percent EPT	RG_MI5	2018	2	Mine-Influenced	60	88
Percent EPT	RG_MI5	2018	3	Mine-Influenced	58	87
Percent EPT	RG_MI5	2019	1	Mine-Influenced	56	86
Percent EPT	RG_MI5	2019	2	Mine-Influenced	60	88
Percent EPT	RG_MI5	2019	3	Mine-Influenced	56	86
Percent EPT	RG_MI5	2020	1	Mine-Influenced	57	87
Percent EPT	RG_MI5	2020	2	Mine-Influenced	59	88
Percent EPT	RG_MI5	2020	3	Mine-Influenced	56	86
Percent EPT	RG_CM_MC2	2020	1	Mine-Influenced	55	86
Percent EPT	RG_CM_MC2	2020	2	Mine-Influenced	52	85
Percent EPT	RG_CM_MC2	2020	3	Mine-Influenced	54	86
Percent EPT	RG_MIDAG-S1	2020	1	Mine-Influenced	63	91
Percent EPT	RG_MIDAG-S1	2020	2	Mine-Influenced	64	92
Percent EPT	RG_MIDAG-S1	2020	3	Mine-Influenced	65	92
Percent EPT	RG_MIDAG-S2	2020	1	Mine-Influenced	65	92
Percent EPT	RG_MIDAG-S2	2020	2	Mine-Influenced	66	92
Percent EPT	RG_MIDAG-S2	2020	3	Mine-Influenced	67	92
Ephemeroptera Abundance	RG_MI25	2012	1	Reference	2551	56131
Ephemeroptera Abundance	RG_MI25	2013	1	Reference	2281	50895
Ephemeroptera Abundance	RG_MI25	2013	2	Reference	2269	51558
Ephemeroptera Abundance	RG_MI25	2013	3	Reference	2269	51293
Ephemeroptera Abundance	RG_MI25	2015	1	Reference	2685	59652
Ephemeroptera Abundance	RG_MI25	2015	2	Reference	2669	59659
Ephemeroptera Abundance	RG_MI25	2015	3	Reference	2680	59272
Ephemeroptera Abundance	RG_MI25	2016	1	Reference	2150	53385
Ephemeroptera Abundance	RG_MI25	2017	1	Reference	2238	50282
Ephemeroptera Abundance	RG_MI25	2018	1	Reference	2079	48946
Ephemeroptera Abundance	RG_MI25	2018	2	Reference	1250	48035
Ephemeroptera Abundance	RG_MI25	2018	3	Reference	2012	47229
Ephemeroptera Abundance	RG_MI25	2019	1	Reference	2378	53240
Ephemeroptera Abundance	RG_MI25	2019	2	Reference	2076	48328
Ephemeroptera Abundance	RG_MI25	2019	3	Reference	2071	50572
Ephemeroptera Abundance	RG_MI25	2020	1	Reference	2203	49027
Ephemeroptera Abundance	RG_MI25	2020	2	Reference	2065	50476
Ephemeroptera Abundance	RG_MI25	2020	3	Reference	2225	50795
Ephemeroptera Abundance	RG_AGCK	2012	1	Reference	1197	11747
Ephemeroptera Abundance	RG_AGCK	2013	1	Reference	1082	9882
Ephemeroptera Abundance	RG_AGCK	2015	1	Reference	932	8986
Ephemeroptera Abundance	RG_AGCK	2018	1	Reference	1079	11153
Ephemeroptera Abundance	RG_AGCK	2018	2	Reference	1030	10731
Ephemeroptera Abundance	RG_AGCK	2018	3	Reference	987	10247
Ephemeroptera Abundance	RG_AGCK	2019	1	Reference	1092	10370
Ephemeroptera Abundance	RG_AGCK	2019	2	Reference	1002	9871
Ephemeroptera Abundance	RG_AGCK	2019	3	Reference	1039	9989
Ephemeroptera Abundance	RG_AGCK	2020	1	Reference	966	9179
Ephemeroptera Abundance	RG_AGCK	2020	2	Reference	1058	9973
Ephemeroptera Abundance	RG_AGCK	2020	3	Reference	1004	9632
Ephemeroptera Abundance	RG_LE1	2018	1	Reference	662	8193
Ephemeroptera Abundance	RG_LE1	2019	1	Reference	632	8228
Ephemeroptera Abundance	RG_LE1	2019	2	Reference	695	8464
Ephemeroptera Abundance	RG_LE1	2019	3	Reference	642	8254
Ephemeroptera Abundance	RG_LE1	2020	1	Reference	675	8476
Ephemeroptera Abundance	RG_LE1	2020	2	Reference	699	8144
Ephemeroptera Abundance	RG_LE1	2020	3	Reference	701	7968
Ephemeroptera Abundance	RG_MIUCO	2012	1	Mine-Influenced	1513	37738
Ephemeroptera Abundance	RG_MIUCO	2015	1	Mine-Influenced	1224	31483
Ephemeroptera Abundance	RG_MIUCO	2016	1	Mine-Influenced	1218	31245
Ephemeroptera Abundance	RG_MIUCO	2017	1	Mine-Influenced	1318	33102
Ephemeroptera Abundance	RG_MIUCO	2018	1	Mine-Influenced	1129	32707
Ephemeroptera Abundance	RG_MIUCO	2018	2	Mine-Influenced	1216	34778
Ephemeroptera Abundance	RG_MIUCO	2018	3	Mine-Influenced	1223	34139
Ephemeroptera Abundance	RG_MIUCO	2019	1	Mine-Influenced	1209	34354
Ephemeroptera Abundance	RG_MIUCO	2019	2	Mine-Influenced	1265	34018
Ephemeroptera Abundance	RG_MIUCO	2019	3	Mine-Influenced	1292	34042
Ephemeroptera Abundance	RG_MIUCO	2020	1	Mine-Influenced	1193	31875
Ephemeroptera Abundance	RG_MIUCO	2020	2	Mine-Influenced	1376	34845
Ephemeroptera Abundance	RG_MIUCO	2020	3	Mine-Influenced	1254	32206
Ephemeroptera Abundance	RG_CORCK	2012	1	Mine-Influenced	1427	14824
Ephemeroptera Abundance	RG_CORCK	2015	1	Mine-Influenced	1316	14516

Table J-2: Site Specific Normal Ranges at CMO LAEMP Sampling Stations, 2012 to 2020

Variable	Station	Year	Replicate	Status	Lower Bound	Upper Bound
Ephemeroptera Abundance	RG_CORCK	2016	1	Mine-Influenced	1221	13269
Ephemeroptera Abundance	RG_CORCK	2017	1	Mine-Influenced	1281	13252
Ephemeroptera Abundance	RG_CORCK	2018	1	Mine-Influenced	1304	14322
Ephemeroptera Abundance	RG_CORCK	2018	2	Mine-Influenced	1328	13810
Ephemeroptera Abundance	RG_CORCK	2018	3	Mine-Influenced	1239	14168
Ephemeroptera Abundance	RG_CORCK	2019	1	Mine-Influenced	1392	15480
Ephemeroptera Abundance	RG_CORCK	2019	2	Mine-Influenced	1427	17236
Ephemeroptera Abundance	RG_CORCK	2019	3	Mine-Influenced	987	24771
Ephemeroptera Abundance	RG_CORCK	2020	1	Mine-Influenced	1389	14324
Ephemeroptera Abundance	RG_CORCK	2020	2	Mine-Influenced	1357	14411
Ephemeroptera Abundance	RG_CORCK	2020	3	Mine-Influenced	1269	17020
Ephemeroptera Abundance	RG_MIDCO	2012	1	Mine-Influenced	1069	15378
Ephemeroptera Abundance	RG_MIDCO	2015	1	Mine-Influenced	1059	15260
Ephemeroptera Abundance	RG_MIDCO	2016	1	Mine-Influenced	995	14375
Ephemeroptera Abundance	RG_MIDCO	2017	1	Mine-Influenced	1003	15013
Ephemeroptera Abundance	RG_MIDCO	2018	1	Mine-Influenced	922	14530
Ephemeroptera Abundance	RG_MIDCO	2018	2	Mine-Influenced	1015	15128
Ephemeroptera Abundance	RG_MIDCO	2018	3	Mine-Influenced	1015	14696
Ephemeroptera Abundance	RG_MIDCO	2018	4	Mine-Influenced	1022	15190
Ephemeroptera Abundance	RG_MIDCO	2018	5	Mine-Influenced	979	14778
Ephemeroptera Abundance	RG_MIDCO	2019	1	Mine-Influenced	951	14335
Ephemeroptera Abundance	RG_MIDCO	2019	2	Mine-Influenced	996	14647
Ephemeroptera Abundance	RG_MIDCO	2019	3	Mine-Influenced	1002	14629
Ephemeroptera Abundance	RG_MIDCO	2019	4	Mine-Influenced	1045	15315
Ephemeroptera Abundance	RG_MIDCO	2019	5	Mine-Influenced	1014	14834
Ephemeroptera Abundance	RG_MIDCO	2020	1	Mine-Influenced	969	14440
Ephemeroptera Abundance	RG_MIDCO	2020	2	Mine-Influenced	940	14603
Ephemeroptera Abundance	RG_MIDCO	2020	3	Mine-Influenced	874	13748
Ephemeroptera Abundance	RG_MIDCO	2020	4	Mine-Influenced	986	14440
Ephemeroptera Abundance	RG_MIDCO	2020	5	Mine-Influenced	955	14681
Ephemeroptera Abundance	RG_MIDAG	2012	1	Mine-Influenced	879	12421
Ephemeroptera Abundance	RG_MIDAG	2015	1	Mine-Influenced	723	11047
Ephemeroptera Abundance	RG_MIDAG	2018	1	Mine-Influenced	786	11952
Ephemeroptera Abundance	RG_MIDAG	2018	2	Mine-Influenced	689	10787
Ephemeroptera Abundance	RG_MIDAG	2018	3	Mine-Influenced	754	11262
Ephemeroptera Abundance	RG_MIDAG	2019	1	Mine-Influenced	800	11334
Ephemeroptera Abundance	RG_MIDAG	2019	2	Mine-Influenced	774	11770
Ephemeroptera Abundance	RG_MIDAG	2019	3	Mine-Influenced	793	11572
Ephemeroptera Abundance	RG_MIDAG	2020	1	Mine-Influenced	669	11333
Ephemeroptera Abundance	RG_MIDAG	2020	2	Mine-Influenced	754	11561
Ephemeroptera Abundance	RG_MIDAG	2020	3	Mine-Influenced	784	11785
Ephemeroptera Abundance	RG_MIULE	2018	1	Mine-Influenced	236	4722
Ephemeroptera Abundance	RG_MIULE	2018	2	Mine-Influenced	235	4905
Ephemeroptera Abundance	RG_MIULE	2018	3	Mine-Influenced	244	4718
Ephemeroptera Abundance	RG_MIULE	2019	1	Mine-Influenced	257	4950
Ephemeroptera Abundance	RG_MIULE	2019	2	Mine-Influenced	248	4846
Ephemeroptera Abundance	RG_MIULE	2019	3	Mine-Influenced	268	5481
Ephemeroptera Abundance	RG_MIULE	2020	1	Mine-Influenced	274	4790
Ephemeroptera Abundance	RG_MIULE	2020	2	Mine-Influenced	265	4762
Ephemeroptera Abundance	RG_MIULE	2020	3	Mine-Influenced	263	4943
Ephemeroptera Abundance	RG_MI5	2012	1	Mine-Influenced	595	7580
Ephemeroptera Abundance	RG_MI5	2015	1	Mine-Influenced	457	6334
Ephemeroptera Abundance	RG_MI5	2018	1	Mine-Influenced	453	6751
Ephemeroptera Abundance	RG_MI5	2018	2	Mine-Influenced	492	6781
Ephemeroptera Abundance	RG_MI5	2018	3	Mine-Influenced	572	7108
Ephemeroptera Abundance	RG_MI5	2019	1	Mine-Influenced	531	6756
Ephemeroptera Abundance	RG_MI5	2019	2	Mine-Influenced	610	7615
Ephemeroptera Abundance	RG_MI5	2019	3	Mine-Influenced	587	7092
Ephemeroptera Abundance	RG_MI5	2020	1	Mine-Influenced	451	6829
Ephemeroptera Abundance	RG_MI5	2020	2	Mine-Influenced	586	7342
Ephemeroptera Abundance	RG_MI5	2020	3	Mine-Influenced	519	6952
Ephemeroptera Abundance	RG_CM_MC2	2020	1	Mine-Influenced	340	7272
Ephemeroptera Abundance	RG_CM_MC2	2020	2	Mine-Influenced	338	7132
Ephemeroptera Abundance	RG_CM_MC2	2020	3	Mine-Influenced	340	7363
Ephemeroptera Abundance	RG_MIDAG-S1	2020	1	Mine-Influenced	223	5405
Ephemeroptera Abundance	RG_MIDAG-S1	2020	2	Mine-Influenced	219	5383
Ephemeroptera Abundance	RG_MIDAG-S1	2020	3	Mine-Influenced	214	5226
Ephemeroptera Abundance	RG_MIDAG-S2	2020	1	Mine-Influenced	160	5501
Ephemeroptera Abundance	RG_MIDAG-S2	2020	2	Mine-Influenced	173	5340
Ephemeroptera Abundance	RG_MIDAG-S2	2020	3	Mine-Influenced	180	5848
Percent Ephemeroptera	RG_MI25	2012	1	Reference	28	62
Percent Ephemeroptera	RG_MI25	2013	1	Reference	29	62
Percent Ephemeroptera	RG_MI25	2013	2	Reference	28	62
Percent Ephemeroptera	RG_MI25	2013	3	Reference	28	62
Percent Ephemeroptera	RG_MI25	2015	1	Reference	29	63
Percent Ephemeroptera	RG_MI25	2015	2	Reference	29	63
Percent Ephemeroptera	RG_MI25	2015	3	Reference	29	63
Percent Ephemeroptera	RG_MI25	2016	1	Reference	28	62
Percent Ephemeroptera	RG_MI25	2017	1	Reference	28	62
Percent Ephemeroptera	RG_MI25	2018	1	Reference	29	63
Percent Ephemeroptera	RG_MI25	2018	2	Reference	28	62
Percent Ephemeroptera	RG_MI25	2018	3	Reference	27	62
Percent Ephemeroptera	RG_MI25	2019	1	Reference	28	62
Percent Ephemeroptera	RG_MI25	2019	2	Reference	27	61
Percent Ephemeroptera	RG_MI25	2019	3	Reference	28	63
Percent Ephemeroptera	RG_MI25	2020	1	Reference	28	62
Percent Ephemeroptera	RG_MI25	2020	2	Reference	29	63
Percent Ephemeroptera	RG_MI25	2020	3	Reference	29	62
Percent Ephemeroptera	RG_AGCK	2012	1	Reference	44	75
Percent Ephemeroptera	RG_AGCK	2013	1	Reference	43	73
Percent Ephemeroptera	RG_AGCK	2015	1	Reference	43	74
Percent Ephemeroptera	RG_AGCK	2018	1	Reference	44	74
Percent Ephemeroptera	RG_AGCK	2018	2	Reference	43	73
Percent Ephemeroptera	RG_AGCK	2018	3	Reference	42	73
Percent Ephemeroptera	RG_AGCK	2019	1	Reference	43	74
Percent Ephemeroptera	RG_AGCK	2019	2	Reference	43	73
Percent Ephemeroptera	RG_AGCK	2019	3	Reference	42	73
Percent Ephemeroptera	RG_AGCK	2020	1	Reference	43	74
Percent Ephemeroptera	RG_AGCK	2020	2	Reference	43	73
Percent Ephemeroptera	RG_AGCK	2020	3	Reference	44	74
Percent Ephemeroptera	RG_LE1	2018	1	Reference	31	62
Percent Ephemeroptera	RG_LE1	2019	1	Reference	31	63
Percent Ephemeroptera	RG_LE1	2019	2	Reference	33	64
Percent Ephemeroptera	RG_LE1	2019	3	Reference	31	63
Percent Ephemeroptera	RG_LE1	2020	1	Reference	33	64
Percent Ephemeroptera	RG_LE1	2020	2	Reference	31	63
Percent Ephemeroptera	RG_LE1	2020	3	Reference	32	64
Percent Ephemeroptera	RG_MIUCO	2012	1	Mine-Influenced	25	58

Table J-2: Site Specific Normal Ranges at CMO LAEMP Sampling Stations, 2012 to 2020

Variable	Station	Year	Replicate	Status	Lower Bound	Upper Bound
Percent Ephemeroptera	RG_MIUCO	2015	1	Mine-Influenced	24	58
Percent Ephemeroptera	RG_MIUCO	2016	1	Mine-Influenced	23	56
Percent Ephemeroptera	RG_MIUCO	2017	1	Mine-Influenced	25	58
Percent Ephemeroptera	RG_MIUCO	2018	1	Mine-Influenced	23	56
Percent Ephemeroptera	RG_MIUCO	2018	2	Mine-Influenced	23	56
Percent Ephemeroptera	RG_MIUCO	2018	3	Mine-Influenced	24	56
Percent Ephemeroptera	RG_MIUCO	2019	1	Mine-Influenced	23	57
Percent Ephemeroptera	RG_MIUCO	2019	2	Mine-Influenced	24	58
Percent Ephemeroptera	RG_MIUCO	2019	3	Mine-Influenced	25	59
Percent Ephemeroptera	RG_MIUCO	2020	1	Mine-Influenced	24	58
Percent Ephemeroptera	RG_MIUCO	2020	2	Mine-Influenced	25	59
Percent Ephemeroptera	RG_MIUCO	2020	3	Mine-Influenced	25	58
Percent Ephemeroptera	RG_CORCK	2012	1	Mine-Influenced	38	70
Percent Ephemeroptera	RG_CORCK	2015	1	Mine-Influenced	35	66
Percent Ephemeroptera	RG_CORCK	2016	1	Mine-Influenced	33	66
Percent Ephemeroptera	RG_CORCK	2017	1	Mine-Influenced	35	66
Percent Ephemeroptera	RG_CORCK	2018	1	Mine-Influenced	36	67
Percent Ephemeroptera	RG_CORCK	2018	2	Mine-Influenced	36	67
Percent Ephemeroptera	RG_CORCK	2018	3	Mine-Influenced	35	66
Percent Ephemeroptera	RG_CORCK	2019	1	Mine-Influenced	38	76
Percent Ephemeroptera	RG_CORCK	2019	2	Mine-Influenced	38	77
Percent Ephemeroptera	RG_CORCK	2019	3	Mine-Influenced	38	78
Percent Ephemeroptera	RG_CORCK	2020	1	Mine-Influenced	38	69
Percent Ephemeroptera	RG_CORCK	2020	2	Mine-Influenced	37	68
Percent Ephemeroptera	RG_CORCK	2020	3	Mine-Influenced	37	69
Percent Ephemeroptera	RG_MIDCO	2012	1	Mine-Influenced	29	62
Percent Ephemeroptera	RG_MIDCO	2015	1	Mine-Influenced	28	60
Percent Ephemeroptera	RG_MIDCO	2016	1	Mine-Influenced	29	61
Percent Ephemeroptera	RG_MIDCO	2017	1	Mine-Influenced	28	61
Percent Ephemeroptera	RG_MIDCO	2018	1	Mine-Influenced	28	61
Percent Ephemeroptera	RG_MIDCO	2018	2	Mine-Influenced	28	62
Percent Ephemeroptera	RG_MIDCO	2018	3	Mine-Influenced	29	61
Percent Ephemeroptera	RG_MIDCO	2018	4	Mine-Influenced	29	61
Percent Ephemeroptera	RG_MIDCO	2018	5	Mine-Influenced	29	60
Percent Ephemeroptera	RG_MIDCO	2019	1	Mine-Influenced	28	62
Percent Ephemeroptera	RG_MIDCO	2019	2	Mine-Influenced	29	61
Percent Ephemeroptera	RG_MIDCO	2019	3	Mine-Influenced	28	61
Percent Ephemeroptera	RG_MIDCO	2019	4	Mine-Influenced	29	61
Percent Ephemeroptera	RG_MIDCO	2019	5	Mine-Influenced	29	61
Percent Ephemeroptera	RG_MIDCO	2020	1	Mine-Influenced	29	62
Percent Ephemeroptera	RG_MIDCO	2020	2	Mine-Influenced	28	61
Percent Ephemeroptera	RG_MIDCO	2020	3	Mine-Influenced	28	61
Percent Ephemeroptera	RG_MIDCO	2020	4	Mine-Influenced	28	61
Percent Ephemeroptera	RG_MIDCO	2020	5	Mine-Influenced	29	61
Percent Ephemeroptera	RG_MIDAG	2012	1	Mine-Influenced	33	66
Percent Ephemeroptera	RG_MIDAG	2015	1	Mine-Influenced	29	63
Percent Ephemeroptera	RG_MIDAG	2018	1	Mine-Influenced	32	65
Percent Ephemeroptera	RG_MIDAG	2018	2	Mine-Influenced	29	63
Percent Ephemeroptera	RG_MIDAG	2018	3	Mine-Influenced	31	64
Percent Ephemeroptera	RG_MIDAG	2019	1	Mine-Influenced	32	65
Percent Ephemeroptera	RG_MIDAG	2019	2	Mine-Influenced	32	64
Percent Ephemeroptera	RG_MIDAG	2019	3	Mine-Influenced	30	63
Percent Ephemeroptera	RG_MIDAG	2020	1	Mine-Influenced	32	67
Percent Ephemeroptera	RG_MIDAG	2020	2	Mine-Influenced	30	63
Percent Ephemeroptera	RG_MIDAG	2020	3	Mine-Influenced	32	65
Percent Ephemeroptera	RG_MIULE	2018	1	Mine-Influenced	32	67
Percent Ephemeroptera	RG_MIULE	2018	2	Mine-Influenced	29	66
Percent Ephemeroptera	RG_MIULE	2018	3	Mine-Influenced	31	67
Percent Ephemeroptera	RG_MIULE	2019	1	Mine-Influenced	31	68
Percent Ephemeroptera	RG_MIULE	2019	2	Mine-Influenced	31	67
Percent Ephemeroptera	RG_MIULE	2019	3	Mine-Influenced	31	67
Percent Ephemeroptera	RG_MIULE	2020	1	Mine-Influenced	33	69
Percent Ephemeroptera	RG_MIULE	2020	2	Mine-Influenced	33	70
Percent Ephemeroptera	RG_MIULE	2020	3	Mine-Influenced	32	69
Percent Ephemeroptera	RG_MI5	2012	1	Mine-Influenced	28	61
Percent Ephemeroptera	RG_MI5	2015	1	Mine-Influenced	29	62
Percent Ephemeroptera	RG_MI5	2018	1	Mine-Influenced	25	59
Percent Ephemeroptera	RG_MI5	2018	2	Mine-Influenced	26	59
Percent Ephemeroptera	RG_MI5	2018	3	Mine-Influenced	28	61
Percent Ephemeroptera	RG_MI5	2019	1	Mine-Influenced	28	61
Percent Ephemeroptera	RG_MI5	2019	2	Mine-Influenced	28	60
Percent Ephemeroptera	RG_MI5	2019	3	Mine-Influenced	29	62
Percent Ephemeroptera	RG_MI5	2020	1	Mine-Influenced	26	59
Percent Ephemeroptera	RG_MI5	2020	2	Mine-Influenced	28	60
Percent Ephemeroptera	RG_MI5	2020	3	Mine-Influenced	29	63
Percent Ephemeroptera	CM_MC2	2020	1	Mine-Influenced	34	69
Percent Ephemeroptera	CM_MC2	2020	2	Mine-Influenced	34	69
Percent Ephemeroptera	CM_MC2	2020	3	Mine-Influenced	33	68
Percent Ephemeroptera	RG_MIDAG-S1	2020	1	Mine-Influenced	29	66
Percent Ephemeroptera	RG_MIDAG-S1	2020	2	Mine-Influenced	29	66
Percent Ephemeroptera	RG_MIDAG-S1	2020	3	Mine-Influenced	30	66
Percent Ephemeroptera	RG_MIDAG-S2	2020	1	Mine-Influenced	31	66
Percent Ephemeroptera	RG_MIDAG-S2	2020	2	Mine-Influenced	31	67
Percent Ephemeroptera	RG_MIDAG-S2	2020	3	Mine-Influenced	31	68

Notes:

Grey cells indicate that the replicate's result was used

EPT = Ephemeroptera, Plecoptera, Trichoptera.

Table J-3: Spatial Analysis of Benthic Invertebrate Community Variables at CMO LAEMP Sampling Stations, 2020

Variable	Year	Transformation	Overall ANOVA	Mine-Influenced Station Compared to Downstream Stations								
			p-value	MIUCO[a]	CORCK	MIDCO	CM-MC2	MIDAG-S1	MIDAG-S2	MIDAG	MIULE	MI5
Benthic invertebrate taxonomic richness (taxa per 3 min kick)	2020	none	**<0.001**	0.595 (0.1)	**<0.001 (-3.5)**	0.07 (0.5)	0.365 (-0.3)	0.190 (0.4)	**<0.001 (1.3)**	**<0.001 (1.8)**	**0.005 (1.5)**	0.064 (0.9)
Benthic invertebrate abundance (organisms per 3 min kick)	2020	none	**<0.001**	**<0.001 (-1.4)**	**0.032 (-0.7)**	0.691 (0.1)	**0.047 (-0.6)**	**<0.001 (1.2)**	**<0.001 (2.7)**	**<0.001 (2.8)**	**0.032 (1.6)**	0.056 (1.8)
Ephemeroptera, Plecoptera, Trichoptera abundance (organisms per 3 min kick)	2020	ln(X+1)	**<0.001**	**<0.001 (-1.8)**	**<0.001 (-2.5)**	**0.043 (-0.5)**	**<0.001 (-1.3)**	**<0.001 (1.2)**	**<0.001 (1.9)**	**<0.001 (1.7)**	**0.049 (0.8)**	**0.012 (1.0)**
Percent Ephemeroptera, Plecoptera, Trichoptera (%)	2020	none	**<0.001**	0.175 (-0.1)	**<0.001 (-2.7)**	**<0.001 (-2.3)**	**<0.001 (-5.0)**	0.560 (0.3)	0.825 (0.1)	0.504 (-0.3)	**<0.001 (-2.7)**	0.057 (-1.9)
Emphemeroptera abundance (organisms per 3 min kick)	2020	none	**<0.001**	**<0.001 (-1.0)**	**<0.001 (-1.3)**	**<0.001 (-1.0)**	**<0.001 (-1.5)**	0.446 (-0.2)	**<0.001 (2.3)**	**<0.001 (1.9)**	0.178 (0.5)	0.190 (0.4)
Percent Ephemeroptera (%)	2020	ln(X+1)	**<0.001**	0.967 (0.0)	**<0.001 (-2.0)**	**<0.001 (-1.6)**	**<0.001 (-2.7)**	**<0.001 (-1.7)**	0.445 (-0.3)	0.547 (-0.2)	0.107 (-0.5)	0.229 (-0.3)

Notes: a) MIUCO is located in Michel Creek upstream of the Corbin Creek confluence.

The direction and magnitude of difference (expressed as standard deviation) is provided in backets. Magnitude of difference was calculated as [(average at station)-(average of downstream and reference stations)]/standard deviation of downstream and reference stations.

Grey cells represent magnitude of differences greater than two standard deviations below the mean.

% = percent; min = minute; ANOVA = analysis of variance; Ln = natural logarithm; < = less than; p = probability.

Table J-4: Temporal Analysis of Benthic Invertebrate Community Variables at CMO LAEMP Sampling Stations, 2012 to 2020

Benthic Invertebrate Community Endpoint	Area	Station	Transformation	Overall ANOVA (*p* -value)	Is there a Positive or Negative Temporal Change — Year Compared to Combined Previous Years							
					2020 VS 2012-2019	2019 VS 2012-2018	2018 VS 2012-2017	2017 VS 2012-2016	2016 VS 2012-2015	2015 VS 2012-2014	2014 VS 2012-2013	2013 VS 2012
Benthic Invertebrate Richness (taxa per 3 min kick)	Reference Stations	MI25	ln(X+1)	**0.001**	**0.036 (0.9)**	0.807 (0.3)	**0.011 (1.5)**	0.473 (0.8)	**0.010 (2.5)**	0.927 (0.5)	n/a	**0.006 (n/a)**
		AGCK	none	0.237	**0.032 (1.6)**	0.605 (0.1)	0.159 (2.6)	n/a	n/a	0.733 (-0.7)	n/a	0.559 (n/a)
		LE1	none	0.227	0.882 (0.3)	0.114 (n/a)	n/a	n/a	n/a	n/a	n/a	n/a
	Mine-Influenced Stations	MIUCO	ln(X+1)	**0.047**	**0.012 (1.5)**	**0.013 (3.6)**	0.440 (-2.8)	0.826 (1.2)	0.876 (-0.7)	0.788 (n/a)	n/a	n/a
		CORCK	ln(X+1)	0.090	**0.015 (-1.5)**	0.312 (-0.2)	0.050 (-1.5)	0.165 (-1.7)	0.409 (0.9)	0.282 (n/a)	n/a	n/a
		MIDCO	none	**0.006**	**0.003 (1.7)**	0.124 (1.1)	0.125 (-0.8)	0.173 (1.1)	0.063 (12.0)	0.838 (n/a)	n/a	n/a
		MIDAG	ln(X+1)	0.148	**0.025 (1.8)**	0.174 (1.3)	0.574 (1.4)	n/a	n/a	0.720 (n/a)	n/a	n/a
		MIULE	none	0.153	0.101 (1.4)	0.271 (1.0)	n/a	n/a	n/a	n/a	n/a	n/a
		MI5	none	0.068	**0.017 (1.5)**	0.169 (0.7)	0.380 (0.4)	n/a	n/a	0.092 (n/a)	n/a	n/a
Benthic Invertebrate Abundance (organisms per 3 min kick)	Reference Stations	MI25	ln(X+1)	**0.018**	**0.041 (-1.0)**	0.097 (-0.8)	0.955 (0.0)	**0.048 (1.3)**	0.096 (0.8)	0.664 (-0.3)	n/a	**0.003 (n/a)**
		AGCK	none	**0.001**	**0.016 (-0.6)**	0.832 (0.1)	**0.036 (-0.4)**	n/a	n/a	**0.001 (-1.1)**	n/a	**0.001 (n/a)**
		LE1	ln(X+1)	**0.029**	**0.014 (-1.5)**	**0.045 (n/a)**	n/a	n/a	n/a	n/a	n/a	n/a
	Mine-Influenced Stations	MIUCO	ln(X+1)	0.121	0.087 (-1.2)	0.300 (0.4)	0.405 (0.4)	0.228 (0.8)	0.833 (0.1)	**0.038 (n/a)**	n/a	n/a
		CORCK	ln(X+1)	**0.030**	0.880 (0.1)	0.092 (0.9)	**0.044 (-0.8)**	0.787 (0.1)	0.194 (0.4)	**0.007 (n/a)**	n/a	n/a
		MIDCO	ln(X+1)	**<0.001**	0.056 (0.5)	**<0.001 (2.6)**	**0.007 (-1.7)**	0.108 (2.0)	0.177 (-11.5)	0.882 (n/a)	n/a	n/a
		MIDAG	ln(X+1)	0.528	0.181 (1.3)	0.665 (-0.4)	0.658 (-1.2)	n/a	n/a	0.725 (n/a)	n/a	n/a
		MIULE	none	0.866	0.631 (0.4)	0.848 (-0.1)	n/a	n/a	n/a	n/a	n/a	n/a
		MI5	ln(X+1)	0.468	0.190 (0.7)	0.152 (1.2)	0.485 (5.1)	n/a	n/a	0.899 (n/a)	n/a	n/a
Ephemeroptera, Trichoptera, Plecoptera Abundance (organisms per 3 min kick)	Reference Stations	MI25	ln(X+1)	**0.042**	0.105 (-0.8)	0.100 (-0.9)	0.932 (-0.1)	0.100 (1.1)	0.283 (0.4)	0.949 (-0.5)	n/a	**0.007 (n/a)**
		AGCK	none	**0.001**	**0.006 (-0.7)**	0.579 (0.1)	**0.018 (-0.4)**	n/a	n/a	**0.001 (-1.0)**	n/a	n/a
		LE1	ln(X+1)	0.054	**0.028 (-1.3)**	0.068 (n/a)	n/a	n/a	n/a	n/a	n/a	n/a
	Mine-Influenced Stations	MIUCO	ln(X+1)	0.099	**0.026 (-1.6)**	0.979 (0.0)	0.696 (0.2)	0.183 (1.0)	0.798 (0.1)	**0.046 (n/a)**	n/a	n/a
		CORCK	none	**0.003**	**0.033 (-0.3)**	0.217 (0.0)	**0.001 (-1.3)**	0.992 (0.0)	**0.032 (0.6)**	**0.001 (n/a)**	n/a	n/a
		MIDCO	ln(X+1)	**<0.001**	0.066 (0.8)	0.253 (0.9)	**<0.001 (-3.6)**	0.208 (1.3)	0.128 (-13.7)	0.887 (n/a)	n/a	n/a
		MIDAG	none	0.295	0.074 (2.0)	0.659 (-0.5)	0.650 (-2.1)	n/a	n/a	0.840 (n/a)	n/a	n/a
		MIULE	none	0.830	0.673 (0.3)	0.681 (-0.3)	n/a	n/a	n/a	n/a	n/a	n/a
		MI5	none	0.566	0.279 (0.6)	0.174 (1.2)	0.516 (3.7)	n/a	n/a	0.872 (n/a)	n/a	n/a
Percent Ephemeroptera, Trichoptera, Plecoptera (%)	Reference Stations	MI25	none	0.092	0.332 (0.4)	0.254 (-0.7)	0.515 (-0.5)	0.533 (-0.7)	0.056 (-1.8)	**0.040 (-5.9)**	n/a	0.556 (n/a)
		AGCK	ln(X+1)	0.196	**0.038 (-1.3)**	0.315 (-0.4)	0.247 (-0.9)	n/a	n/a	0.288 (1.2)	n/a	0.273 (n/a)
		LE1	ln(X+1)	0.557	0.315 (1.1)	0.840 (n/a)	n/a	n/a	n/a	n/a	n/a	n/a
	Mine-Influenced Stations	MIUCO	ln(X+1)	**0.001**	**0.002 (-0.7)**	**<0.001 (-2.5)**	**0.005 (-1.9)**	0.687 (0.2)	0.858 (0.1)	**0.024 (n/a)**	n/a	n/a
		CORCK	ln(X+1)	0.219	0.262 (-0.4)	0.051 (-1.2)	0.312 (-0.7)	0.680 (0.3)	0.911 (-0.1)	0.072 (n/a)	n/a	n/a
		MIDCO	ln(X+1)	**0.015**	0.713 (0.5)	**0.002 (-0.9)**	**0.002 (-5.8)**	0.603 (-1.5)	0.709 (-1.0)	0.652 (n/a)	n/a	n/a
		MIDAG	none	**0.021**	0.219 (0.8)	**0.004 (-3.7)**	0.311 (-0.9)	n/a	n/a	0.327 (n/a)	n/a	n/a
		MIULE	none	0.908	0.868 (-0.1)	0.699 (-0.4)	n/a	n/a	n/a	n/a	n/a	n/a
		MI5	ln(X+1)	0.736	0.809 (-0.2)	0.915 (0.0)	0.896 (-0.1)	n/a	n/a	0.213 (n/a)	n/a	n/a
Ephemeroptera Abundance (organisms per 3 min kick)	Reference Stations	MI25	ln(X+1)	**0.041**	0.128 (-0.9)	0.390 (-0.5)	0.866 (0.0)	0.080 (1.1)	0.106 (0.7)	0.207 (0.0)	n/a	**0.003 (n/a)**
		AGCK	ln(X+1)	**0.007**	**0.028 (-0.9)**	0.203 (0.4)	0.607 (-0.1)	n/a	n/a	**0.002 (-1.9)**	n/a	**0.017 (n/a)**
		LE1	ln(X+1)	0.060	**0.039 (-1.0)**	0.051 (n/a)	n/a	n/a	n/a	n/a	n/a	n/a
	Mine-Influenced Stations	MIUCO	ln(X+1)	**0.027**	**0.006 (-1.9)**	0.616 (-0.3)	0.465 (0.3)	0.235 (0.6)	0.949 (0.0)	**0.014 (n/a)**	n/a	n/a
		CORCK	ln(X+1)	0.363	0.078 (-1.3)	0.604 (-0.3)	0.836 (-0.2)	0.877 (0.1)	0.297 (1.0)	0.195 (n/a)	n/a	n/a
		MIDCO	ln(X+1)	**<0.001**	0.201 (0.4)	**0.001 (1.3)**	**<0.001 (-2.5)**	0.309 (0.5)	**0.003 (-17.1)**	0.797 (n/a)	n/a	n/a
		MIDAG	none	0.391	0.140 (1.6)	0.650 (-0.3)	0.429 (-34.0)	n/a	n/a	0.983 (n/a)	n/a	n/a
		MIULE	none	0.948	0.819 (0.2)	0.828 (-0.1)	n/a	n/a	n/a	n/a	n/a	n/a
		MI5	ln(X+1)	0.296	0.096 (0.9)	0.272 (0.4)	0.164 (1.6)	n/a	n/a	0.392 (n/a)	n/a	n/a
Percent Ephemeroptera (%)	Reference Stations	MI25	none	0.499	0.688 (-0.4)	0.906 (0.0)	0.879 (0.0)	0.339 (0.9)	0.317 (0.7)	0.145 (0.5)	n/a	0.055 (n/a)
		AGCK	none	0.322	0.145 (-1.4)	0.299 (0.6)	0.469 (0.7)	n/a	n/a	0.282 (-3.4)	n/a	0.681 (n/a)
		LE1	ln(X+1)	0.530	0.855 (0.6)	0.349 (n/a)	n/a	n/a	n/a	n/a	n/a	n/a
	Mine-Influenced Stations	MIUCO	ln(X+1)	**0.036**	**0.009 (-1.3)**	**0.005 (-3.4)**	0.508 (-0.8)	0.499 (-1.2)	0.613 (-0.8)	0.433 (n/a)	n/a	n/a
		CORCK	ln(X+1)	0.823	0.609 (-0.5)	0.590 (-0.5)	0.359 (1.7)	0.803 (-0.6)	0.800 (-0.5)	0.534 (n/a)	n/a	n/a
		MIDCO	ln(X+1)	**0.002**	0.245 (0.0)	0.688 (0.7)	**<0.001 (-1.6)**	0.578 (-0.3)	**0.006 (-5.5)**	0.468 (n/a)	n/a	n/a
		MIDAG	none	**0.016**	0.728 (0.3)	**0.004 (-1.4)**	**0.023 (-1.1)**	n/a	n/a	0.050 (n/a)	n/a	n/a
		MIULE	ln(X+1)	0.934	0.832 (-0.1)	0.776 (0.2)	n/a	n/a	n/a	n/a	n/a	n/a
		MI5	ln(X+1)	**0.037**	0.295 (0.4)	0.106 (-1.2)	**0.048 (0.9)**	n/a	n/a	0.053 (n/a)	n/a	n/a

Notes:

The direction and magnitude of difference (expressed as standard deviation) is provided in backets. Magnitude of difference was calculated as [(average at year)-(average of all previous years]/standard deviation of all previous years

Grey cells represent magnitude of differences greater than two standard deviations below the mean.

% = percent; min = minute; ANOVA = analysis of variance; Ln = natural logarithm; < = less than; p = probability.

APPENDIX K

Benthic Invertebrate Tissue Chemistry

Table K-1: Benthic Invertebrate Tissue Chemistry at CMO LAEMP Sampling Stations, 2020

Location		**BC Invertebrate Tissue Guidelines for the Protection of Aquatic Life**	**EVWQP Invertebrate Benchmarks**		**Reference Sites**											
Watercourse					**Michel Creek**				**Andy Goode Creek**				**Leach Creek**			
Station					**MI25**				**AGCK**				**LE1**			
Replicate					**1**	**2**	**3**	**% CV**	**1**	**2**	**3**	**% CV**	**1**	**2**	**3**	**% CV**
Date			**Level 1**	**Level 2**	**11-Sep-20**	**11-Sep-20**	**11-Sep-20**		**10-Sep-20**	**10-Sep-20**	**10-Sep-20**		**9-Sep-20**	**9-Sep-20**	**9-Sep-20**	
Parameter	**Unit**															
Wet Mass	g	-	-	-	1.6	0.77	0.88	35	1.9	1.1	1.4	23	1.8	1.5	0.94	25
Dry Mass	g	-	-	-	0.32	0.16	0.18	34	0.32	0.27	0.3	7	0.44	0.36	0.19	32
% Moisture	%	-	-	-	80	80	80	0	83	76	78	4	75	77	80	3
Aluminum	mg/kg dw	-	-	-	1154	2636	1273	40	127	243	263	28	532	627	325	25
Antimony	mg/kg dw	-	-	-	0.033	0.061	0.038	28	0.014	0.014	0.014	0	0.04	0.033	0.022	23
Arsenic	mg/kg dw	-	-	-	0.94	2.9	1.1	54	1.7	1.2	1.5	14	0.46	0.51	0.55	7
Barium	mg/kg dw	-	-	-	88	212	70	51	13	21	26	27	65	105	67	23
Boron	mg/kg dw	-	-	-	2.9	5.2	3.0	29	0.51	0.55	0.62	8	0.88	0.73	0.59	17
Cadmium	mg/kg dw	-	-	-	1.1	3.4	4.1	45	0.52	0.48	0.53	4	2.2	2.7	2.9	11
Calcium	mg/kg dw	-	-	-	1353	2105	1804	18	1828	1758	1478	9	1159	1221	895	13
Chromium	mg/kg dw	-	-	-	3.7	5.9	4.8	19	1.9	2.9	2.4	17	3.3	4.7	2.5	26
Cobalt	mg/kg dw	-	-	-	0.75	2.1	1.5	38	0.098	0.18	0.14	25	0.45	0.77	0.38	32
Copper	mg/kg dw	-	-	-	13	20	19	18	9.2	9.3	8.8	2	18	17	17	3
Iron	mg/kg dw	-	-	-	532	991	563	30	108	182	175	22	410	487	254	25
Lead	mg/kg dw	-	-	-	0.63	1.1	0.79	23	0.084	0.071	0.08	7	0.23	0.29	0.13	31
Lithium	mg/kg dw	-	-	-	0.55	0.94	0.54	27	0.2	0.19	0.24	10	0.29	0.41	0.28	19
Magnesium	mg/kg dw	-	-	-	1126	1797	1378	19	1269	1247	1404	5	1210	1104	1239	5
Manganese	mg/kg dw	-	-	-	53	95	50	31	13	16	19	15	57	87	63	19
Mercury	mg/kg dw	-	-	-	0.052	0.086	0.095	24	0.052	0.043	0.069	20	0.15	0.11	0.14	13
Molybdenum	mg/kg dw	-	-	-	0.34	0.75	0.47	32	0.26	0.26	0.3	6	0.55	0.66	0.57	8
Nickel	mg/kg dw	-	-	-	7.6	14	11	24	4.5	6.0	5.7	12	4.8	9.0	3.3	42
Phosphorus	mg/kg dw	-	-	-	9517	12438	11933	11	12105	10154	12821	10	10963	10267	12294	8
Potassium	mg/kg dw	-	-	-	8536	15405	11840	24	10646	9919	12125	8	9577	8665	10219	7
Selenium	mg/kg dw	*4*	13	**20**	2.9	*4.4*	*4.1*	17	*6.4*	*4.9*	*7.2*	15	*4.5*	*5.2*	*6.0*	12
Silver	mg/kg dw	-	-	-	0.039	0.064	0.057	20	0.042	0.036	0.051	14	0.2	0.15	0.17	12
Sodium	mg/kg dw	-	-	-	3075	4649	4682	18	4259	2920	4562	18	3598	3365	3857	6
Strontium	mg/kg dw	-	-	-	4.1	7.5	5.9	24	4.7	4.4	3.5	12	2.2	2.6	1.8	15
Thallium	mg/kg dw	-	-	-	0.038	0.064	0.042	24	0.22	0.13	0.25	25	0.03	0.035	0.028	9
Tin	mg/kg dw	-	-	-	0.14	0.37	0.23	39	0.14	0.18	0.088	28	0.07	0.14	0.094	27
Titanium	mg/kg dw	-	-	-	65	190	83	49	6.8	17	15	34	32	40	16	34
Uranium	mg/kg dw	-	-	-	0.043	0.11	0.068	36	0.027	0.032	0.037	13	0.048	0.056	0.026	29
Vanadium	mg/kg dw	-	-	-	1.3	3.0	1.6	38	0.26	0.46	0.41	23	1.5	1.7	0.94	23
Zinc	mg/kg dw	-	-	-	139	243	190	22	224	219	216	2	164	161	148	4

Note: Data were screened against the approved invertebrate tissue guideline for the protection of aquatic life (BC ENV 2019a) and EVWQP benchmarks for selenium. Invertebrate tissue guidelines and benchmarks were not available for additional parameters.

Value = concentration exceeds the BC Invertebrate tissue guideline.

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Table K-1: Benthic Invertebrate Tissue Che

Location															
Watercourse		**Michel Creek**				**Corbin Creek**				**Michel Creek**					
Station		**MIUCO**				**CORCK**				**MIDCO**					
Replicate		**1**	**2**	**3**	**% CV**	**1**	**2**	**3**	**% CV**	**1**	**2**	**3**	**4**	**5**	**% CV**
Date		**12-Sep-20**	**12-Sep-20**	**12-Sep-20**		**12-Sep-20**	**12-Sep-20**	**12-Sep-20**		**15-Sep-20**	**15-Sep-20**	**15-Sep-20**	**15-Sep-20**	**15-Sep-20**	
Parameter	**Unit**														
Wet Mass	g	0.75	0.31	0.63	33	0.27	0.46	0.33	22	0.86	0.92	0.92	2.3	1.5	43
Dry Mass	g	0.12	0.058	0.13	31	0.082	0.13	0.099	18	0.22	0.26	0.29	0.69	0.27	51
% Moisture	%	84	81	79	3	70	73	70	2	75	72	69	70	82	6
Aluminum	mg/kg dw	1006	1986	912	37	59	76	54	15	252	943	168	648	967	56
Antimony	mg/kg dw	0.021	0.024	0.017	14	0.019	0.024	0.024	11	0.014	0.042	0.014	0.017	0.028	47
Arsenic	mg/kg dw	0.66	1.2	0.89	24	<0.418	<0.418	<0.418	0	<0.418	0.73	<0.418	<0.418	0.57	24
Barium	mg/kg dw	116	59	41	44	6.0	4.4	6.2	15	12	32	5.3	18	16	53
Boron	mg/kg dw	1.9	2.9	1.4	30	0.82	0.8	0.71	6	0.98	2.0	0.86	1.0	2.2	41
Cadmium	mg/kg dw	1.8	4.0	2.1	37	0.45	0.27	0.23	31	0.37	0.45	0.14	0.14	0.41	46
Calcium	mg/kg dw	2208	2700	1484	23	3433	2694	1989	22	2379	3434	1535	1725	3606	34
Chromium	mg/kg dw	4.2	4.9	2.7	23	2.4	2.1	2.1	6	2.2	2.8	2.0	1.8	2.9	19
Cobalt	mg/kg dw	1.2	1.6	0.94	22	8.2	8.9	7.5	7	25	51	30	21	28	34
Copper	mg/kg dw	18	23	19	11	9.9	9.4	10	3	15	14	18	12	13	14
Iron	mg/kg dw	635	1000	526	28	109	106	94	6	157	483	126	346	501	49
Lead	mg/kg dw	0.33	0.46	0.24	26	0.019	0.026	0.019	15	0.083	0.29	0.061	0.21	0.31	54
Lithium	mg/kg dw	0.46	0.66	0.36	25	0.18	0.2	0.2	5	0.24	0.51	0.14	0.3	0.49	42
Magnesium	mg/kg dw	1539	1538	1254	9	1670	1339	1432	9	1530	1190	1483	1255	1753	14
Manganese	mg/kg dw	213	108	137	29	51	52	49	2	41	166	53	116	77	50
Mercury	mg/kg dw	0.051	0.077	0.07	17	0.034	<0.030	<0.030	6	0.045	0.038	<0.030	0.038	0.051	18
Molybdenum	mg/kg dw	0.74	0.72	0.42	24	0.17	0.12	0.14	15	0.18	0.42	0.27	0.21	0.31	30
Nickel	mg/kg dw	10	10	5.7	24	11	8.3	8.0	15	11	34	15	17	43	51
Phosphorus	mg/kg dw	11554	10588	10487	4	8695	7532	8123	6	10232	8639	8816	8110	8330	8
Potassium	mg/kg dw	9698	8376	11037	11	7504	5615	7206	12	9084	8290	6208	6419	6766	15
Selenium	mg/kg dw	*5.3*	*8.1*	*4.9*	23	2.7	2.6	2.6	2	2.0	*4.1*	2.3	2.5	3.2	27
Silver	mg/kg dw	0.054	0.093	0.059	25	0.03	0.024	0.033	13	0.069	0.054	0.059	0.05	0.066	12
Sodium	mg/kg dw	4406	2541	4401	23	3465	2794	2656	12	4630	3285	2539	2686	7670	46
Strontium	mg/kg dw	5.3	6.0	3.4	22	15	12	13	9	6.2	11	4.0	4.0	8.4	40
Thallium	mg/kg dw	0.036	0.046	0.029	19	0.017	0.013	0.016	11	0.033	0.053	0.014	0.018	0.047	47
Tin	mg/kg dw	0.29	0.65	0.23	48	0.07	0.07	0.059	8	0.11	0.15	<0.025	0.059	0.16	52
Titanium	mg/kg dw	62	129	56	40	2.9	3.9	2.8	16	16	66	8.6	38	61	61
Uranium	mg/kg dw	0.052	0.061	0.032	25	0.031	0.028	0.027	6	0.025	0.074	0.015	0.031	0.068	56
Vanadium	mg/kg dw	1.4	2.3	1.0	35	0.11	0.11	0.085	13	0.37	1.3	0.24	0.91	1.3	54
Zinc	mg/kg dw	171	207	191	8	132	142	176	13	195	185	159	127	173	14

Note: Data were screened against the approved invertebrate tissue guideline for the protection of aquatic life (BC ENV 2019a) and EVWQP benchmarks for selenium. Invertebrate tissue guidelines and benchmarks were not available for additional parameters.

Value = concentration exceeds the BC Invertebrate tissue guideline.

Value = concentration exceeds the level 1 EVWQP invertebrate benchmark.

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Table K-1: Benthic Invertebrate Tissue Che

Location		Mine-Influenced Sites											
Watercourse		Michel Creek				Michel Creek				Michel Creek			
Station		CM_MC2				MIDAG-S1				MIDAG-S2			
Replicate		1	2	3	% CV	1	2	3	% CV	1	2	3	% CV
Date		19-Sep-20	19-Sep-20	19-Sep-20		18-Sep-20	18-Sep-20	18-Sep-20		17-Sep-20	17-Sep-20	17-Sep-20	
Parameter	Unit												
Wet Mass	g	0.95	1.1	1.6	22	2.0	2.0	2.0	0	1.9	1.7	1.5	9
Dry Mass	g	0.24	0.21	0.44	35	0.43	0.47	0.49	5	0.46	0.41	0.32	15
% Moisture	%	75	81	72	5	78	76	76	2	76	76	79	2
Aluminum	mg/kg dw	1292	1621	211	58	427	808	452	31	597	687	2069	60
Antimony	mg/kg dw	0.039	0.033	0.019	28	0.019	0.031	0.027	19	0.027	0.019	0.05	41
Arsenic	mg/kg dw	0.81	0.88	0.41	30	0.56	0.71	0.66	9	1.0	0.77	1.5	28
Barium	mg/kg dw	42	34	12	43	17	19	24	15	30	15	35	32
Boron	mg/kg dw	3.0	4.6	1.0	51	0.97	1.5	1.0	21	1.2	1.4	3.0	43
Cadmium	mg/kg dw	0.43	0.45	0.31	16	0.68	0.42	0.41	25	0.52	0.38	0.93	39
Calcium	mg/kg dw	8420	4696	2496	47	1237	1107	1046	7	1289	1359	2076	23
Chromium	mg/kg dw	5.7	4.9	2.1	36	3.3	3.4	2.6	11	3.5	3.1	7.3	41
Cobalt	mg/kg dw	52	44	37	14	17	16	26	23	18	12	30	37
Copper	mg/kg dw	12	13	10	11	9.3	11	9.9	7	13	9.4	13	14
Iron	mg/kg dw	703	813	181	49	270	392	319	15	355	322	884	49
Lead	mg/kg dw	0.31	0.4	0.074	52	0.14	0.28	0.2	27	0.21	0.2	0.52	49
Lithium	mg/kg dw	0.71	0.88	0.23	45	0.28	0.38	0.28	15	0.28	0.31	0.79	51
Magnesium	mg/kg dw	1512	1590	1536	2	1186	971	1116	8	1186	1285	1643	14
Manganese	mg/kg dw	134	103	78	22	54	73	93	22	76	49	86	22
Mercury	mg/kg dw	<0.023	0.036	0.032	18	0.058	0.039	0.052	16	0.032	0.036	0.045	14
Molybdenum	mg/kg dw	0.3	0.34	0.2	22	0.21	0.25	0.28	12	0.29	0.23	0.37	20
Nickel	mg/kg dw	53	53	18	40	16	21	23	15	20	15	41	44
Phosphorus	mg/kg dw	8756	8788	9326	3	7725	9324	8541	8	10502	10127	10372	2
Potassium	mg/kg dw	9035	9895	7106	13	7242	10076	7381	16	10601	9670	11142	6
Selenium	mg/kg dw	4.0	4.0	2.7	17	4.0	3.7	*4.2*	5	*4.5*	3.2	*5.6*	22
Silver	mg/kg dw	0.049	0.049	0.05	1	0.049	0.068	0.054	14	0.065	0.047	0.07	16
Sodium	mg/kg dw	3869	5233	2583	28	3247	2919	3268	5	3141	3645	4080	11
Strontium	mg/kg dw	16	14	7.9	27	3.7	3.9	3.5	4	4.8	4.1	7.4	26
Thallium	mg/kg dw	0.071	0.071	0.031	33	0.083	0.085	0.072	7	0.059	0.057	0.14	46
Tin	mg/kg dw	0.14	0.27	0.15	32	0.12	0.13	0.041	41	0.17	0.097	0.21	29
Titanium	mg/kg dw	89	119	12	61	34	54	29	28	44	43	152	64
Uranium	mg/kg dw	0.13	0.11	0.035	44	0.025	0.053	0.052	30	0.047	0.035	0.098	46
Vanadium	mg/kg dw	1.7	2.2	0.32	57	0.72	1.2	0.71	26	0.89	0.9	3.1	64
Zinc	mg/kg dw	168	174	156	5	177	142	161	9	169	145	181	9

Note: Data were screened against the approved invertebrate tissue guideline for the protection of aquatic life (BC ENV 2019a) and EVWQP benchmarks for selenium. Invertebrate tissue guidelines and benchmarks were not available for additional parameters.

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Table K-1: Benthic Invertebrate Tissue Che

Location													
Watercourse		**Michel Creek**				**Michel Creek**				**Michel Creek**			
Station		**MIDAG**				**MIULE**				**MI5**			
Replicate		**1**	**2**	**3**	**% CV**	**1**	**2**	**3**	**% CV**	**1**	**2**	**3**	**% CV**
Date		**15-Sep-20**	**15-Sep-20**	**15-Sep-20**		**16-Sep-20**	**16-Sep-20**	**16-Sep-20**		**19-Sep-20**	**19-Sep-20**	**19-Sep-20**	
Parameter	**Unit**												
Wet Mass	g	1.2	1.1	0.95	10	0.51	0.53	1.3	49	0.37	2.1	2.0	53
Dry Mass	g	0.19	0.27	0.28	16	0.1	0.11	0.26	46	0.096	0.44	0.4	49
% Moisture	%	84	75	70	8	80	79	80	1	74	79	80	3
Aluminum	mg/kg dw	2717	414	192	103	107	61	166	39	97	258	485	57
Antimony	mg/kg dw	0.051	0.015	0.011	70	0.015	0.011	0.015	14	0.018	0.018	0.026	18
Arsenic	mg/kg dw	1.4	0.55	0.43	55	0.61	0.74	0.81	12	<0.418	0.62	0.56	16
Barium	mg/kg dw	46	16	16	54	21	24	25	7	37	37	52	17
Boron	mg/kg dw	4.3	0.78	0.6	90	0.81	0.61	1.4	36	0.47	0.83	0.93	26
Cadmium	mg/kg dw	1.1	0.92	0.54	28	1.2	2.0	1.8	20	0.72	1.7	2.5	44
Calcium	mg/kg dw	3514	1926	1521	37	2501	2590	2643	2	1493	2814	2426	25
Chromium	mg/kg dw	13	2.7	2.3	83	2.6	2.0	2.9	15	2.6	3.1	6.4	42
Cobalt	mg/kg dw	37	21	14	40	6.6	10	12	23	1.6	4.4	4.9	40
Copper	mg/kg dw	17	15	13	11	14	12	14	7	12	15	17	14
Iron	mg/kg dw	1202	279	173	84	130	112	196	25	134	245	385	40
Lead	mg/kg dw	0.59	0.15	0.089	80	0.048	0.033	0.068	29	0.063	0.1	0.15	34
Lithium	mg/kg dw	1.5	0.23	0.15	99	0.14	0.15	0.2	16	0.087	0.21	0.26	39
Magnesium	mg/kg dw	1905	1218	1396	19	1316	1394	1437	4	1148	1897	1800	21
Manganese	mg/kg dw	131	56	53	45	29	34	34	7	34	37	37	4
Mercury	mg/kg dw	0.067	0.034	<0.030	38	0.037	0.061	0.04	23	0.061	0.061	0.054	6
Molybdenum	mg/kg dw	0.57	0.28	0.3	34	0.28	0.26	0.26	4	0.21	0.25	0.26	9
Nickel	mg/kg dw	66	12	9.3	90	7.4	8.0	12	22	9.9	11	20	33
Phosphorus	mg/kg dw	11016	9822	8755	9	10890	10965	10985	0	9836	10735	11192	5
Potassium	mg/kg dw	12328	9968	8247	16	11203	10875	10570	2	10551	10611	11505	4
Selenium	mg/kg dw	*7.5*	*5.6*	3.5	30	*6.0*	*6.7*	7.1	7	*4.8*	*6.9*	*5.3*	16
Silver	mg/kg dw	0.097	0.078	0.078	11	0.081	0.1	0.081	12	0.14	0.12	0.15	9
Sodium	mg/kg dw	8633	3956	2685	50	3018	5482	4537	23	3277	5415	5702	23
Strontium	mg/kg dw	9.6	4.6	3.7	43	6.6	8.0	7.9	9	4.7	8.2	6.4	22
Thallium	mg/kg dw	0.17	0.081	0.038	58	0.054	0.086	0.07	19	0.035	0.06	0.072	28
Tin	mg/kg dw	0.38	0.16	0.063	66	0.25	0.18	0.25	15	0.058	0.33	0.37	55
Titanium	mg/kg dw	198	24	8.6	112	5.7	3.3	8.1	34	4.7	12	29	67
Uranium	mg/kg dw	0.12	0.028	0.015	87	0.024	0.024	0.032	14	0.023	0.04	0.055	33
Vanadium	mg/kg dw	4.2	0.6	0.29	105	0.2	0.12	0.29	36	0.25	0.54	1.2	60
Zinc	mg/kg dw	171	185	154	7	192	249	231	11	216	201	193	5

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